Appendix A: Murrieta Canyon Academy Air Quality Impact Analysis

URBAN CROSSROADS

Murrieta Canyon Academy

AIR QUALITY IMPACT ANALYSIS

CITY OF MURRIETA

PREPARED BY:

Haseeb Qureshi
hqureshi@urbanxroads.com
(949) 336-5987

Alyssa Tamase
atamase@urbanxroads.com
(949) 336-5988

MAY 5, 2020

TABLE OF CONTENTS

APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

%	Percent
°F	Degrees Fahrenheit
(1)	Reference
µg/m^3	Microgram per Cubic Meter
1992 CO Plan	*1992 Federal Attainment Plan for Carbon Monoxide*
1993 CEQA Handbook	SCAQMD's *CEQA Air Quality Handbook (1993)*
2003 AQMP	SCAQMD's *2003 Air Quality Management Plan*
2016 AQMP	SCAQMD's *Final 2019 Air Quality Management Plan*
2016-2040 RTP/SCS	*2016-2040 Regional Transportation Plan/Sustainable Communities Strategy*
AB 2595	California Clean Air Act
AQIA	Air Quality Impact Analysis
AQMP	Air Quality Management Plan
BACM	Best Available Control Measures
BAAQMD	Bay Area Air Quality Management District
Brief	Brief of Amicus Curiae by the SCAQMD in the Friant Ranch Case
C/I	Civic/Institutional
C_2H_3Cl	Vinyl Chloride
CAA	Federal Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CALGreen	California Green Building Standards Code
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCR	California Code of Regulations
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CEQA Guidelines	*2019 CEQA Statute and Guidelines*
City	City of Murrieta
CO	Carbon Monoxide
COHb	Carboxyhemoglobin
DPM	Diesel Particulate Matter
EIR	Environmental Impact Reports

EMFAC	EMissions FACtor Model
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GHG	Greenhouse Gas
H_2S	Hydrogen Sulfide
HI	Hazard Index
lbs	Pounds
lbs/day	Pounds Per Day
LST	Localized Significance Threshold
LST METHODOLOGY	Final Localized Significance Threshold Methodology
MCA	Murrieta Canyon Academy
MICR	Maximum Individual Cancer Risk
MM	Mitigation Measures
MVUSD	Murrieta Valley Unified School District
MWELO	California Department of Water Resources' Model Water Efficient
N_2	Nitrogen
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
O_2	Oxygen
O_3	Ozone
O_2 Deficiency	Chronic Hypoxemia
OPR	Office of Planning and Research
Pb	Lead
PM_{10}	Particulate Matter 10 microns in diameter or less
$PM_{2.5}$	Particulate Matter 2.5 microns in diameter or less
ppm	Parts Per Million
Project	Murrieta Canyon Academy
RECLAIM	Regional Clean Air Incentives Market
ROG	Reactive Organic Gases
SB	Senate Bill
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District

sf	Square Feet
SIPs	State Implementation Plans
SO_2	Sulfur Dioxide
SO_4	Sulfates
SO_X	Sulfur Oxides
SRA	Source Receptor Area
SRA 26	Temecula Valley
TAC	Toxic Air Contaminant
TDM	Transportation Demand Management
Title 24	California Building Code
TITLE I	Non-Attainment Provisions
TITLE II	Mobile Sources Provisions
Traffic Study	*Murrieta Canyon Academy Expansion Traffic Impact Study*
UFP	Ultra Fine Particles
UTRs	Utility Tractors
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
vph	Vehicles Per Hour

This page intentionally left blank

EXECUTIVE SUMMARY

ES.1 SUMMARY OF FINDINGS

The results of this *Murrieta Canyon Academy Air Quality Impact Analysis* (AQIA) are summarized below based on the significance criteria in Section 3 of this report consistent with Appendix G of the *California Environmental Quality Act (CEQA) Guidelines* (*CEQA Guidelines*) (1). Table ES-1 shows the findings of significance for each potential air quality impact under CEQA before and after any required mitigation measures (MM) described below.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Regional Construction Emissions	3.4	*Less Than Significant*	*n/a*
Localized Construction Emissions	3.7	*Less Than Significant*	*n/a*
Regional Operational Emissions	3.5	*Less Than Significant*	*n/a*
Localized Operational Emissions	3.8	*Less Than Significant*	*n/a*
CO "Hot Spot" Analysis	3.9	*Less Than Significant*	*n/a*
Air Quality Management Plan	3.10	*Less Than Significant*	*n/a*
Sensitive Receptors	3.11	*Less Than Significant*	*n/a*
Odors	3.12	*Less Than Significant*	*n/a*
Cumulative Impacts	3.13	*Less Than Significant*	*n/a*

ES.2 STANDARD REGULATORY REQUIREMENTS/BEST AVAILABLE CONTROL MEASURES

Measures listed below (or equivalent language) shall appear on all Project grading plans, construction specifications and bid documents, and the City shall ensure such language is incorporated prior to issuance of any development permits. South Coast Air Quality Management District (SCAQMD) Rules that are currently applicable during construction activity for this Project include but are not limited to Rule 403 (Fugitive Dust) and Rule 1113 (Architectural Coatings) (2) (3). It should be noted that these Best Available Control Measures (BACMs) are not mitigation as they are standard regulatory requirements. As such, credit for Rule 403 and Rule 1113 have been taken.

BACM AQ-1

The contractor shall adhere to applicable measures contained in Table 1 of Rule 403 including, but not limited to (2):

- All clearing, grading, earth-moving, or excavation activities shall cease when winds exceed 25 miles per hour (mph) per SCAQMD guidelines in order to limit fugitive dust emissions.
- The contractor shall ensure that all disturbed unpaved roads and disturbed areas within the Project are watered at least three (3) times daily during dry weather. Watering, with complete coverage of disturbed areas, shall occur at least three times a day, preferably in the mid-morning, afternoon, and after work is done for the day.
- The contractor shall ensure that traffic speeds on unpaved roads and Project site areas are limited to 15 mph or less.

BACM AQ-2

The following measures shall be incorporated into Project plans and specifications as implementation of SCAQMD Rule 1113 (3):

- Only "Low-Volatile Organic Compounds (VOC)" paints (no more than 50 gram/liter (g/L) of VOC) consistent with SCAQMD Rule 1113 shall be used.

ES.3 CONSTRUCTION AND OPERATIONAL-SOURCE MMS

The Project would not result in an exceedance of any localized or regional construction and operational emissions thresholds. As such, the Project would not result in any significant impacts and no MMs are required.

This page intentionally left blank

1 INTRODUCTION

This report presents the results of the air quality impact analysis (AQIA) prepared by Urban Crossroads, Inc., for the proposed Murrieta Canyon Academy (Project). The purpose of this AQIA is to evaluate the potential impacts to air quality associated with construction and operation of the proposed Project and recommend measures to mitigate impacts considered potentially significant in comparison to thresholds established by the SCAQMD.

1.1 SITE LOCATION

The proposed Murrieta Canyon Academy Project is located on the northeast corner of Hayes Avenue and Fullerton Road in the City of Murrieta, as shown on Exhibit 1-A. The area surrounding the Project Site includes residential to the east and south; Thompson Middle School field and Thompson Middle School to the west; and Murrieta Valley High School to the north.

1.2 PROJECT DESCRIPTION

Murrieta Valley Unified School District (MVUSD) proposes to construct new buildings and associated infrastructure at the Murrieta Canyon Academy (MCA). MCA is an existing school campus consisting of portable structures that provides alternative high school programs including, independent study, alternative high school, and adult education. MVUSD proposes to construct a new campus with permanent single and two-story buildings and associated infrastructure and demolish the existing MCA buildings (Project). The site plan for the proposed Project is shown on Exhibit 1-B.

The proposed Project includes the construction of a new campus with approximately 41,500 square feet (sf) of classrooms and administrative offices, an associated parking lot, and other site improvements, to replace an existing campus of 22,500 sf of portable classrooms. More specifically, the new campus will include construction of single and two-story buildings with 22 classroom, student pavilion, library, restrooms, storage rooms, administration office, and various academic and activity courts with additional parking and landscaping. The proposed buildings are designed as single and two-story structures. All utilities exist to the Project site. The proposed Project will increase current enrollment capacity from 234 students to 594 students.

The Project is proposed to be constructed in the general location of the existing softball fields associated with Thompson Middle School, located immediately north-west of the existing MCA campus and south of the adjacent Thompson Middle School buildings. While the construction of the new buildings occurs, the existing buildings will remain in operation. Following the completion of the new buildings, anticipated to be during summer recess from school, the original buildings and parking lot will be demolished, and the new parking and associated landscape will be constructed.

EXHIBIT 1-A: LOCATION MAP

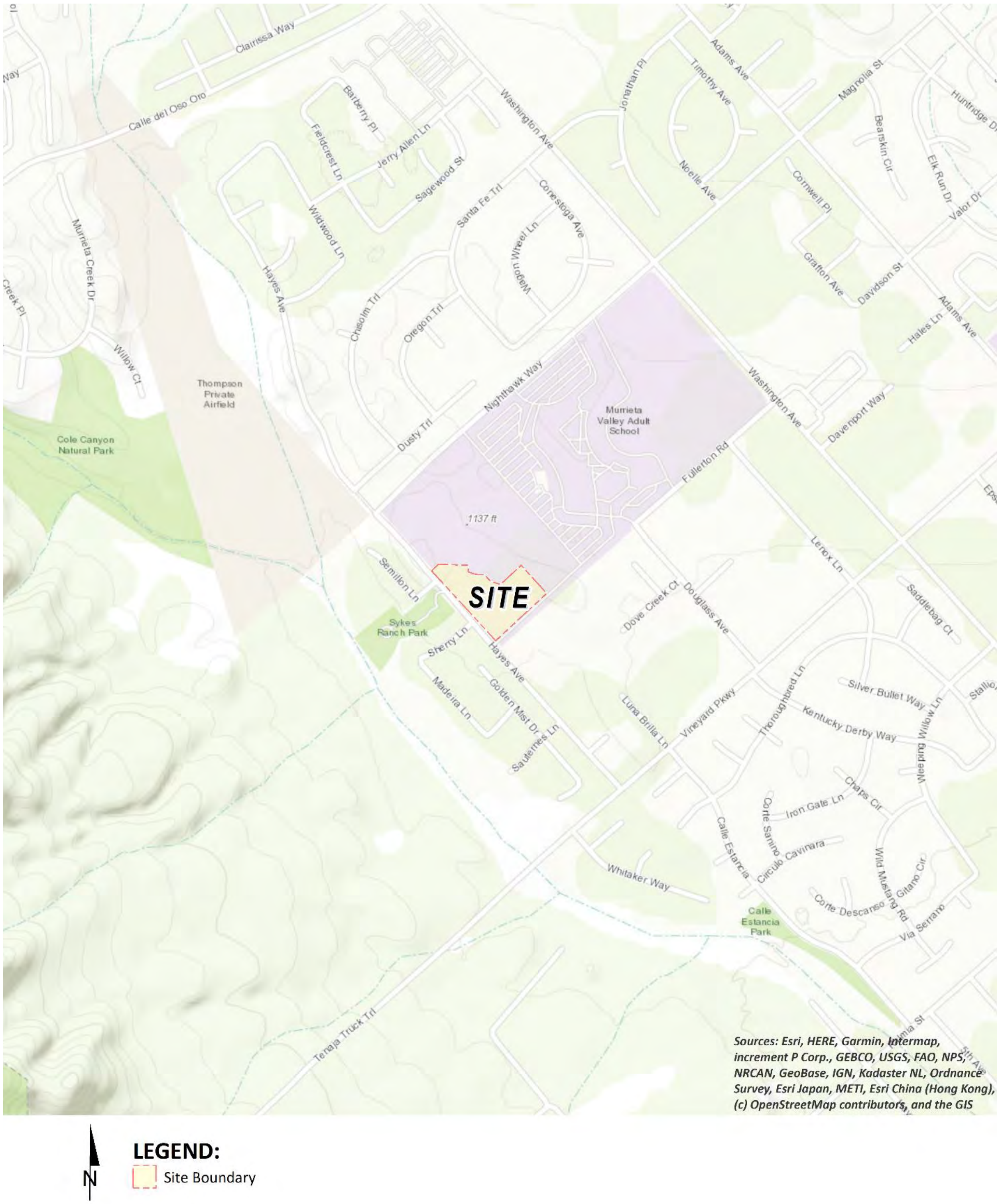


EXHIBIT 1-B: SITE PLAN

This page intentionally left blank

2 AIR QUALITY SETTING

This section provides an overview of the existing air quality conditions in the Project area and region.

2.1 SOUTH COAST AIR BASIN

The Project site is located in the South Coast Air Basin (SCAB) within the jurisdiction of SCAQMD (4). The SCAQMD was created by the 1977 Lewis-Presley Air Quality Management Act, which merged four county air pollution control bodies into one regional district. Under the Act, the SCAQMD is responsible for bringing air quality in areas under its jurisdiction into conformity with federal and state air quality standards. As previously stated, the Project site is located within the SCAB, a 6,745-square mile subregion of the SCAQMD, which includes portions of Los Angeles, Riverside, and San Bernardino Counties, and all of Orange County.

The SCAB is bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The Los Angeles County portion of the Mojave Desert Air Basin is bounded by the San Gabriel Mountains to the south and west, the Los Angeles / Kern County border to the north, and the Los Angeles / San Bernardino County border to the east. The Riverside County portion of the Salton Sea Air Basin is bounded by the San Jacinto Mountains in the west and spans eastward up to the Palo Verde Valley.

2.2 REGIONAL CLIMATE

The regional climate has a substantial influence on air quality in the SCAB. In addition, the temperature, wind, humidity, precipitation, and amount of sunshine influence the air quality.

The annual average temperatures throughout the SCAB vary from the low to middle 60s degrees Fahrenheit (°F). Due to a decreased marine influence, the eastern portion of the SCAB shows greater variability in average annual minimum and maximum temperatures. January is the coldest month throughout the SCAB, with average minimum temperatures of 47°F in downtown Los Angeles and 36°F in San Bernardino. All portions of the SCAB have recorded maximum temperatures above 100°F.

Although the climate of the SCAB can be characterized as semi-arid, the air near the land surface is quite moist on most days because of the presence of a marine layer. This shallow layer of sea air is an important modifier of SCAB climate. Humidity restricts visibility in the SCAB, and the conversion of sulfur dioxide (SO_2) to sulfates (SO_4) is heightened in air with high relative humidity. The marine layer provides an environment for that conversion process, especially during the spring and summer months. The annual average relative humidity within the SCAB is 71% along the coast and 59% inland. Since the ocean effect is dominant, periods of heavy early morning fog are frequent and low stratus clouds are a characteristic feature. These effects decrease with distance from the coast.

More than 90% of the SCAB's rainfall occurs from November through April. The annual average rainfall varies from approximately nine inches in Riverside to fourteen inches in downtown Los

Angeles. Monthly and yearly rainfall totals are extremely variable. Summer rainfall usually consists of widely scattered thunderstorms near the coast and slightly heavier shower activity in the eastern portion of the SCAB with frequency being higher near the coast.

Due to its generally clear weather, about three-quarters of available sunshine is received in the SCAB. The remaining one-quarter is absorbed by clouds. The ultraviolet portion of this abundant radiation is a key factor in photochemical reactions. On the shortest day of the year there are approximately 10 hours of possible sunshine, and on the longest day of the year there are approximately 14½ hours of possible sunshine.

The importance of wind to air pollution is considerable. The direction and speed of the wind determines the horizontal dispersion and transport of the air pollutants. During the late autumn to early spring rainy season, the SCAB is subjected to wind flows associated with the traveling storms moving through the region from the northwest. This period also brings five to ten periods of strong, dry offshore winds, locally termed "Santa Anas" each year. During the dry season, which coincides with the months of maximum photochemical smog concentrations, the wind flow is bimodal, typified by a daytime onshore sea breeze and a nighttime offshore drainage wind. Summer wind flows are created by the pressure differences between the relatively cold ocean and the unevenly heated and cooled land surfaces that modify the general northwesterly wind circulation over southern California. Nighttime drainage begins with the radiational cooling of the mountain slopes. Heavy, cool air descends the slopes and flows through the mountain passes and canyons as it follows the lowering terrain toward the ocean. Another characteristic wind regime in the SCAB is the "Catalina Eddy," a low level cyclonic (counterclockwise) flow centered over Santa Catalina Island which results in an offshore flow to the southwest. On most spring and summer days, some indication of an eddy is apparent in coastal sections.

In the SCAB, there are two distinct temperature inversion structures that control vertical mixing of air pollution. During the summer, warm high-pressure descending (subsiding) air is undercut by a shallow layer of cool marine air. The boundary between these two layers of air is a persistent marine subsidence/inversion. This boundary prevents vertical mixing which effectively acts as an impervious lid to pollutants over the entire SCAB. The mixing height for the inversion structure is normally situated 1,000 to 1,500 feet above mean sea level.

A second inversion-type forms in conjunction with the drainage of cool air off the surrounding mountains at night followed by the seaward drift of this pool of cool air. The top of this layer forms a sharp boundary with the warmer air aloft and creates nocturnal radiation inversions. These inversions occur primarily in the winter, when nights are longer and onshore flow is weakest. They are typically only a few hundred feet above mean sea level. These inversions effectively trap pollutants, such as NO_X and CO from vehicles, as the pool of cool air drifts seaward. Winter is therefore a period of high levels of primary pollutants along the coastline.

2.3 WIND PATTERNS AND PROJECT LOCATION

The distinctive climate of the Project area and the SCAB is determined by its terrain and geographical location. The SCAB is located in a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean in the southwest quadrant with high mountains forming the remainder of the perimeter.

Wind patterns across the south coastal region are characterized by westerly and southwesterly onshore winds during the day and easterly or northeasterly breezes at night. Winds are characteristically light although the speed is somewhat greater during the dry summer months than during the rainy winter season.

2.4 CRITERIA POLLUTANTS

Criteria pollutants are pollutants that are regulated through the development of human health based and/or environmentally based criteria for setting permissible levels. Criteria pollutants, their typical sources, and health effects are identified below (5):

TABLE 2-1: CRITERIA POLLUTANTS

Criteria Pollutant	Description	Sources	Health Effects
CO	CO is a colorless, odorless gas produced by the incomplete combustion of carbon-containing fuels, such as gasoline or wood. CO concentrations tend to be the highest during the winter morning, when little to no wind and surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines, unlike O_3, motor vehicles operating at slow speeds are the primary source of CO in the SCAB. The highest ambient CO concentrations are generally found near congested transportation corridors and intersections.	Any source that burns fuel such as automobiles, trucks, heavy construction equipment, farming equipment and residential heating.	Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest pain with exercise, and electrocardiograph changes indicative of decreased oxygen (O_2) supply to the heart. Inhaled CO has no direct toxic effect on the lungs but exerts its effect on tissues by interfering with O_2 transport and competing with O_2 to combine with hemoglobin present in the blood to form carboxyhemoglobin (COHb). Hence, conditions with an increased demand for O_2 supply can be adversely affected by exposure to CO. Individuals most at risk include fetuses, patients with diseases involving heart and blood vessels, and patients with chronic hypoxemia (O_2 deficiency) as seen at high altitudes.

Criteria Pollutant	Description	Sources	Health Effects
SO_2	SO_2 is a colorless, extremely irritating gas or liquid. It enters the atmosphere as a pollutant mainly as a result of burning high sulfur-content fuel oils and coal and from chemical processes occurring at chemical plants and refineries. When SO_2 oxidizes in the atmosphere, it forms SO_4. Collectively, these pollutants are referred to as sulfur oxides (SO_X).	Coal or oil burning power plants and industries, refineries, diesel engines	A few minutes of exposure to low levels of SO_2 can result in airway constriction in some asthmatics, all of whom are sensitive to its effects. In asthmatics, increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, are observed after acute exposure to SO_2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO_2. Animal studies suggest that despite SO_2 being a respiratory irritant, it does not cause substantial lung injury at ambient concentrations. However, very high levels of exposure can cause lung edema (fluid accumulation), lung tissue damage, and sloughing off of cells lining the respiratory tract. Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO_2 levels. In these studies, efforts to separate the effects of SO_2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically, or one pollutant alone is the predominant factor.

Criteria Pollutant	Description	Sources	Health Effects
NO_X	NO_X consist of nitric oxide (NO), nitrogen dioxide (NO_2) and nitrous oxide (N_2O) and are formed when nitrogen (N_2) combines with O_2. Their lifespan in the atmosphere ranges from one to seven days for nitric oxide and nitrogen dioxide, to 170 years for nitrous oxide. NO_X is typically created during combustion processes and are major contributors to smog formation and acid deposition. NO_2 is a criteria air pollutant and may result in numerous adverse health effects; it absorbs blue light, resulting in a brownish-red cast to the atmosphere and reduced visibility. Of the seven types of nitrogen oxide compounds, NO_2 is the most abundant in the atmosphere. As ambient concentrations of NO_2 are related to traffic density, commuters in heavy traffic may be exposed to higher concentrations of NO_2 than those indicated by regional monitoring station.	Any source that burns fuel such as automobiles, trucks, heavy construction equipment, farming equipment and residential heating.	Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposure to NO_2 at levels found in homes with gas stoves, which are higher than ambient levels found in Southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO_2 in healthy subjects. Larger decreases in lung functions are observed in individuals with asthma or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these sub-groups. In animals, exposure to levels of NO_2 considerably higher than ambient concentrations result in increased susceptibility to infections, possibly due to the observed changes in cells involved in maintaining immune functions. The severity of lung tissue damage associated with high levels of O_3 exposure increases when animals are exposed to a combination of O_3 and NO_2.
O_3	O_3 is a highly reactive and unstable gas that is formed when VOCs and NO_X, both byproducts of internal combustion engine exhaust, undergo slow photochemical reactions in the presence of sunlight. O_3 concentrations are generally highest during the summer	Formed when reactive organic gases (ROG) and NO_X react in the presence of sunlight. ROG sources include any source	Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the most susceptible sub-groups for O_3 effects. Short-term exposure (lasting for a

Criteria Pollutant	Description	Sources	Health Effects
	months when direct sunlight, light wind, and warm temperature conditions are favorable to the formation of this pollutant.	that burns fuels, (e.g., gasoline, natural gas, wood, oil) solvents, petroleum processing and storage and pesticides.	few hours) to O_3 at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. Elevated O_3 levels are associated with increased school absences. In recent years, a correlation between elevated ambient O_3 levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple outdoor sports and live in communities with high O_3 levels. O_3 exposure under exercising conditions is known to increase the severity of the responses described above. Animal studies suggest that exposure to a combination of pollutants that includes O_3 may be more toxic than exposure to O_3 alone. Although lung volume and resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.
Particulate Matter	PM_{10}: A major air pollutant consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and aerosols. Particulate matter pollution is a major cause of reduce visibility (haze) which is caused by the scattering of light	Sources of PM_{10} include road dust, windblown dust and construction. Also formed from other pollutants (acid rain, NO_X, SO_X,	A consistent correlation between elevated ambient fine particulate matter (PM_{10} and $PM_{2.5}$) levels and an increase in mortality rates, respiratory infections, number and severity of

Criteria Pollutant	Description	Sources	Health Effects
	and consequently the significant reduction air clarity. The size of the particles (10 microns or smaller, about 0.0004 inches or less) allows them to easily enter the lungs where they may be deposited, resulting in adverse health effects. Additionally, it should be noted that PM_{10} is considered a criteria air pollutant. $PM_{2.5}$: A similar air pollutant to PM_{10} consisting of tiny solid or liquid particles which are 2.5 microns or smaller (which is often referred to as fine particles). These particles are formed in the atmosphere from primary gaseous emissions that include SO_4 formed from SO_2 release from power plants and industrial facilities and nitrates that are formed from NO_X release from power plants, automobiles and other types of combustion sources. The chemical composition of fine particles highly depends on location, time of year, and weather conditions. $PM_{2.5}$ is a criteria air pollutant.	organics). Incomplete combustion of any fuel. $PM_{2.5}$ comes from fuel combustion in motor vehicles, equipment and industrial sources, residential and agricultural burning. Also formed from reaction of other pollutants (acid rain, NO_X, SO_X, organics).	asthma attacks and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. In recent years, some studies have reported an association between long-term exposure to air pollution dominated by fine particles and increased mortality, reduction in lifespan, and an increased mortality from lung cancer. Daily fluctuations in $PM_{2.5}$ concentration levels have also been related to hospital admissions for acute respiratory conditions in children, to school and kindergarten absences, to a decrease in respiratory lung volumes in normal children, and to increased medication use in children and adults with asthma. Recent studies show lung function growth in children is reduced with long term exposure to particulate matter. The elderly, people with pre-existing respiratory or cardiovascular disease, and children appear to be more susceptible to the effects of high levels of PM_{10} and $PM_{2.5}$.
VOC	VOCs are hydrocarbon compounds (any compound containing various combinations of hydrogen and carbon atoms) that exist in the ambient air. VOCs contribute to the formation of smog through atmospheric photochemical reactions and/or may be toxic. Compounds of carbon (also known as organic compounds) have different levels of reactivity; that is, they do not react at the same speed or do not	Organic chemicals are widely used as ingredients in household products. Paints, varnishes and wax all contain organic solvents, as do many cleaning, disinfecting, cosmetic, degreasing and hobby products.	Breathing VOCs can irritate the eyes, nose and throat, can cause difficulty breathing and nausea, and can damage the central nervous system as well as other organs. Some VOCs can cause cancer. Not all VOCs have all these health effects, though many have several.

Criteria Pollutant	Description	Sources	Health Effects
	form O_3 to the same extent when exposed to photochemical processes. VOCs often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints. Exceptions to the VOC designation include CO, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate. VOCs are a criteria pollutant since they are a precursor to O_3, which is a criteria pollutant. The terms VOC and ROG (see below) interchangeably.	Fuels are made up of organic chemicals. All of these products can release organic compounds while you are using them, and, to some degree, when they are stored.	
ROG	Similar to VOC, ROGs are also precursors in forming O_3 and consist of compounds containing methane, ethane, propane, butane, and longer chain hydrocarbons, which are typically the result of some type of combustion/decomposition process. Smog is formed when ROG and NO_X react in the presence of sunlight. ROGs are a criteria pollutant since they are a precursor to O_3, which is a criteria pollutant. The terms ROG and VOC (see previous) interchangeably.	Sources similar to VOCs.	Health effects similar to VOCs.
Lead (Pb)	Pb is a heavy metal that is highly persistent in the environment and is considered a criteria pollutant. In the past, the primary source of Pb in the air was emissions from vehicles burning leaded gasoline. The major sources of Pb emissions are ore and metals processing, particularly Pb smelters, and piston-engine aircraft operating on leaded aviation gasoline. Other stationary sources include waste incinerators, utilities, and lead-acid battery manufacturers. It should be noted that the Project does not include	Metal smelters, resource recovery, leaded gasoline, deterioration of Pb paint.	Fetuses, infants, and children are more sensitive than others to the adverse effects of Pb exposure. Exposure to low levels of Pb can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence quotient. In adults, increased Pb levels are associated with increased blood pressure.

Criteria Pollutant	Description	Sources	Health Effects
	operational activities such as metal processing or Pb acid battery manufacturing. As such, the Project is not anticipated to generate a quantifiable amount of Pb emissions.		Pb poisoning can cause anemia, lethargy, seizures, and death; although it appears that there are no direct effects of Pb on the respiratory system. Pb can be stored in the bone from early age environmental exposure, and elevated blood Pb levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland) and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of Pb because of previous environmental Pb exposure of their mothers.
Odor	Odor means the perception experienced by a person when one or more chemical substances in the air come into contact with the human olfactory nerves (6).	Odors can come from many sources including animals, human activities, industry, natures, and vehicles.	Offensive odors can potentially affect human health in several ways. First, odorant compounds can irritate the eye, nose, and throat, which can reduce respiratory volume. Second, studies have shown that the VOCs that cause odors can stimulate sensory nerves to cause neurochemical changes that might influence health, for instance, by compromising the immune system. Finally, unpleasant odors can trigger memories or attitudes linked to unpleasant odors, causing cognitive and emotional effects such as stress.

2.5 EXISTING AIR QUALITY

Existing air quality is measured at established SCAQMD air quality monitoring stations. Monitored air quality is evaluated in the context of ambient air quality standards. These standards are the levels of air quality that are considered safe, with an adequate margin of safety, to protect the public health and welfare. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) currently in effect are shown in Table 2-2 (7).

The determination of whether a region's air quality is healthful or unhealthful is determined by comparing contaminant levels in ambient air samples to the state and federal standards. At the time of this AQIA, the most recent state and federal standards were updated by California Air Resources Board (CARB) on May ,4 2016 and are presented in Table 2-2. The air quality in a region is considered to be in attainment by the state if the measured ambient air pollutant levels for O_3, CO (except 8-hour Lake Tahoe), SO_2 (1 and 24 hour), NO_2, PM_{10}, and $PM_{2.5}$ are not to be exceeded. All others are not to be equaled or exceeded. It should be noted that the three-year period is presented for informational purposes and is not the basis for how the State assigns attainment status. Attainment status for a pollutant means that the SCAQMD meets the standards set by the Environmental Protection Agency (EPA) or the California EPA (CalEPA). Conversely, nonattainment means that an area has monitored air quality that does not meet the NAAQS or CAAQS standards. In order to improve air quality in nonattainment areas, a State Implementation Plan (SIP) is drafted by CARB. The SIP outlines the measures that the state will take to improve air quality. Once nonattainment areas meet the standards and additional redesignation requirements, the EPA will designate the area as a maintenance area (8).

TABLE 2-2: AMBIENT AIR QUALITY STANDARDS (1 OF 2)

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 μg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 μg/m^3)		0.070 ppm (137 μg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 μg/m^3	Gravimetric or Beta Attenuation	150 μg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 μg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 μg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 μg/m^3	Gravimetric or Beta Attenuation	12.0 μg/m^3	15 μg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 μg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 μg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 μg/m^3)		0.053 ppm (100 μg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 μg/m^3)	Ultraviolet Fluorescence	75 ppb (196 μg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 μg/m^3)	
	24 Hour	0.04 ppm (105 μg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 μg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 μg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 μg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 μg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 μg/m^3)	Gas Chromatography			

See footnotes on next page …

For more information please call ARB-PIO at (916) 322-2990 — California Air Resources Board (5/4/16)

TABLE 2-2: AMBIENT AIR QUALITY STANDARDS (2 OF 2)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.
8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.
11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

For more information please call ARB-PIO at (916) 322-2990 **California Air Resources Board (5/4/16)**

2.6 REGIONAL AIR QUALITY

Air pollution contributes to a wide variety of adverse health effects. The EPA has established NAAQS for six of the most common air pollutants: CO, Pb, O_3, particulate matter (PM_{10} and $PM_{2.5}$), NO_2, and SO_2 which are known as criteria pollutants. The SCAQMD monitors levels of various criteria pollutants at 37 permanent monitoring stations and 5 single-pollutant source Pb air monitoring sites throughout the air district (9). On February 21, 2019, CARB posted the 2018 amendments to the state and national area designations. See Table 2-3 for attainment designations for the SCAB (10). Appendix 2.1 provides geographic representation of the state and federal attainment status for applicable criteria pollutants within the SCAB.

TABLE 2-3: ATTAINMENT STATUS OF CRITERIA POLLUTANTS IN THE SCAB

Criteria Pollutant	State Designation	Federal Designation
O_3 – 1-hour standard	Nonattainment	--
O_3 – 8-hour standard	Nonattainment	Nonattainment
PM_{10}	Nonattainment	Attainment
$PM_{2.5}$	Nonattainment	Nonattainment
CO	Attainment	Unclassifiable/Attainment
NO_2	Attainment	Unclassifiable/Attainment
SO_2	Unclassifiable/Attainment	Unclassifiable/Attainment
Pb[1]	Attainment	Unclassifiable/Attainment

Note: See Appendix 2.1 for a detailed map of State/National Area Designations within the SCAB
"-" = The national 1-hour O_3 standard was revoked effective June 15, 2005

2.7 LOCAL AIR QUALITY

The Project site is located within the Source Receptor Area (SRA) 26. Within SRA 26, the SCAQMD Temecula Valley monitoring station, located 8.84 miles northeast of the Project site, is the nearest long-term air quality monitoring station for O_3, CO, NO_2, and PM_{10}. The Temecula Valley monitoring station does not include data for CO, NO_2, and $PM_{2.5}$. As such, the next nearest monitoring stations where will be used. The Elsinore Valley monitoring station, located in SRA 25, is the next nearest monitoring station for CO and NO_2, and is located approximately 10.31 miles northwest of the Project site. The Metropolitan Riverside County monitoring station is located within SRA 23, roughly 33.42 miles northwest of the Project site, and is the nearest station that monitors $PM_{2.5}$, It should be noted that the Elsinore Valley and Metropolitan Riverside County monitoring stations were utilized in lieu of the Temecula Valley monitoring station only in instances where data was not available.

The most recent three (3) years of data available is shown on Table 2-4 and identifies the number of days ambient air quality standards were exceeded for the study area, which is considered to be representative of the local air quality at the Project site. Data for O_3, CO, NO_2, PM_{10}, and $PM_{2.5}$

[1] The Federal nonattainment designation for lead is only applicable towards the Los Angeles County portion of the SCAB.

for 2016 through 2018 was obtained from the SCAQMD Air Quality Data Tables (11). Additionally, data for SO_2 has been omitted as attainment is regularly met in the SCAB and few monitoring stations measure SO_2 concentrations.

TABLE 2-4: PROJECT AREA AIR QUALITY MONITORING SUMMARY 2016-2018

POLLUTANT	STANDARD	YEAR		
		2016	2017	2018
O_3				
Maximum Federal 1-Hour Concentration (ppm)		0.124	0.112	0.116
Maximum Federal 8-Hour Concentration (ppm)		0.093	0.098	0.095
Number of Days Exceeding State 1-Hour Standard	> 0.09 ppm	15	23	16
Number of Days Exceeding State/Federal 8-Hour Standard	> 0.070 ppm	45	54	30
CO				
Maximum Federal 1-Hour Concentration	> 35 ppm	1.2	1.2	1.1
Maximum Federal 8-Hour Concentration	> 20 ppm	0.6	0.8	0.8
NO_2				
Maximum Federal 1-Hour Concentration	> 0.100 ppm	0.051	0.049	0.041
Annual Average		8.1	8.2	8.5
PM_{10}				
Maximum Federal 24-Hour Concentration (μg/m^3)	> 150 μg/m^3	99	133	104
Annual Federal Arithmetic Mean (μg/m^3)		21.4	22.5	22.4
Number of Days Exceeding Federal 24-Hour Standard	> 150 μg/m^3	0	0	0
Number of Days Exceeding State 24-Hour Standard	> 50 μg/m^3	4	9	9
$PM_{2.5}$				
Maximum Federal 24-Hour Concentration (μg/m^3)	> 35 μg/m^3	39.12	50.3	50.7
Annual Federal Arithmetic Mean (μg/m^3)	> 12 μg/m^3	12.54	12.18	12.41
Number of Days Exceeding Federal 24-Hour Standard	> 35 μg/m^3	4	6	2

ppm = Parts Per Million
μg/m^3 = Microgram per Cubic Meter
Source: Data for O_3, CO, NO_2, PM_{10}, and $PM_{2.5}$ was obtained from SCAQMD Air Quality Data Tables.

2.8 REGULATORY BACKGROUND

2.8.1 FEDERAL REGULATIONS

The EPA is responsible for setting and enforcing the NAAQS for O_3, CO, NO_X, SO_2, PM_{10}, and Pb (12). The EPA has jurisdiction over emissions sources that are under the authority of the federal government including aircraft, locomotives, and emissions sources outside state waters (Outer Continental Shelf). The EPA also establishes emission standards for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission requirements of CARB.

The Federal Clean Air Act (CAA) was first enacted in 1955 and has been amended numerous times in subsequent years (1963, 1965, 1967, 1970, 1977, and 1990). The CAA establishes the federal air quality standards, the NAAQS, and specifies future dates for achieving compliance (13). The CAA also mandates that states submit and implement SIPs for local areas not meeting these standards. These plans must include pollution control measures that demonstrate how the standards will be met.

The 1990 amendments to the CAA that identify specific emission reduction goals for areas not meeting the NAAQS require a demonstration of reasonable further progress toward attainment and incorporate additional sanctions for failure to attain or to meet interim milestones. The sections of the CAA most directly applicable to the development of the Project site include Title I (Non-Attainment Provisions) and Title II (Mobile Source Provisions) (14) (15). Title I provisions were established with the goal of attaining the NAAQS for the following criteria pollutants O_3, NO_2, SO_2, PM_{10}, CO, $PM_{2.5}$, and Pb. The NAAQS were amended in July 1997 to include an additional standard for O_3 and to adopt a NAAQS for $PM_{2.5}$. Table 2-3 (previously presented) provides the NAAQS within the SCAB.

Mobile source emissions are regulated in accordance with Title II provisions. These provisions require the use of cleaner burning gasoline and other cleaner burning fuels such as methanol and natural gas. Automobile manufacturers are also required to reduce tailpipe emissions of hydrocarbons and NO_X. NO_X is a collective term that includes all forms of NO_X which are emitted as byproducts of the combustion process.

2.8.2 CALIFORNIA REGULATIONS

CARB

CARB, which became part of the CalEPA in 1991, is responsible for ensuring implementation of the California Clean Air Act (AB 2595), responding to the federal CAA, and for regulating emissions from consumer products and motor vehicles. AB 2595 mandates achievement of the maximum degree of emissions reductions possible from vehicular and other mobile sources in order to attain the state ambient air quality standards by the earliest practical date. CARB established the CAAQS for all pollutants for which the federal government has NAAQS and, in addition, establishes standards for SO_4, visibility, hydrogen sulfide (H_2S), and vinyl chloride (C_2H_3Cl). However, at this time, H_2S and C_2H_3Cl are not measured at any monitoring stations in the SCAB because they are not considered to be a regional air quality problem. Generally, the CAAQS are more stringent than the NAAQS (16) (12).

Local air quality management districts, such as the SCAQMD, regulate air emissions from stationary sources such as commercial and industrial facilities. All air pollution control districts have been formally designated as attainment or non-attainment for each CAAQS.

Serious non-attainment areas are required to prepare AQMPs that include specified emission reduction strategies in an effort to meet clean air goals. These plans are required to include:

- Application of Best Available Retrofit Control Technology to existing sources;
- Developing control programs for area sources (e.g., architectural coatings and solvents) and indirect sources (e.g. motor vehicle use generated by residential and commercial development);
- A District permitting system designed to allow no net increase in emissions from any new or modified permitted sources of emissions;
- Implementing reasonably available transportation control measures and assuring a substantial reduction in growth rate of vehicle trips and miles traveled;
- Significant use of low emissions vehicles by fleet operators;
- Sufficient control strategies to achieve a 5% or more annual reduction in emissions or 15% or more in a period of three years for ROGs, NO_X, CO and PM_{10}. However, air basins may use alternative emission reduction strategy that achieves a reduction of less than 5% per year under certain circumstances.

TITLE 24 ENERGY EFFICIENCY STANDARDS AND CALIFORNIA GREEN BUILDING STANDARDS

California Code of Regulations (CCR) Title 24 Part 6: The California Energy Code was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption.

The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. CCR, Title 24, Part 11: California Green Building Standards Code (CALGreen) is a comprehensive and uniform regulatory code for all residential, commercial, and school buildings that went in effect on January 1, 2009, and is administered by the California Building Standards Commission.

CALGreen is updated on a regular basis, with the most recent approved update consisting of the 2019 California Green Building Code Standards that became effective January 1, 2020.

Local jurisdictions are permitted to adopt more stringent requirements, as state law provides methods for local enhancements. CALGreen recognizes that many jurisdictions have developed existing construction waste and demolition ordinances and defers to them as the ruling guidance provided they establish a minimum 65% diversion requirement.

The code also provides exemptions for areas not served by construction waste and demolition recycling infrastructure. The State Building Code provides the minimum standard that buildings must meet in order to be certified for occupancy, which is generally enforced by the local building official.

Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases greenhouse gas (GHG) emissions. The 2019 version of Title 24 was adopted by the California Energy Commission (CEC) and became effective on January 1, 2020.

The 2019 Title 24 standards will result in less energy use, thereby reducing air pollutant emissions associated with energy consumption in the SCAB and across the State of California. For example, the 2019 Title 24 standards will require solar photovoltaic systems for new homes, establish requirements for newly constructed healthcare facilities, encourage demand responsive technologies for residential buildings, and update indoor and outdoor lighting requirements for nonresidential buildings.

The CEC anticipates that single-family homes built with the 2019 standards will use approximately 7% less energy compared to the residential homes built under the 2016 standards. Additionally, after implementation of solar photovoltaic systems, homes built under the 2019 standards will use about 53% less energy than homes built under the 2016 standards. Nonresidential buildings (such as the Project) will use approximately 30% less energy due to lighting upgrade requirements (17).

Because the Project will be constructed after January 1, 2019, the 2019 CALGreen standards are applicable to the Project and require, among other items (18):

- Short-term bicycle parking. If the new project or an additional alteration is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5% of new visitor motorized vehicle parking spaces being added, with a minimum of one two-bike capacity rack (5.106.4.1.1).
- Long-term bicycle parking. For new buildings with tenant spaces that have 10 or more tenant-occupants, provide secure bicycle parking for 5% of the tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility (5.106.4.1.2).
- Designated parking for clean air vehicles. In new projects or additions to alterations that add 10 or more vehicular parking spaces, provide designated parking for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as shown in Table 5.106.5.2 (5.106.5.2).
- Electric vehicle charging stations. New construction shall facilitate the future installation of electric vehicle supply equipment. The compliance requires empty raceways for future conduit and documentation that the electrical system has adequate capacity for the future load. The number of spaces to be provided for is contained in Table 5.106. 5.3.3 (5.106.5.3).
- Outdoor light pollution reduction. Outdoor lighting systems shall be designed to meet the backlight, uplight and glare ratings per Table 5.106.8 (5.106.8)
- Construction waste management. Recycle and/or salvage for reuse a minimum of 65% of the nonhazardous construction and demolition waste in accordance with Section 5.408.1.1. 5.405.1.2, or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent (5.408.1).
- Excavated soil and land clearing debris. 100% of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed (5.408.3).

- Recycling by Occupants. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals or meet a lawfully enacted local recycling ordinance, if more restrictive (5.410.1).
- Water conserving plumbing fixtures and fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:
    - Water Closets. The effective flush volume of all water closets shall not exceed 1.28 gallons per flush (5.303.3.1)
    - Urinals. The effective flush volume of wall-mounted urinals shall not exceed 0.125 gallons per flush (5.303.3.2.1). The effective flush volume of floor-mounted or other urinals shall not exceed 0.5 gallons per flush (5.303.3.2.2).
    - Showerheads. Single showerheads shall have a minimum flow rate of not more than 1.8 gallons per minute and 80 psi (5.303.3.3.1). When a shower is served by more than one showerhead, the combine flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 1.8 gallons per minute at 80 psi (5.303.3.3.2).
    - Faucets and fountains. Nonresidential lavatory faucets shall have a maximum flow rate of not more than 0.5 gallons per minute at 60 psi (5.303.3.4.1). Kitchen faucets shall have a maximum flow rate of not more than 1.8 gallons per minute of 60 psi (5.303.3.4.2). Wash fountains shall have a maximum flow rate of not more than 1.8 gallons per minute (5.303.3.4.3). Metering faucets shall not deliver more than 0.20 gallons per cycle (5.303.3.4.4). Metering faucets for wash fountains shall have a maximum flow rate not more than 0.20 gallons per cycle (5.303.3.4.5).
- Outdoor portable water use in landscaped areas. Nonresidential developments shall comply with a local water efficient landscape ordinance or the current California Department of Water Resources' Model Water Efficient (MWELO), whichever is more stringent (5.304.1).
- Water meters. Separate submeters or metering devices shall be installed for new buildings or additions in excess of 50,000 sf or for excess consumption where any tenant within a new building or within an addition that is project to consume more than 1,000 gallons per day (5.303.1.1 and 5.303.1.2).
- Outdoor water use in rehabilitated landscape projects equal or greater than 2,500 sf. Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 2,500 sf requiring a building or landscape permit (5.304.3).
- Commissioning. For new buildings 10,000 sf and over, building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the owner's or owner representative's project requirements (5.410.2).

2.8.3 AIR QUALITY MANAGEMENT PLANNING

Currently, the NAAQS and CAAQS are exceeded in most parts of the SCAB. In response, the SCAQMD has adopted a series of AQMPs to meet the state and federal ambient air quality standards (17). AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy. A detailed discussion on the AQMP and Project consistency with the AQMP is provided in Section 3.10.

2.10 EXISTING PROJECT SITE AIR QUALITY CONDITIONS

As previous stated, the Project site is currently developed with an existing campus of 22,500 sf of portable classrooms. Detailed operation model outputs are presented in Appendix 3.2. The existing campus emissions are presented in Table 2-5.

TABLE 2-5: EMISSIONS FROM EXISTING CAMPUS EMISSIONS

Existing Campus Operational Activities	Emissions (lbs/day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Summer Scenario						
Total Maximum Daily Emissions	**2.63**	**8.65**	**23.52**	**0.08**	**7.47**	**2.05**
Winter Scenario						
Total Maximum Daily Emissions	**2.42**	**8.98**	**20.10**	**0.08**	**7.47**	**2.05**

Source: CalEEMod operational-source emissions for the existing campus emissions are presented in Appendix 3.2

This page intentionally left blank

3 PROJECT AIR QUALITY IMPACT

3.1 INTRODUCTION

The Project has been evaluated to determine if it will violate an air quality standard, contribute to an existing or projected air quality violation, or determine if it will result in a cumulatively considerable net increase of a criteria pollutant for which the SCAB is non-attainment under an applicable NAAQS and CAAQS. Additionally, the Project has been evaluated to determine consistency with the applicable AQMP, exposure of sensitive receptors to substantial pollutant concentrations, and the impacts of odors. The significance of these potential impacts is described in the following section.

3.2 STANDARDS OF SIGNIFICANCE

The criteria used to determine the significance of potential Project-related air quality impacts are taken from the *CEQA Guidelines* (14 CCR §§15000, et seq.). Based on these thresholds, a project would result in a significant impact related to air quality if it would (1):

- Conflict with or obstruct implementation of the applicable air quality plan.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard.
- Expose sensitive receptors to substantial pollutant concentrations.
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

The SCAQMD has also developed regional significance thresholds for other regulated pollutants, as summarized at Table 3-1 (18). The SCAQMD's *CEQA Air Quality Significance Thresholds* (April 2019) indicate that any projects in the SCAB with daily emissions that exceed any of the indicated thresholds should be considered as having an individually and cumulatively significant air quality impact.

TABLE 3-1: MAXIMUM DAILY REGIONAL EMISSIONS THRESHOLDS

Pollutant	Regional Emissions Thresholds (lbs/day)	
	Construction	Operations
NO_X	100	55
VOC	75	55
PM_{10}	150	150
$PM_{2.5}$	55	55
SO_X	150	150
CO	550	550
Pb	3	3

lbs/day = Pounds Per Day
Source: Regional Thresholds presented in this table are based on the SCAQMD Air Quality Significance Thresholds, April 2019

3.3 MODELS EMPLOYED TO ANALYZE AIR QUALITY

3.3.1 CALIFORNIA EMISSIONS ESTIMATOR MODEL (CALEEMOD)

Land uses such as the Project affect air quality through construction-source and operational-source emissions.

On October 17, 2017, the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts, released the latest version of the CalEEMod Version 2016.3.2. The purpose of this model is to calculate construction-source and operational-source criteria pollutant (VOCs, NO_X, SO_X, CO, PM_{10}, and $PM_{2.5}$) and GHG emissions from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from mitigation measures (19). Accordingly, the latest version of CalEEMod has been used for this Project to determine construction and operational air quality emissions. Output from the model runs for both construction and operational activity are provided in Appendices 3.1 through 3.2.

3.3.2 EMISSION FACTORS MODEL

On August 19, 2019, the EPA approved the 2017 version of the EMissions FACtor model (EMFAC) web database for use in SIP and transportation conformity analyses. EMFAC2017 is a mathematical model that was developed to calculate emission rates, fuel consumption, VMT from motor vehicles that operate on highways, freeways, and local roads in California and is commonly used by CARB to project changes in future emissions from on-road mobile sources (20). This AQIA utilizes summer, winter, and annual EMFAC2017 emission factors in order to derive vehicle emissions associated with Project operational activities, which vary by season.

Because the EMFAC2017 emission rates are associated with vehicle fuel types while CalEEMod vehicle emission factors are aggregated to include all fuel types for each individual vehicle class, the EMFAC2017 emission rates for different fuel types of a vehicle class are averaged by activity or by population and activity to derive CalEEMod emission factors. The equations applied to obtain CalEEMod vehicle emission factors for each emission type are detailed in CalEEMod User's Guide *Appendix A: Calculation Details for CalEEMod* (21).

3.4 CONSTRUCTION EMISSIONS

3.4.1 CONSTRUCTION ACTIVITIES

Construction activities associated with the Project will result in emissions of VOCs, NO_X, SO_X, CO, PM_{10}, and $PM_{2.5}$. Construction related emissions are expected from the following construction activities:

- Site Preparation
- Grading
- Building Construction
- Paving

- Architectural Coating
- Demolition

GRADING ACTIVITIES

Dust is typically a major concern during grading activities. Because such emissions are not amenable to collection and discharge through a controlled source, they are called "fugitive emissions". Fugitive dust emissions rates vary as a function of many parameters (soil silt, soil moisture, wind speed, area disturbed, number of vehicles, depth of disturbance or excavation, etc.). CalEEMod was utilized to calculate fugitive dust emissions resulting from this phase of activity. Based on information provided by the Project Applicant, the Project is anticipated to require 6,000 cubic yards of export. For purposes of analysis, the export quantity will be modeled with the CalEEMod default hauling trip length of 20 miles.

DEMOLITION ACTIVITIES

Following the completion of the new buildings, it is our understanding that the Project will demolish 22,500 sf of existing portable structures.

CONSTRUCTION WORKER VEHICLE TRIPS

Construction emissions for construction worker vehicles traveling to and from the Project site, as well as vendor trips (construction materials delivered to the Project site) were estimated based on CalEEMod defaults.

3.4.2 CONSTRUCTION DURATION

Construction is expected to commence in August 2022 and will last through August 2023. The construction schedule utilized in the analysis, shown in Table 3-2, represents a "worst-case" analysis scenario should construction occur any time after the respective dates since emission factors for construction decrease as time passes and the analysis year increases due to emission regulations becoming more stringent.[2] The duration of construction activity and associated equipment represents a reasonable approximation of the expected construction fleet as required per *CEQA Guidelines* (1). The duration of construction activity was based on information provided by the Project Applicant and the 2023 opening year.

3.4.3 CONSTRUCTION EQUIPMENT

Site specific construction fleet may vary due to specific project needs at the time of construction. The associated construction equipment was generally based on CalEEMod defaults. A detailed summary of construction equipment assumptions by phase is provided at Table 3-3.

[2] As shown in the CalEEMod User's Guide Version 2016.3.2, Section 4.3 "OFFROAD Equipment" as the analysis year increases, emission factors for the same equipment pieces decrease due to the natural turnover of older equipment being replaced by newer less polluting equipment and new regulatory requirements.

TABLE 3-2: CONSTRUCTION DURATION

Phase Name	Start Date	End Date	Days
Site Preparation	08/01/2022	09/30/2022	45
Grading	08/01/2022	09/30/2022	45
Building Construction	10/01/2022	06/23/2023	190
Paving	05/28/2023	06/23/2023	20
Architectural Coating	05/28/2023	06/23/2023	20
Demolition	06/24/2023	08/04/2023	30

TABLE 3-3: CONSTRUCTION EQUIPMENT ASSUMPTIONS

Phase Name	Equipment Type [A]	Quantity	Hours Per Day
Site Preparation	Crawler Tractors	4	8
	Rubber Tired Dozers	3	8
Grading	Crawler Tractors	3	8
	Excavators	1	8
	Graders	1	8
	Rubber Tired Dozers	1	8
Building Construction	Cranes	1	8
	Crawler Tractors	3	8
	Forklifts	3	8
	Generator Sets	1	8
	Welders	1	8
Paving	Cement and Mortar Mixers	2	8
	Crawler Tractors	1	8
	Pavers	1	8
	Paving Equipment	2	8
	Rollers	2	8
Architectural Coating	Air Compressors	1	8
Demolition	Concrete/Industrial Saws	1	8
	Excavators	3	8
	Rubber Tired Dozers	2	8

[A] In order to account for fugitive dust emissions associated with Site Preparation and Grading activities, Crawler Tractors were used in lieu of Tractors/Loaders/Backhoes.

The City of Murrieta’s Noise Ordinance prohibits construction from 7:00 P.M. and 7:00 A.M. and on Sundays and holidays (22). As such, an 8-hour workday is a reasonable assumption of construction work based on a typical 40-hour work week; this represents approximately twothirds (⅔) of the period during which construction activities are allowed pursuant to the Noise Ordinance and is a recognized typical workday by SCAQMD.

3.4.4 CONSTRUCTION EMISSIONS SUMMARY

CalEEMod calculates maximum daily emissions for summer and winter periods. The estimated maximum daily construction emissions are summarized in Table 3-4. Detailed construction model outputs are presented in Appendix 3.1. Project construction-source emissions would not exceed the numerical thresholds of significance established by the SCAQMD for any criteria pollutant. Thus, a less than significant impact would occur for Project-related construction-source emissions and no mitigation is required.

TABLE 3-4: OVERALL CONSTRUCTION EMISSIONS SUMMARY – WITHOUT MITIGATION

Year	**Emissions (lbs/day)**					
	VOC	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Summer						
2022	7.63	87.65	37.10	0.12	17.72	9.03
2023	16.66	44.48	38.53	0.09	3.42	2.16
Winter						
2022	7.63	87.66	36.95	0.12	17.72	9.03
2023	16.66	44.46	37.86	0.09	3.42	2.16
Maximum Daily Emissions	**16.66**	**87.66**	**38.53**	**0.12**	**17.72**	**9.03**
SCAQMD Regional Threshold	75	100	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Source: CalEEMod construction-source (unmitigated) emissions are presented in Appendix 3.1.

3.5 OPERATIONAL EMISSIONS

Operational activities associated with the proposed Project will result in emissions of VOCs, NO_X, SO_X, CO, PM_{10}, and $PM_{2.5}$. Operational emissions would be expected from the following primary sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions

3.5.1 AREA SOURCE EMISSIONS

ARCHITECTURAL COATINGS

Over a period of time the buildings that are part of this Project will be subject to emissions resulting from the evaporation of solvents contained in paints, varnishes, primers, and other surface coatings as part of Project maintenance. The emissions associated with architectural coatings were calculated using CalEEMod.

CONSUMER PRODUCTS

Consumer products include, but are not limited to detergents, cleaning compounds, polishes, personal care products, and lawn and garden products. Many of these products contain organic compounds which when released in the atmosphere can react to form ozone and other photochemically reactive pollutants. The emissions associated with use of consumer products were calculated based on defaults provided within CalEEMod.

LANDSCAPE MAINTENANCE EQUIPMENT

Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in CalEEMod.

3.5.2 ENERGY SOURCE EMISSIONS

COMBUSTION EMISSIONS ASSOCIATED WITH NATURAL GAS AND ELECTRICITY

Electricity and natural gas are used by almost every project. Criteria pollutant emissions are emitted through the generation of electricity and consumption of natural gas. However, because electrical generating facilities for the Project area are located either outside the region (state) or offset through the use of pollution credits (RECLAIM) for generation within the SCAB, criteria pollutant emissions from offsite generation of electricity is generally excluded from the evaluation of significance and only natural gas use is considered. The emissions associated with natural gas use were calculated using CalEEMod.

TITLE 24 ENERGY EFFICIENCY STANDARDS

California's Energy Efficiency Standards for Residential and Nonresidential Buildings was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. Energy efficient buildings require less electricity.

The 2019 version of Title 24 was adopted by the CEC and became effective on January 1, 2020. The CEC estimates that nonresidential buildings will use approximately 30% less energy through compliance with the 2019 Title 24 standards, compared to the 2016 Title 24 standards they replace(19). As such, the CalEEMod defaults for Title 24 – Electricity and Lighting Energy (which are based on 2016 Title 24) were reduced by 30% in order to reflect consistency with 2019 Title 24 requirements.

3.5.3 MOBILE SOURCE EMISSIONS

Project mobile source air quality impacts are dependent on both overall daily vehicle trip generation and the effect of the Project on peak hour traffic volumes and traffic operations in the vicinity of the Project. The Project-related operational air quality impacts are derived primarily from vehicle trips generated by the Project. Trip characteristics available from the

Murrieta Canyon Academy Expansion Traffic Impact Study (Traffic Study) prepared by RK Engineering Group, Inc. were utilized in this analysis (23).

FUGITIVE DUST RELATED TO VEHICULAR TRAVEL

Vehicles traveling on paved roads would be a source of fugitive emissions due to the generation of road dust inclusive of break and tire wear particulates. The emissions estimates for travel on paved roads were calculated using CalEEMod.

3.5.4 OPERATIONAL EMISSIONS SUMMARY

Operational-source emissions are summarized on Table 3-5. Detailed operational model outputs are presented in Appendix 3.1. Project operational-source emissions would not exceed the numerical thresholds of significance established by the SCAQMD for any criteria pollutant. Thus, a less than significant impact would occur for Project-related operational-source emissions and no mitigation is required.

TABLE 3-5: MAXIMUM OPERATIONAL EMISSIONS SUMMARY

Operational Activities – Summer Scenario	Emissions (lbs/day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area	0.99	9.00E-05	9.45E-03	0.00	3.00E-05	3.00E-05
Energy Source	8.18E-03	0.07	0.06	4.50E-04	5.65E-03	5.65E-03
Mobile	3.26	13.22	36.11	0.13	11.48	3.15
Total Maximum Daily Emissions	**4.27**	**13.29**	**36.18**	**0.13**	**11.49**	**3.16**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Operational Activities – Winter Scenario	**Emissions (lbs/day)**					
	VOC	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Area	0.99	9.00E-05	9.45E-03	0.00	3.00E-05	3.00E-05
Energy Source	8.18E-03	0.07	0.06	4.50E-04	5.65E-03	5.65E-03
Mobile	2.93	13.73	30.85	0.12	11.48	3.15
Total Maximum Daily Emissions	**3.94**	**13.80**	**30.92**	**0.12**	**11.49**	**3.16**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Source: CalEEMod operational-source emissions outputs are presented in Appendix 3.1

3.5.5 POTENTIAL OVERLAP OF CONSTRUCTION AND OPERATIONAL ACTIVITY

As previously stated, while the construction of the new buildings occurs, the existing buildings will remain in operation. As a conservative measure, the peak daily emissions of the overlap of construction and operational activities are shown in Tables 3-6. It should be noted that the SCAQMD does not have different thresholds for overlapping activities, rather the SCAQMD has separate thresholds for construction activity and operational activity. As such, the potential emissions from overlapping construction and operational activity is provided for informational purposes only.

TABLE 3-6: POTENTIAL OVERLAP OF CONSTRUCTION AND OPERATIONAL ACTIVITY

Maximum Daily Emissions	Emissions (lbs/day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Construction Peak Emissions	16.66	87.66	38.53	0.12	17.72	9.03
Operational Maximum Total Emissions	2.63	8.98	23.52	0.08	7.47	2.05
Total Maximum Daily Emissions	**19.29**	**96.64**	**62.06**	**0.20**	**25.19**	**11.08**

3.6 LOCALIZED SIGNIFICANCE

3.6.1 BACKGROUND ON LOCALIZED SIGNIFICANCE THRESHOLD (LST) DEVELOPMENT

The analysis makes use of methodology included in the SCAQMD *Final Localized Significance Threshold Methodology* (*LST Methodology*) (24). The SCAQMD has established that impacts to air quality are significant if there is a potential to contribute or cause localized exceedances of the NAAQS and CAAQS. Collectively, these are referred to as LSTs.

The SCAQMD established LSTs in response to the SCAQMD Governing Board's Environmental Justice Initiative I-4[3]. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard at the nearest residence or sensitive receptor. The SCAQMD states that lead agencies can use the LSTs as another indicator of significance in its air quality impact analyses.

LSTs were developed in response to environmental justice and health concerns raised by the public regarding exposure of individuals to criteria pollutants in local communities. To address the issue of localized significance, the SCAQMD adopted LSTs that show whether a project would cause or contribute to localized air quality impacts and thereby cause or contribute to potential localized adverse health effects. The analysis makes use of methodology included in the *LST Methodology* (25).

3.6.2 APPLICABILITY OF LSTS FOR THE PROJECT

For this Project, the appropriate SRA for the LST analysis is the SCAQMD Temecula Valley monitoring station (SRA 26). LSTs apply to CO, NO_X, PM_{10}, and $PM_{2.5}$. The SCAQMD produced look-up tables for projects less than or equal to 5 acres in size.

In order to determine the appropriate methodology for determining localized impacts that could occur as a result of Project-related construction, the following process is undertaken:

[3] The purpose of SCAQMD's Environmental Justice program is to ensure that everyone has the right to equal protection from air pollution and fair access to the decision-making process that works to improve the quality of air within their communities. Further, the SCAQMD defines Environmental Justice as "…equitable environmental policymaking and enforcement to protect the health of all residents, regardless of age, culture, ethnicity, gender, race, socioeconomic status, or geographic location, from the health effects of air pollution."

- CalEEMod is utilized to determine the maximum daily on-site emissions that will occur during construction activity.
- The SCAQMD's *Fact Sheet for Applying CalEEMod to Localized Significance Thresholds* and CalEEMod User's Guide *Appendix A: Calculation Details for CalEEMod* is used to determine the maximum site acreage that is actively disturbed based on the construction equipment fleet and equipment hours as estimated in CalEEMod (26) (21).
- If the total acreage disturbed is less than or equal to five acres per day, then the SCAQMD's screening look-up tables are utilized to determine if a Project has the potential to result in a significant impact. The look-up tables establish a maximum daily emissions threshold in lbs/day that can be compared to CalEEMod outputs.
- If the total acreage disturbed is greater than five acres per day, then LST impacts are appropriately evaluated through dispersion modeling.
- The *LST methodology* presents mass emission rates for each SRA, project sizes of 1, 2, and 5 acres, and nearest receptor distances of 25, 50, 100, 200, and 500 meters. For project sizes between the values given, or with receptors at distances between the given receptors, the methodology uses linear interpolation to determine the thresholds.

3.6.3 EMISSIONS CONSIDERED

SCAQMD's *LST Methodology* clearly states that "off-site mobile emissions from the Project should not be included in the emissions compared to LSTs (24)." Therefore, for purposes of the construction LST analysis, only emissions included in the CalEEMod "on-site" emissions outputs were considered.

3.6.4 MAXIMUM DAILY DISTURBED-ACREAGE

As a conservative measure, it is assumed that a maximum of 5 acres per day can be actively disturbed during site preparation and grading activities. As such, the "Total Acres Graded" field in CalEEMod has been revised to 225 acres for site preparation and grading activities.

3.6.5 SENSITIVE RECEPTORS

As previously stated, LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable NAAQS and CAAQS at the nearest residence or sensitive receptor. Receptor locations are off-site locations where individuals may be exposed to emissions from Project activities.

RESIDENTIAL RECEPTORS

Some people are especially sensitive to air pollution and are given special consideration when evaluating air quality impacts from projects. These groups of people include children, the elderly, individuals with pre-existing respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. Structures that house these persons or places where they gather to exercise are defined as "sensitive receptors". These structures typically include residences, hotels, hospitals, etc. as they are also known to be locations where an individual can remain for 24 hours. Consistent with the LST Methodology, the nearest land use where an individual could remain for 24 hours to the Project site (in this case the nearest residential land use) has been used to determine construction and operational air quality impacts for emissions of PM_{10} and $PM_{2.5}$, since PM_{10} and $PM_{2.5}$ thresholds are based on a 24 hour averaging time.

NON-RESIDENTIAL RECEPTORS

As per the *LST Methodology*, commercial and industrial facilities are not included in the definition of sensitive receptor because employees and patrons do not typically remain onsite for a full 24 hours but are typically onsite for 8 hours or less. The LST Methodology explicitly states that "*LSTs based on shorter averaging periods, such as the NO_2 and CO LSTs, could also be applied to receptors such as industrial or commercial facilities since it is reasonable to assume that a worker at these sites could be present for periods of one to eight hours* (24)." For purposes of analysis, if an industrial/commercial use is located at a closer distance to the Project site than the nearest residential use, the nearest industrial/commercial use will be utilized to determine construction and operational LST air impacts for emissions of NO_2 and CO an individual could be present at these sites for periods of 1 to 8 hours.

PROJECT-RELATED SENSITIVE RECEPTORS

Receptors in the Project study area are described below and shown on Exhibit 3-A. Localized air quality impacts were evaluated at sensitive receptor land uses nearest the Project site. All distances are measured from the Project site boundary to the outdoor living areas (e.g., backyards) or at the building façade, whichever is closer to the Project site. The selection of receptor locations is based on Federal Highway Administration (FHWA) guidelines and is consistent with additional guidance provided by California Department of Transportation (Caltrans) and the Federal Transit Administration (FTA), as such receptor locations are located in outdoor living areas (e.g., backyards) at 10 feet from any existing or proposed barriers or at the building façade, whichever is closer to the Project site.

R1: Location R1 represents the Murrieta Valley High, approximately 526 feet northeast of the Project site.

R2: Location R2 represents the existing residence at 24200 Hayes Avenue, approximately 142 feet east of the Project site. Receiver R2 is placed at the residential building façade.

R3: Location R3 represents the existing residence at 24104 Golden Mist Drive, approximately 156 feet south of the Project site. Receiver R3 is placed behind the existing 6-foot high barrier in the private outdoor living area (backyard).

R4: Location R4 represents the existing residence at 42512 Sherry Lane, approximately 85 feet southwest of the Project site. Receiver R4 is placed behind the existing 6-foot high barrier in the private outdoor living area (backyard).

R5: Location R5 represents the existing residence at 42515 Sherry Lane, approximately 91 feet west of the Project site. Receiver R5 is placed behind the existing 6-foot high barrier in the private outdoor living area (backyard).

R6: Location R6 represents the existing residence at 24112 Semillon Lane, approximately 86 feet west of the Project site. Receiver R5 is placed behind the existing 6-foot high barrier in the private outdoor living area (backyard).

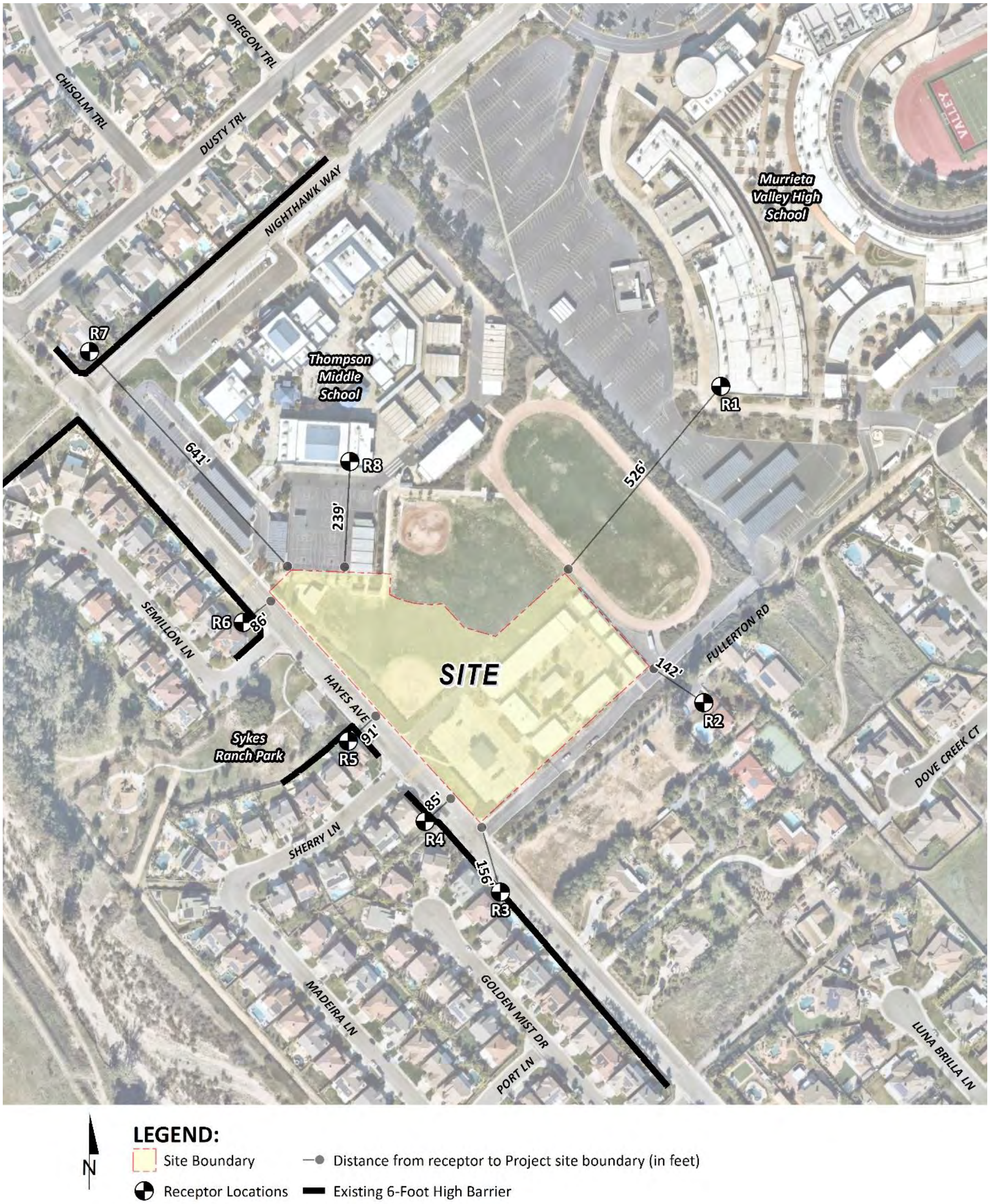
R7: Location R7 represents the existing residence at 42491 Dusty Trail, approximately 641 feet northwest of the Project site. Receiver R7 is placed behind the existing 6-foot high barrier in the private outdoor living area (backyard).

R8: Location R1 represents the existing Thompson Middle School, approximately 239 feet north of the Project site.

The SCAQMD recommends that the nearest sensitive receptor be considered when determining the Project's potential to cause an individual and cumulatively significant impact. The nearest land use where an individual could remain for 24 hours to the Project site (in this case the nearest residential land use) has been used to determine localized construction and operational air quality impacts for emissions of PM_{10} and $PM_{2.5}$ (since PM_{10} and $PM_{2.5}$ thresholds are based on a 24 hour averaging time). As such, nearest receptor to evaluate localized impacts of PM_{10} and $PM_{2.5}$, is the existing residential home represented by R4, located roughly 85 feet/26 meters southwest of the Project site at 42512 Sherry Lane.

As previously stated, and consistent with *LST* Methodology, the nearest industrial/commercial use to the Project site is used to determine construction and operational LST air impacts for emissions of NO_2 and CO as the averaging periods for these pollutants are shorter (eight hours or less) and it is reasonable to assumed that an individual could be present at these sites for periods of 1 to 8 hours. Based on Exhibit 3-A, there are no industrial/commercial receptors closer than the residential home located at R4. As such, the same 26-meter distance used for evaluation of PM_{10} and $PM_{2.5}$ will be used for evaluation of localized NO_2, and CO.

EXHIBIT 3-A: SENSITIVE RECEPTOR LOCATIONS



3.7 CONSTRUCTION-SOURCE EMISSIONS LST ANALYSIS

3.7.1 LOCALIZED THRESHOLDS FOR CONSTRUCTION ACTIVITY

As previously stated, this AQIA assumes that the total acreage disturbed 5 acres per day for site preparation, grading, and demolition activities. The *LST Methodology* provides look-up tables for sites with an area with daily disturbance of 5 acres or less. The 5-acre LST look-up tables can be used as a screening tool to determine which pollutants require additional detailed analysis. This approach is conservative as it assumes that all on-site emissions associated with the project would occur within a concentrated 5-acre area. This screening method would therefore over-predict potential localized impacts, because by assuming that on-site construction activities are occurring over a smaller area, the resulting concentrations of air pollutants are more highly concentrated once they reach the smaller site boundary than they would be for activities if they were spread out over a larger surface area. On a larger site, the same amount of air pollutants generated would disperse over a larger surface area and would result in a lower concentration once emissions reach the project-site boundary. As such, LSTs for a 5-acre site during construction are used as a screening tool to determine if further detailed analysis is required. The thresholds used in for the construction-source LST analysis are presented below in Table 3-7.

TABLE 3-7: MAXIMUM DAILY LOCALIZED EMISSIONS THRESHOLDS

Pollutant	Construction Localized Thresholds
NO_X	373 lbs/day (Site Preparation)
	373 lbs/day (Grading)
	373 lbs/day (Demolition)
CO	1,995 lbs/day (Site Preparation)
	1,995 lbs/day (Grading)
	1,995 lbs/day (Demolition)
PM_{10}	14 lbs/day (Site Preparation)
	14 lbs/day (Grading)
	14 lbs/day (Demolition)
$PM_{2.5}$	8 lbs/day (Site Preparation)
	8 lbs/day (Grading)
	8 lbs/day (Demolition)

3.7.2 LOCALIZED CONSTRUCTION-SOURCE EMISSIONS

Table 3-8 identifies the localized impacts at the nearest receptor location in the vicinity of the Project. Without mitigation, localized construction emissions would not exceed the applicable SCAQMD LSTs for emissions of any criterial pollutant. Outputs from the model runs for unmitigated construction LSTs are provided in Appendix 3.1.

TABLE 3-8: LOCALIZED SIGNIFICANCE SUMMARY OF CONSTRUCTION – WITHOUT MITIGATION

On-Site Site Preparation Emissions	Emissions (lbs/day)			
	NO_X	CO	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions	**50.41**	**20.01**	**11.27**	**6.08**
SCAQMD Localized Threshold	373	1,995	14	8
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**
On-Site Grading Emissions	**Emissions (lbs/day)**			
	NO_X	CO	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions	**33.85**	**15.50**	**5.77**	**2.76**
SCAQMD Localized Threshold	373	1,995	14	8
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**
On-Site Demolition Emissions	**Emissions (lbs/day)**			
	NO_X	CO	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions	**21.48**	**19.64**	**1.29**	**0.97**
SCAQMD Localized Threshold	373	1,995	14	8
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

Source: CalEEMod unmitigated localized construction-source emissions are presented in Appendix 3.1.

3.8 OPERATIONAL-SOURCE EMISSIONS LST ANALYSIS

The development of the proposed Project is located on 4.51 acres. As previously stated, the proposed Project includes the development of 41,500 sf of classrooms and administrative offices, an associated parking lot, and other site improvements to replace an existing campus of 22,500 sf of portable classrooms. According to SCAQMD LST methodology, LSTs would apply to the operational phase of a proposed project, if the project includes stationary sources, or attracts mobile sources that may spend long periods queuing and idling at the site (e.g., transfer facilities and warehouse buildings). The proposed project does not include such uses, and thus, due to the lack of significant stationary source emissions, no long-term localized significance threshold analysis is needed.

3.9 CO "HOT SPOT" ANALYSIS

As discussed below, the Project would not result in potentially adverse CO concentrations or "hot spots." Further, detailed modeling of Project-specific CO "hot spots" is not needed to reach this conclusion. An adverse CO concentration, known as a "hot spot", would occur if an exceedance of the state one-hour standard of 20 ppm or the eight-hour standard of 9 ppm were to occur. At the time of the SCAQMD's *CEQA Air Quality Handbook (1993)* (*1993 CEQA Handbook*), the SCAB was designated nonattainment under the CAAQS and NAAQS for CO (27).

It has long been recognized that CO hotspots are caused by vehicular emissions, primarily when idling at congested intersections. In response, vehicle emissions standards have become increasingly stringent in the last twenty years. Currently, the allowable CO emissions standard in

California is a maximum of 3.4 grams/mile for passenger cars (there are requirements for certain vehicles that are more stringent). With the turnover of older vehicles, introduction of cleaner fuels, and implementation of increasingly sophisticated and efficient emissions control technologies, CO concentration in the SCAB is now designated as attainment.

To establish a more accurate record of baseline CO concentrations affecting the SCAB, a CO "hot spot" analysis was conducted in 2003 for four busy intersections in Los Angeles at the peak morning and afternoon time periods. This "hot spot" analysis did not predict any violation of CO standards, as shown on Table 3-9.

TABLE 3-9: CO MODEL RESULTS

Intersection Location	CO Concentrations (ppm)		
	Morning 1-hour	Afternoon 1-hour	8-hour
Wilshire Boulevard/Veteran Avenue	4.6	3.5	3.7
Sunset Boulevard/Highland Avenue	4	4.5	3.5
La Cienega Boulevard/Century Boulevard	3.7	3.1	5.2
Long Beach Boulevard/Imperial Highway	3	3.1	8.4

Source: 2003 AQMP, Appendix V: Modeling and Attainment Demonstrations
Notes: Federal 1-hour standard is 35 ppm and the deferral 8-hour standard is 9.0 ppm.

Based on the SCAQMD's *2003 AQMP* and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan), peak carbon monoxide concentrations in the SCAB were a result of unusual meteorological and topographical conditions and not a result of traffic volumes and congestion at a particular intersection. As evidence of this, for example, 9.3 ppm 8-hour CO concentration measured at the Long Beach Blvd. and Imperial Hwy. intersection (highest CO generating intersection within the "hot spot" analysis), only 0.7 ppm was attributable to the traffic volumes and congestion at this intersection; the remaining 8.6 ppm were due to the ambient air measurements at the time the *2003 AQMP* was prepared (28). In contrast, an adverse CO concentration, known as a "hot spot", would occur if an exceedance of the state one-hour standard of 20 ppm or the eight-hour standard of 9 ppm were to occur. The ambient 1-hour and 8-hour CO concentration within the Project study area is estimated to be 4.7 ppm and 3.5 ppm, respectively (data from South Central Los Angeles County Monitoring Station for 2018). Therefore, even if the traffic volumes for the proposed Project were double or even triple of the traffic volumes generated at the Long Beach Boulevard and Imperial Highway intersection, coupled with the on-going improvements in ambient air quality, the Project would not be capable of resulting in a CO "hot spot" at any study area intersections. Similar considerations are also employed by other Air Districts when evaluating potential CO concentration impacts. More specifically, the Bay Area Air Quality Management District (BAAQMD) concludes that under existing and future vehicle emission rates, a given project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour (vph) —or 24,000 vehicles per hour where vertical and/or horizontal air does not mix—in order to generate a significant CO impact (29).

As shown on Table 3-10, the *2003 AQMP* determined that the highest traffic volumes on a segment of road is 8,674 vph on La Cienega Boulevard and Century Boulevard. As summarized on Table 3-11, the highest trips on a segment of road for the proposed Project is 2,972 vph Washington Avenue and Nutmeg Street (23). As such, Project-related traffic volumes are less than the traffic volumes identified in the *2003 AQMP*. The Project considered herein would not produce the volume of traffic required to generate a CO "hot spot" either in the context of the 2003 Los Angeles hot spot study or based on representative BAAQMD CO threshold considerations. Therefore, CO "hot spots" are not an environmental impact of concern for the Project. Localized air quality impacts related to mobile-source emissions would therefore be less than significant.

TABLE 3-10: TRAFFIC VOLUMES

Intersection Location	Peak Traffic Volumes (vph)				
	Eastbound (AM/PM)	Westbound (AM/PM)	Southbound (AM/PM)	Northbound (AM/PM)	Total (AM/PM)
Wilshire Boulevard/Veteran Avenue	4,954/2,069	1,830/3,317	721/1,400	560/933	8,062/7,719
Sunset Boulevard/ Highland Avenue	1,417/1,764	1,342/1,540	2,304/1,832	1,551/2,238	6,614/5,374
La Cienega Boulevard/ Century Boulevard	2,540/2,243	1,890/2,728	1,384/2,029	821/1,674	6,634/8,674
Long Beach Boulevard/ Imperial Highway	1,217/2,020	1,760/1,400	479/944	756/1,150	4,212/5,514

Source: 2003 AQMP

TABLE 3-11: PROJECT PEAK HOUR TRAFFIC VOLUMES

Intersection Location	Peak Traffic Volumes (vph)				
	Eastbound (AM/PM)	Westbound (AM/PM)	Southbound (AM/PM)	Northbound (AM/PM)	Total (AM/PM)
Washington Avenue/ Nutmeg Street	700/936	1,085/700	565/277	622/900	2,972/2,813
Washington Avenue/ Nighthawk Way	709/843	756/622	273/104	1,046/229	2,784/1,798
Washington Avenue/ Lemon Street	440/748	1,113/725	149/89	569/337	2,271/1,899
Washington Avenue/ Kalmia Street	860/1,031	377/396	1,104/783	112/163	2,453/2,373

Source: *Murrieta Canyon Academy Traffic Impact Study* (RK Engineering Group, Inc., 2020)

3.10 AIR QUALITY MANAGEMENT PLANNING

The Project site is located within the SCAB, which is characterized by relatively poor air quality. The SCAQMD has jurisdiction over an approximately 10,743 square-mile area consisting of the four-county Basin and the Los Angeles County and Riverside County portions of what use to be referred to as the Southeast Desert Air Basin. In these areas, the SCAQMD is principally responsible for air pollution control, and works directly with the SCAG, county transportation commissions, local governments, as well as state and federal agencies to reduce emissions from stationary, mobile, and indirect sources to meet state and federal ambient air quality standards.

Currently, these state and federal air quality standards are exceeded in most parts of the SCAB. In response, the SCAQMD has adopted a series of AQMPs to meet the state and federal ambient air quality standards. AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy.

In March 2017, the SCAQMD released the *2016 AQMP*. The *2016 AQMP* continues to evaluate current integrated strategies and control measures to meet the NAAQS, as well as, explore new and innovative methods to reach its goals. Some of these approaches include utilizing incentive programs, recognizing existing co-benefit programs from other sectors, and developing a strategy with fair-share reductions at the federal, state, and local levels (30). Similar to the 2012 AQMP, the *2016 AQMP* incorporates scientific and technological information and planning assumptions, including the *2016-2040 RTP/SCS*, a planning document that supports the integration of land use and transportation to help the region meet the CAA requirements (17). The Project's consistency with the AQMP will be determined using the *2016 AQMP* as discussed below.

Criteria for determining consistency with the AQMP are defined in Chapter 12, Section 12.2 and Section 12.3 of the *1993 CEQA Handbook* (31). These indicators are discussed below:

3.10.1 CONSISTENCY CRITERION NO. 1

The proposed Project will not result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations or delay the timely attainment of air quality standards or the interim emissions reductions specified in the AQMP.

The violations that Consistency Criterion No. 1 refers to are the CAAQS and NAAQS. CAAQS and NAAQS violations would occur if regional or localized significance thresholds were exceeded.

Construction Impacts – Consistency Criterion 1

Consistency Criterion No. 1 refers to violations of the CAAQS and NAAQS. CAAQS and NAAQS violations would occur if LSTs or regional significance thresholds were exceeded. As evaluated, after implementation of MM AQ-1, the Project's regional and localized construction-source emissions would not exceed applicable regional significance threshold and LST thresholds. As such, a less than significant impact is expected.

Operational Impacts – Consistency Criterion 1

Consistency Criterion No. 1 refers to violations of the CAAQS and NAAQS. CAAQS and NAAQS violations would occur if LSTs or regional significance thresholds were exceeded. As evaluated, the Project's regional and localized operational-source emissions would not exceed applicable regional significance threshold and LST thresholds. As such, a less than significant impact is expected.

On the basis of the preceding discussion, the Project is determined to be consistent with the first criterion.

3.10.2 CONSISTENCY CRITERION NO. 2

The Project will not exceed the assumptions in the AQMP based on the years of Project build-out phase.

The 2016 AQMP demonstrates that the applicable ambient air quality standards can be achieved within the timeframes required under federal law. Growth projections from local general plans adopted by cities in the district are provided to the SCAG, which develops regional growth forecasts, which are then used to develop future air quality forecasts for the AQMP. Development consistent with the growth projections in City of Murrieta General Plan is considered to be consistent with the AQMP.

Construction Impacts – Consistency Criterion 2

Peak day emissions generated by construction activities are largely independent of land use assignments, but rather are a function of development scope and maximum area of disturbance. Irrespective of the site's land use designation, development of the site to its maximum potential would likely occur, with disturbance of the entire site occurring during construction activities.

Operational Impacts – Consistency Criterion 2

The City of Murrieta General Plan designates the Project site as Civic/Institutional (C/I) land uses. The C/I designation provides for public and quasi-public uses such as hospitals, government offices, schools, museums, libraries, public safety facilities, water and sewer treatment plants, and publicly or privately owned places intended for public assembly (32). As previously stated, the total development is proposed to consist of 41,500 sf of classrooms and administrative offices, an associated parking lot, and other site improvements to replace an existing campus of 22,500 sf of portable classrooms. The uses proposed by the Project are consistent with the City's land use designation. Additionally, the Project's construction and operational-source air pollutant emissions would not exceed the regional or localized significance thresholds.

On the basis of the preceding discussion, the Project is determined to be consistent with the second criterion.

AQMP CONSISTENCY CONCLUSION

The Project would not result in or cause NAAQS or CAAQS violations. The proposed Project is consistent with the land use and growth intensities reflected in the adopted General Plan. Furthermore, the Project would not exceed any applicable regional or local thresholds. As such, the Project is therefore considered to be consistent with the AQMP.

3.11 POTENTIAL IMPACTS TO SENSITIVE RECEPTORS

The potential impact of Project-generated air pollutant emissions at sensitive receptors has also been considered. Sensitive receptors can include uses such as long-term health care facilities, rehabilitation centers, and retirement homes. Residences, schools, playgrounds, childcare centers, and athletic facilities can also be considered as sensitive receptors.

Results of the LST analysis indicate that, the Project would not exceed the SCAQMD localized significance thresholds during construction. Therefore, sensitive receptors would not be exposed to substantial pollutant concentrations during Project construction.

Results of the LST analysis indicate that the Project would not exceed the SCAQMD localized significance thresholds during operational activity. Further Project traffic would not create or result in a CO "hotspot." Therefore, sensitive receptors would not be exposed to substantial pollutant concentrations as the result of Project operations.

3.11.1 TOXIC AIR POLLUTANTS – PROJECT CONSTRUCTION

The construction equipment would emit diesel particulate matter (DPM), which is a carcinogen, However, the DPM emissions would be short-term in nature. Determination of risk from DPM is considered over a 70-year exposure time. As such, considering the short time frame for construction, exposure to DPM during construction is anticipated to be less than significant.

3.11.2 FRIANT RANCH CASE

In December 2018, in the case of *Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, California Supreme Court held that an EIR's air quality analysis must meaningfully connect the identified air quality impacts to the human health consequences of those impacts, or meaningfully explain why that analysis cannot be provided. As noted in the Brief of Amicus Curiae by the SCAQMD in the Friant Ranch case (April 6, 2015, Appendix 3.4) (*Brief*), SCAQMD has among the most sophisticated air quality modeling and health impact evaluation capability of any of the air districts in the State, and thus it is uniquely situated to express an opinion on how lead agencies should correlate air quality impacts with specific health outcomes (33).

The SCAQMD discusses that it may be infeasible to quantify health risks caused by projects similar to the proposed Project, due to many factors. It is necessary to have data regarding the sources and types of air toxic contaminants, location of emission points, velocity of emissions, the meteorology and topography of the area, and the location of receptors (worker and residence) (33). The *Brief* states that it may not be feasible to perform a health risk assessment for airborne toxics that will be emitted by a generic industrial building that was built on "speculation" (i.e., without knowing the future tenant(s))[4] (33). Even where a health risk assessment can be prepared, however, the resulting maximum health risk value is only a calculation of risk--it does not necessarily mean anyone will contract cancer as a result of the Project (33). The *Brief* also

---

[4] It should also be noted that the actual occurrence of specific health conditions is based on numerous other factors that are infeasible to quantify, such as an individual's genetic predisposition, diet, exercise regiment, stress, and other behavioral characteristics.

cites the author of CARB's methodology, which reported that a $PM_{2.5}$ methodology is not suited for small projects and may yield unreliable results (33). Similarly, SCAQMD staff does not currently know of a way to accurately quantify O_3-related health impacts caused by NO_X or VOC emissions from relatively small projects, due to photochemistry and regional model limitations (33). The *Brief* concludes, with respect to the Friant Ranch EIR, that although it may have been technically possible to plug the data into a methodology, the results would not have been reliable or meaningful (33).

On the other hand, for extremely large regional projects (unlike the proposed Project), the SCAQMD states that it has been able to correlate potential health outcomes for very large emissions sources – as part of their rulemaking activity, specifically 6,620 lbs/day of NO_X and 89,180 lbs/day of VOC were expected to result in approximately 20 premature deaths per year and 89,947 school absences due to O_3 (33).

The proposed Project does not generate anywhere near 6,620 lbs/day of NO_X or 89,190 lbs/day of VOC emissions. The proposed Project would generate 87.66 lbs/day of NO_X during construction and 13.80 lbs/day of NO_X during operations (1.32% and 0.21% of 6,620 lbs/day, respectively). The Project would also generate 16.66 lbs/day of VOC emissions during construction and 4.27 lbs/day of VOC emissions during operations (0.02% and 0.01% of 89,190 lbs/day, respectively). Therefore, the proposed Project's emissions are not sufficiently high enough to use a regional modeling program to correlate health effects on a basin-wide level.

Notwithstanding, this AQIA does evaluate the proposed Project's localized impact to air quality for emissions of CO, NO_X, PM_{10}, and $PM_{2.5}$ by comparing the Proposed Project's on-site emissions to the SCAQMD's applicable LST thresholds. As evaluated in this AQIA, the proposed Project would not result in emissions that exceeded the SCAQMD's LSTs. Therefore, the proposed Project would not be expected to exceed the most stringent applicable federal or state ambient air quality standards for emissions of CO, NO_X, PM_{10}, and $PM_{2.5}$.

3.12 ODORS

The potential for the Project to generate objectionable odors has also been considered. Land uses generally associated with odor complaints include:

- Agricultural uses (livestock and farming)
- Wastewater treatment plants
- Food processing plants
- Chemical plants
- Composting operations
- Refineries
- Landfills
- Dairies
- Fiberglass molding facilities

The Project does not contain land uses typically associated with emitting objectionable odors. Potential odor sources associated with the proposed Project may result from construction equipment exhaust and the application of asphalt and architectural coatings during construction activities and the temporary storage of typical solid waste (refuse) associated with the proposed Project's (long-term operational) uses. Standard construction requirements would minimize odor impacts from construction. The construction odor emissions would be temporary, short-term, and intermittent in nature and would cease upon completion of the respective phase of construction and is thus considered less than significant. It is expected that Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with the City's solid waste regulations. The proposed Project would also be required to comply with SCAQMD Rule 402 to prevent occurrences of public nuisances. Therefore, odors associated with the proposed Project construction and operations would be less than significant and no mitigation is required (34).

3.13 CUMULATIVE IMPACTS

As previously shown in Table 2-3, the CAAQS designate the Project site as nonattainment for O_3 PM_{10}, and $PM_{2.5}$ while the NAAQS designates the Project site as nonattainment for O_3 and $PM_{2.5}$.

The SCAQMD has published a report on how to address cumulative impacts from air pollution: *White Paper on Potential Control Strategies to Address Cumulative Impacts from Air Pollution* (35). In this report the SCAQMD clearly states (Page D-3):

> *"…the [SC]AQMD uses the same significance thresholds for project specific and cumulative impacts for all environmental topics analyzed in an Environmental Assessment or Environmental Impact Report (EIR). The only case where the significance thresholds for project specific and cumulative impacts differ is the Hazard Index (HI) significance threshold for Toxic Air Contaminants (TAC) emissions. The project specific (project increment) significance threshold is HI > 1.0 while the cumulative (facility-wide) is HI > 3.0. It should be noted that the HI is only one of three TAC emission significance thresholds considered (when applicable) in a CEQA analysis. The other two are the maximum individual cancer risk (MICR) and the cancer burden, both of which use the same significance thresholds (MICR of 10 in 1 million and cancer burden of 0.5) for project specific and cumulative impacts.*
>
> *Projects that exceed the project-specific significance thresholds are considered by the SCAQMD to be cumulatively considerable. This is the reason project-specific and cumulative significance thresholds are the same. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant."*

Therefore, this analysis assumes that individual projects that do not generate operational or construction emissions that exceed the SCAQMD's recommended daily thresholds for project-specific impacts would also not cause a cumulatively considerable increase in emissions for those pollutants for which the SCAB is in nonattainment, and, therefore, would not be considered to have a significant, adverse air quality impact. Alternatively, individual project-related construction and operational emissions that exceed SCAQMD thresholds for project-specific impacts would be considered cumulatively considerable.

CONSTRUCTION IMPACTS

Project construction-source air pollutant emissions would not exceed the SCAQMD regional thresholds for any criteria pollutant. Project construction-source emissions would be considered less than significant on a project-specific and cumulative basis.

OPERATIONAL IMPACTS

Project operational-source air pollutant emissions would not exceed the SCAQMD regional thresholds for any criteria pollutant. Project operational-source emissions would be considered less than significant on a project-specific and cumulative basis.

This page intentionally left blank

4 REFERENCES

1. **State of California.** *2019 CEQA California Environmental Quality Act.* 2019.
2. **South Coast Air Quality Management District.** RULE 403. FUGITIVE DUST. [Online] https://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf?sfvrsn=4.
3. —. RULE 1113. Architectural Coatings. [Online] http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1113.pdf.
4. —. Southern California Air Basins. [Online] https://www.arb.ca.gov/msprog/onroad/porttruck/maps/scabc7map.pdf.
5. —. *Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning.* 2005.
6. **St. Croix Sensory, Inc.** *The "Gray Line" Between Odor Nuisance and Health Effects.* 2000.
7. **California Air Resources Board.** Ambient Air Quality Standards (AAQS). [Online] 2016. http://www.arb.ca.gov/research/aaqs/aaqs2.pdf.
8. **United State Environmental Protection Agency.** Frequent Questions about General Conformity . *EPA.* [Online] https://www.epa.gov/general-conformity/frequent-questions-about-general-conformity#8.
9. **South Coast Air Quality Management District.** Annual Air Quality Monitoring Network Plan. [Online] July 2018. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-monitoring-network-plan/annual-air-quality-monitoring-network-plan-v2.pdf?sfvrsn=2.
10. **Air Resources Board.** State and National Ambient Air Quality Standards. [Online] https://www.arb.ca.gov/regact/2019/stateareadesignations/appc.pdf?_ga=2.169398369.1537615702.1554741141-1192937971.1505156621.
11. **District, South Coast Air Quality Management.** Air Quality Data Tables. [Online] https://www.aqmd.gov/home/air-quality/air-quality-data-studies/historical-data-by-year.
12. **Environmental Protection Agency.** National Ambient Air Quality Standards (NAAQS). [Online] 1990. https://www.epa.gov/environmental-topics/air-topics.
13. —. Air Pollution and the Clean Air Act. [Online] http://www.epa.gov/air/caa/.
14. **United States Environmental Protection Agency.** 1990 Clean Air Act Amendment Summary: Title I. [Online] https://www.epa.gov/clean-air-act-overview/1990-clean-air-act-amendment-summary-title-i.
15. —. 1990 Clean Air Act Amendment Summary: Title II. [Online] https://www.epa.gov/clean-air-act-overview/1990-clean-air-act-amendment-summary-title-ii.
16. **Air Resources Board.** California Ambient Air Quality Standards (CAAQS). [Online] 2009. [Cited: April 16, 2018.] http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm.
17. **Southern California Association of Governments.** 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy. [Online] April 2016. http://scagrtpscs.net/Documents/2016/final/f2016RTPSCS.pdf.
18. **South Coast Air Quality Management District (SCAQMD).** SCAQMD Air Quality Significance Thresholds. [Online] http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2.
19. **California Air Pollution Control Officers Association (CAPCOA).** California Emissions Estimator Model (CalEEMod). [Online] September 2016. www.caleemod.com.

20. **California Department of Transportation.** EMFAC Software. [Online] http://www.dot.ca.gov/hq/env/air/pages/emfac.htm.
21. **California Air Pollution Control Officers Association (CAPCOA).** Appendix A: Calculation Details for CalEEMod. *CalEEMod.* [Online] October 2017. http://www.aqmd.gov/docs/default-source/caleemod/02_appendix-a2016-3-2.pdf?sfvrsn=6.
22. **City of Murrieta.** Final EIR Murrieta General Plan 2035. *Section 5.7: Noise.* [Online] https://www.murrietaca.gov/DocumentCenter/View/789/05-07---Noise-PDF.
23. **RK Engineering Group, Inc.** *Murrieta Canyon Academy Expansion Traffic Impact Study.* 2020.
24. **South Coast Air Quality Management District.** *Localized Significance Thresholds Methodology.* s.l. : South Coast Air Quality Managment District, 2003.
25. **Lake Environmental.** US EPA Models. *Lake Environmental.* [Online] http://www.weblakes.com/download/us_epa.html.
26. **South Coast Air Quality Management District.** Fact Sheet for Applying CalEEMod to Localized Significance Thresholds. [Online] http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/caleemod-guidance.pdf.
27. —. 2003 Air Quality Management Plan. [Online] 2003. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2003-air-quality-management-plan/2003-aqmp-appendix-v.pdf.
28. —. 2003 Air Quality Management Plan. [Online] 2003. https://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/2003-aqmp.
29. **Bay Area Air Quality Management District.** [Online] http://www.baaqmd.gov/.
30. **South Coast Air Quality Management District.** Final 2016 Air Quality Management Plan (AQMP). [Online] March 2017. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/final-2016-aqmp/final2016aqmp.pdf?sfvrsn=11.
31. —. *CEQA Air Quality Handbook (1993).* 1993.
32. **City of Murrieta.** *Murrieta General Plan 2035.* 2011.
33. **South Coast Air Quality Management District.** Sierra Club, Revive the San Joaquin and League of Women Voters of Fresno, Plaintiffs and Appellants, v. County of Fresno, Defendant and Respondent and, Friant Ranchm L.P. Real Party in Interest and Respondent. [Online] 2015. https://www.courts.ca.gov/documents/9-s219783-ac-south-coast-air-quality-mgt-dist-041315.pdf.
34. —. RULE 402 NUISANCE. [Online] http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-402.pdf.
35. **Goss, Tracy A and Kroeger, Amy.** White Paper on Potential Control Strategies to Address Cumulative Impacts from Air Pollution. [Online] South Coast Air Quality Management District, 2003. http://www.aqmd.gov/rules/ciwg/final_white_paper.pdf.

This page intentionally left blank

5 CERTIFICATIONS

The contents of this air study report represent an accurate depiction of the environmental impacts associated with the proposed Murrieta Canyon Academy Project. The information contained in this air quality impact report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5987.

Haseeb Qureshi
Associate Principal
URBAN CROSSROADS, INC.
260 E. Baker St., Suite 200
Costa Mesa, CA 92626
(949) 336-5987
hqureshi@urbanxroads.com

EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Environmental Site Assessment – American Society for Testing and Materials • June 2013
Planned Communities and Urban Infill – Urban Land Institute • June 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August 2007
AB2588 Regulatory Standards – Trinity Consultants • November 2006
Air Dispersion Modeling – Lakes Environmental • June 2006

This page intentionally left blank

APPENDIX 2.1:

STATE/FEDERAL ATTAINMENT STATUS OF CRITERIA POLLUTANTS

APPENDIX C

MAPS AND TABLES OF AREA DESIGNATIONS FOR STATE AND NATIONAL AMBIENT AIR QUALITY STANDARDS

[This page intentionally left blank]

APPENDIX C

MAPS AND TABLES OF AREA DESIGNATIONS FOR STATE AND NATIONAL AMBIENT AIR QUALITY STANDARDS

This attachment fulfills the requirement of Health and Safety Code section 40718 for CARB to publish maps that identify areas where one or more violations of any State ambient air quality standard (State standard) or national ambient air quality standard (national standard) have been measured. The national standards are those promulgated under section 109 of the federal Clean Air Act (42 U.S.C. 7409).

This attachment is divided into three parts. The first part comprises a table showing the levels, averaging times, and measurement methods for each of the State and national standards. This is followed by a section containing maps and tables showing the area designations for each pollutant for which there is a State standard in the California Code of Regulations, title 17, section 70200. The last section contains maps and tables showing the most current area designations for the national standards.

Ambient Air Quality Standards

(Updated 5/4/16)

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m³)		0.070 ppm (137 µg/m³)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	12.0 µg/m³	15 µg/m³	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m³)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m³)		9 ppm (10 mg/m³)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m³)	Gas Phase Chemiluminescence	100 ppb (188 µg/m³)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m³)		0.053 ppm (100 µg/m³)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m³)	Ultraviolet Fluorescence	75 ppb (196 µg/m³)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m³)	
	24 Hour	0.04 ppm (105 µg/m³)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m³	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m³ (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m³		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

See footnotes on next page …

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of the CARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.

8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

12. The CARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

14. In 1989, the CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

[This page intentionally left blank]

Area Designations for the State Ambient Air Quality Standards

The following maps and tables show the area designations for each pollutant with a State standard set forth in the California Code of Regulations, title 17, section 60200. Each area is identified as attainment, nonattainment, nonattainment-transitional, or unclassified for each pollutant, as shown below:

Attainment	A
Nonattainment	N
Nonattainment-Transitional	NA-T
Unclassified	U

In general, CARB designates areas by air basin for pollutants with a regional impact and by county for pollutants with a more local impact. However, when there are areas within an air basin or county with distinctly different air quality deriving from sources and conditions not affecting the entire air basin or county, CARB may designate a smaller area. Generally, when boundaries of the designated area differ from the air basin or county boundaries, the description of the specific area is referenced at the bottom of the summary table.

FIGURE 1

Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 1

California Ambient Air Quality Standards
Area Designations for Ozone [(1)]

	N	NA-T	U	A		N	NA-T	U	A
GREAT BASIN VALLEYS AIR BASIN					NORTHEAST PLATEAU AIR BASIN				X
Alpine County			X		SACRAMENTO VALLEY AIR BASIN				
Inyo County	X				Colusa and Glenn Counties				X
Mono County	X				Sutter/Yuba Counties				
LAKE COUNTY AIR BASIN				X	Sutter Buttes	X			
LAKE TAHOE AIR BASIN				X	Remainder of Sutter County				X
MOJAVE DESERT AIR BASIN	X				Yuba County				X
MOUNTAIN COUNTIES AIR BASIN					Yolo/Solano Counties		X		
Amador County	X				Remainder of Air Basin	X			
Calaveras County	X				SALTON SEA AIR BASIN	X			
El Dorado County (portion)	X				SAN DIEGO AIR BASIN	X			
Mariposa County	X				SAN FRANCISCO BAY AREA AIR BASIN	X			
Nevada County	X				SAN JOAQUIN VALLEY AIR BASIN	X			
Placer County (portion)	X				SOUTH CENTRAL COAST AIR BASIN				
Plumas County			X		San Luis Obispo County	X			
Sierra County			X		Santa Barbara County		X		
Tuolumne County	X				Ventura County	X			
NORTH CENTRAL COAST AIR BASIN		X			SOUTH COAST AIR BASIN	X			
NORTH COAST AIR BASIN				X					

(1) AB 3048 (Olberg) and AB 2525 (Miller) signed into law in 1996, made changes to Health and Safety Code, section 40925.5. One of the changes allows nonattainment districts to become nonattainment-transitional for ozone by operation of law.

FIGURE 2

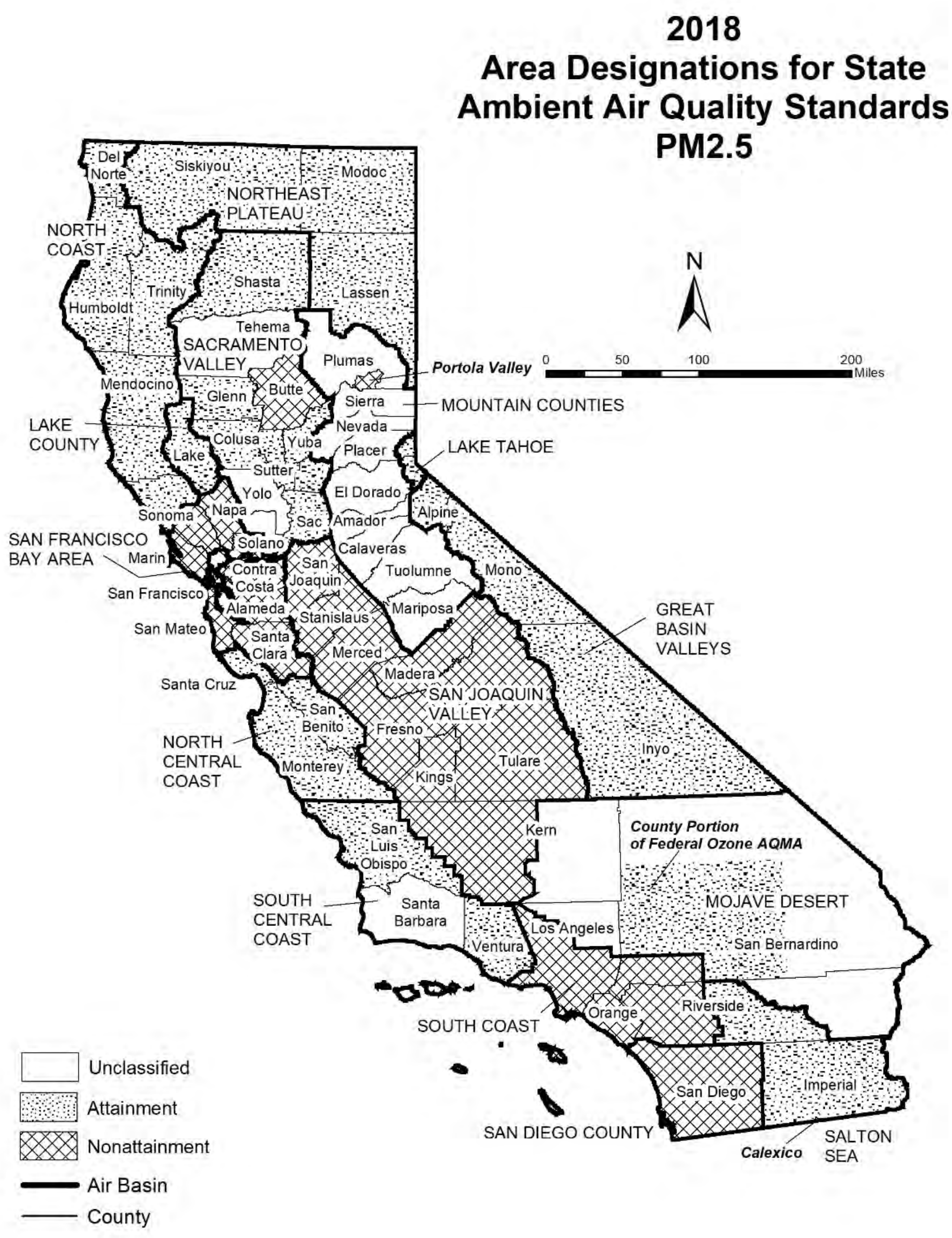

2018
Area Designations for State
Ambient Air Quality Standards
PM10
Del Norte
Siskiyou
Modoc
NORTHEAST PLATEAU
NORTH COAST
Trinity
Shasta
Lassen
Humboldt
Tehama
SACRAMENTO VALLEY
Plumas
Mendocino
Glenn
Butte
Sierra
MOUNTAIN COUNTIES
LAKE COUNTY
Nevada
Colusa
Yuba
Placer
LAKE TAHOE
Lake
Sutter
Yolo
El Dorado
Alpine
Sonoma
Napa
Sac
Amador
Yosemite NP
SAN FRANCISCO BAY AREA
Solano
Calaveras
Marin
Contra Costa
San Joaquin
Tuolumne
Mono
San Francisco
Alameda
Stanislaus
Mariposa
GREAT BASIN VALLEYS
San Mateo
Santa Clara
Merced
Madera
Santa Cruz
SAN JOAQUIN VALLEY
San Benito
NORTH CENTRAL COAST
Fresno
Inyo
Monterey
Tulare
Kings
San Luis Obispo
Kern
MOJAVE DESERT
Santa Barbara
Los Angeles
San Bernardino
Ventura
SOUTH CENTRAL COAST
Orange
Riverside
SOUTH COAST
San Diego
Imperial
SAN DIEGO COUNTY
SALTON SEA
N
0 50 100 200 Miles
Unclassified
Attainment
Nonattainment
Air Basin
County
Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 2

California Ambient Air Quality Standards
Area Designation for Suspended Particulate Matter (PM10)

	N	U	A		N	U	A
GREAT BASIN VALLEYS AIR BASIN	X			NORTH CENTRAL COAST AIR BASIN	X		
LAKE COUNTY AIR BASIN			X	NORTH COAST AIR BASIN			
LAKE TAHOE AIR BASIN	X			Del Norte, Sonoma (portion) and Trinity Counties			X
MOJAVE DESERT AIR BASIN	X			Remainder of Air Basin	X		
MOUNTAIN COUNTIES AIR BASIN				NORTHEAST PLATEAU AIR BASIN			
Amador County		X		Siskiyou County			X
Calaveras County	X			Remainder of Air Basin		X	
El Dorado County (portion)	X			SACRAMENTO VALLEY AIR BASIN			
Mariposa County				Shasta County			X
- Yosemite National Park	X			Remainder of Air Basin	X		
- Remainder of County		X		SALTON SEA AIR BASIN	X		
Nevada County	X			SAN DIEGO AIR BASIN	X		
Placer County (portion)	X			SAN FRANCISCO BAY AREA AIR BASIN	X		
Plumas County	X			SAN JOAQUIN VALLEY AIR BASIN	X		
Sierra County	X			SOUTH CENTRAL COAST AIR BASIN	X		
Tuolumne County		X		SOUTH COAST AIR BASIN	X		

FIGURE 3



Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 3

California Ambient Air Quality Standards
Area Designations for Fine Particulate Matter (PM2.5)

	N	U	A		N	U	A
GREAT BASIN VALLEYS AIR BASIN			X	SALTON SEA AIR BASIN			
LAKE COUNTY AIR BASIN			X	Imperial County			
LAKE TAHOE AIR BASIN			X	- City of Calexico (3)	X		
MOJAVE DESERT AIR BASIN				Remainder of Air Basin			X
San Bernardino County				SAN DIEGO AIR BASIN	X		
- County portion of federal Southeast Desert Modified AQMA for Ozone (1)			X	SAN FRANCISCO BAY AREA AIR BASIN	X		
				SAN JOAQUIN VALLEY AIR BASIN	X		
Remainder of Air Basin		X		SOUTH CENTRAL COAST AIR BASIN			
MOUNTAIN COUNTIES AIR BASIN				San Luis Obispo County			X
Plumas County				Santa Barbara County		X	
- Portola Valley (2)	X			Ventura County			X
Remainder of Air Basin		X		SOUTH COAST AIR BASIN	X		
NORTH CENTRAL COAST AIR BASIN			X				
NORTH COAST AIR BASIN			X				
NORTHEAST PLATEAU AIR BASIN			X				
SACRAMENTO VALLEY AIR BASIN							
Butte County	X						
Colusa County			X				
Glenn County			X				
Placer County (portion)			X				
Sacramento County			X				
Shasta County			X				
Sutter and Yuba Counties			X				
Remainder of Air Basin		X					

(1) California Code of Regulations, title 17, section 60200(b)

(2) California Code of Regulations, title 17, section 60200(c)

(3) California Code of Regulations, title 17, section 60200(a)

FIGURE 4

Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 4

California Ambient Air Quality Standards
Area Designation for Carbon Monoxide*

	N	NA-T	U	A		N	NA-T	U	A
GREAT BASIN VALLEYS AIR BASIN					SACRAMENTO VALLEY AIR BASIN				
Alpine County			X		Butte County				X
Inyo County				X	Colusa County			X	
Mono County				X	Glenn County			X	
LAKE COUNTY AIR BASIN				X	Placer County (portion)				X
LAKE TAHOE AIR BASIN				X	Sacramento County				X
MOJAVE DESERT AIR BASIN					Shasta County			X	
Kern County (portion)			X		Solano County (portion)				X
Los Angeles County (portion)				X	Sutter County				X
Riverside County (portion)			X		Tehama County			X	
San Bernardino County (portion)				X	Yolo County				X
MOUNTAIN COUNTIES AIR BASIN					Yuba County			X	
Amador County			X		SALTON SEA AIR BASIN				X
Calaveras County			X		SAN DIEGO AIR BASIN				X
El Dorado County (portion)			X		SAN FRANCISCO BAY AREA AIR BASIN				X
Mariposa County			X		SAN JOAQUIN VALLEY AIR BASIN				
Nevada County			X		Fresno County				X
Placer County (portion)			X		Kern County (portion)				X
Plumas County				X	Kings County			X	
Sierra County			X		Madera County			X	
Tuolumne County				X	Merced County			X	
NORTH CENTRAL COAST AIR BASIN					San Joaquin County				X
Monterey County				X	Stanislaus County				X
San Benito County			X		Tulare County				X
Santa Cruz County			X		SOUTH CENTRAL COAST AIR BASIN				X
NORTH COAST AIR BASIN					SOUTH COAST AIR BASIN				X
Del Norte County			X						
Humboldt County				X					
Mendocino County				X					
Sonoma County (portion)			X						
Trinity County			X						
NORTHEAST PLATEAU AIR BASIN			X						

* The area designated for carbon monoxide is a county or portion of a county

FIGURE 5


2018
Area Designations for State
Ambient Air Quality Standards
NITROGEN DIOXIDE
N
0 50 100 200 Miles
Del Norte
Siskiyou
Modoc
NORTHEAST PLATEAU
NORTH COAST
Shasta
Trinity
Lassen
Humboldt
Tehema
SACRAMENTO VALLEY
Plumas
Butte
Mendocino
Glenn
Sierra
MOUNTAIN COUNTIES
Nevada
Colusa
LAKE COUNTY
Yuba
Lake
Sutter
Placer
LAKE TAHOE
El Dorado
Yolo
Napa
Sac
Alpine
Sonoma
Amador
SAN FRANCISCO BAY AREA
Solano
Calaveras
Marin
Contra Costa
San Joaquin
Tuolumne
Mono
San Francisco
GREAT BASIN VALLEYS
Alameda
Mariposa
San Mateo
Stanislaus
Santa Clara
Merced
Madera
Santa Cruz
SAN JOAQUIN VALLEY
San Benito
Fresno
NORTH CENTRAL COAST
Inyo
Tulare
Monterey
Kings
San Luis Obispo
Kern
MOJAVE DESERT
Santa Barbara
SOUTH CENTRAL COAST
Los Angeles
San Bernardino
Ventura
Orange
Riverside
SOUTH COAST
CA 60 (Portion)
San Diego
Imperial
SAN DIEGO COUNTY
SALTON SEA
Los Angeles
San Bernardino
CA 60 (Portion)
Riverside
Orange
Attainment
Nonattainment
Air Basin
County
Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 5

California Ambient Air Quality Standards
Area Designation for Nitrogen Dioxide

	N	U	A		N	U	A
GREAT BASIN VALLEYS AIR BASIN			X	SACRAMENTO VALLEY AIR BASIN			X
LAKE COUNTY AIR BASIN			X	SALTON SEA AIR BASIN			X
LAKE TAHOE AIR BASIN			X	SAN DIEGO AIR BASIN			X
MOJAVE DESERT AIR BASIN			X	SAN FRANCISCO BAY AREA AIR BASIN			X
MOUNTAIN COUNTIES AIR BASIN			X	SAN JOAQUIN VALLEY AIR BASIN			X
NORTH CENTRAL COAST AIR BASIN			X	SOUTH CENTRAL COAST AIR BASIN			X
NORTH COAST AIR BASIN			X	SOUTH COAST AIR BASIN			
NORTHEAST PLATEAU AIR BASIN			X	CA 60 Near-road Portion of San Bernardino, Riverside, and Los Angeles Counties	X		
				Remainder of Air Basin			X

FIGURE 6

Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 6

California Ambient Air Quality Standards
Area Designation for Sulfur Dioxide*

	N	U/A		N	U/A
GREAT BASIN VALLEYS AIR BASIN		X	SACRAMENTO VALLEY AIR BASIN		X
LAKE COUNTY AIR BASIN		X	SALTON SEA AIR BASIN		X
LAKE TAHOE AIR BASIN		X	SAN DIEGO AIR BASIN		X
MOJAVE DESERT AIR BASIN		X	SAN FRANCISCO BAY AREA AIR BASIN		X
MOUNTAIN COUNTIES AIR BASIN		X	SAN JOAQUIN VALLEY AIR BASIN		X
NORTH CENTRAL COAST AIR BASIN		X	SOUTH CENTRAL COAST AIR BASIN		X
NORTH COAST AIR BASIN		X	SOUTH COAST AIR BASIN		X
NORTHEAST PLATEAU AIR BASIN		X			

* The area designated for sulfur dioxide is a county or portion of a county

FIGURE 7

Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 7

California Ambient Air Quality Standards
Area Designation for Sulfates

	N	U	A		N	U	A
GREAT BASIN VALLEYS AIR BASIN			X	SACRAMENTO VALLEY AIR BASIN			X
LAKE COUNTY AIR BASIN			X	SALTON SEA AIR BASIN			X
LAKE TAHOE AIR BASIN			X	SAN DIEGO AIR BASIN			X
MOJAVE DESERT AIR BASIN			X	SAN FRANCISCO BAY AREA AIR BASIN			X
MOUNTAIN COUNTIES AIR BASIN			X	SAN JOAQUIN VALLEY AIR BASIN			X
NORTH CENTRAL COAST AIR BASIN			X	SOUTH CENTRAL COAST AIR BASIN			X
NORTH COAST AIR BASIN			X	SOUTH COAST AIR BASIN			X
NORTHEAST PLATEAU AIR BASIN			X				

FIGURE 8

2018
Area Designations for State
Ambient Air Quality Standards
LEAD
N
0
50
100
200
Miles
Del Norte
Siskiyou
Modoc
NORTHEAST PLATEAU
NORTH COAST
Humboldt
Trinity
Shasta
Lassen
Tehama
SACRAMENTO VALLEY
Plumas
Butte
Glenn
Mendocino
Sierra
MOUNTAIN COUNTIES
LAKE COUNTY
Nevada
Colusa
Yuba
Placer
LAKE TAHOE
Lake
El Dorado
Yolo
Sonoma
Alpine
Napa
SAN FRANCISCO BAY AREA
Solano
Calaveras
Marin
Tuolumne
San Joaquin
Mono
San Francisco
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Madera
GREAT BASIN VALLEYS
Santa Cruz
Fresno
SAN JOAQUIN VALLEY
San Benito
Inyo
NORTH CENTRAL COAST
Tulare
Monterey
Kings
San Luis Obispo
Kern
MOJAVE DESERT
Santa Barbara
San Bernardino
SOUTH CENTRAL COAST
Ventura
Los Angeles
SOUTH COAST
Orange
Riverside
San Diego
Imperial
SAN DIEGO COUNTY
SALTON SEA
Attainment
Air Basin
County
Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 8

California Ambient Air Quality Standards
Area Designations for Lead (particulate)*

	N	U	A		N	U	A
GREAT BASIN VALLEYS AIR BASIN			X	SALTON SEA AIR BASIN			X
LAKE COUNTY AIR BASIN			X	SAN DIEGO AIR BASIN			X
LAKE TAHOE AIR BASIN			X	SAN FRANCISCO BAY AREA AIR BASIN			X
MOJAVE DESERT AIR BASIN			X	SAN JOAQUIN VALLEY AIR BASIN			X
MOUNTAIN COUNTIES AIR BASIN			X	SOUTH CENTRAL COAST AIR BASIN			X
NORTH CENTRAL COAST AIR BASIN			X	SOUTH COAST AIR BASIN			X
NORTH COAST AIR BASIN			X				
NORTHEAST PLATEAU AIR BASIN			X				
SACRAMENTO VALLEY AIR BASIN			X				

* The area designated for lead is a county or portion of a county. Since all areas in the State are in attainment for this standard, air basins are indicated here for simplicity.

FIGURE 9

2018
Area Designations for State Ambient Air Quality Standards
HYDROGEN SULFIDE

Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 9

California Ambient Air Quality Standards
Area Designation for Hydrogen Sulfide*

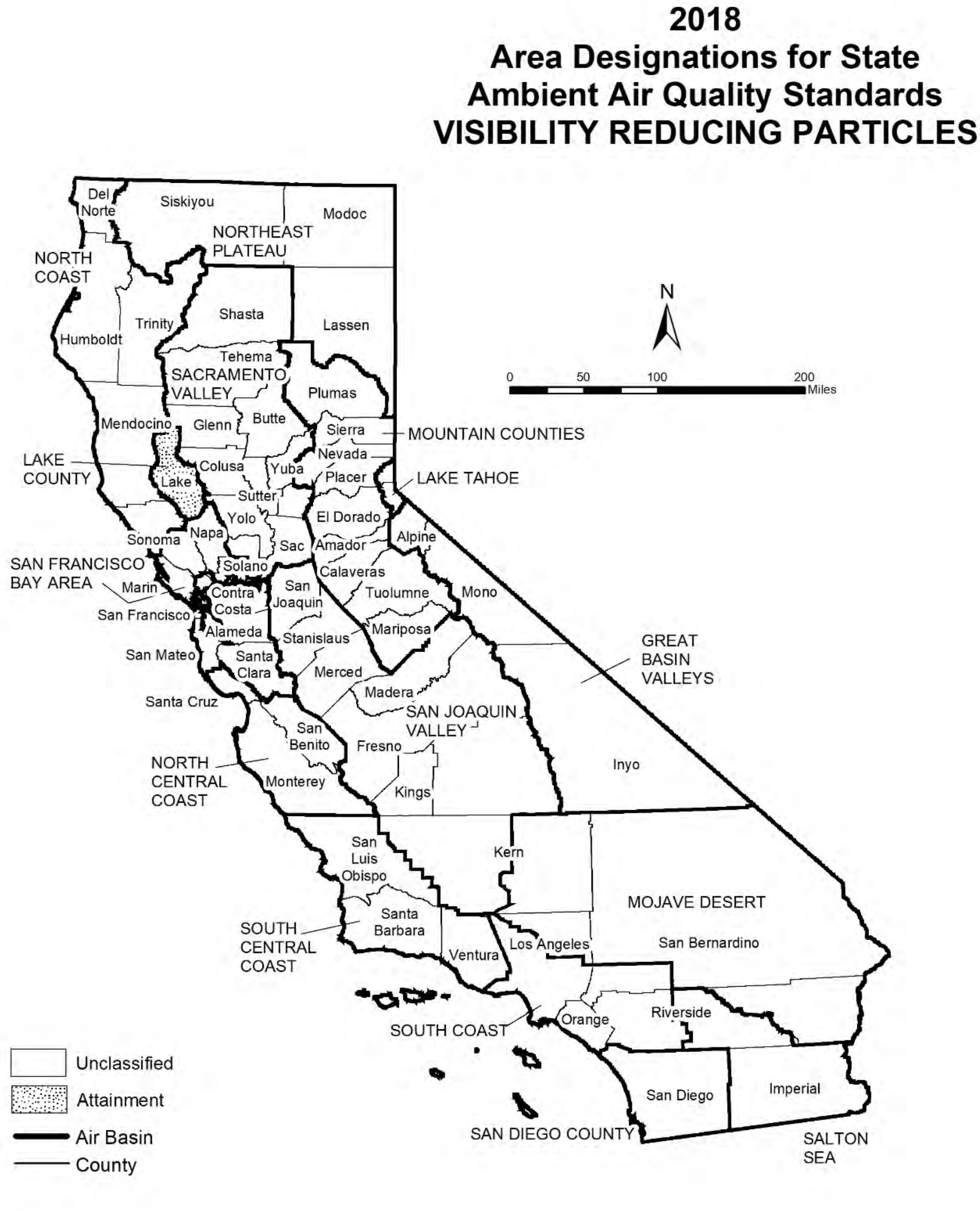
	N	NA-T	U	A		N	NA-T	U	A
GREAT BASIN VALLEYS AIR BASIN					NORTH CENTRAL COAST AIR BASIN			X	
Alpine County			X		NORTH COAST AIR BASIN				
Inyo County				X	Del Norte County			X	
Mono County				X	Humboldt County				X
LAKE COUNTY AIR BASIN				X	Mendocino County			X	
LAKE TAHOE AIR BASIN			X		Sonoma County (portion)				
MOJAVE DESERT AIR BASIN					- Geyser Geothermal Area (2)				X
Kern County (portion)			X		- Remainder of County			X	
Los Angeles County (portion)			X		Trinity County			X	
Riverside County (portion)			X		NORTHEAST PLATEAU AIR BASIN			X	
San Bernardino County (portion)					SACRAMENTO VALLEY AIR BASIN			X	
- Searles Valley Planning Area (1)	X				SALTON SEA AIR BASIN			X	
- Remainder of County			X		SAN DIEGO AIR BASIN			X	
MOUNTAIN COUNTIES AIR BASIN					SAN FRANCISCO BAY AREA AIR BASIN			X	
Amador County					SAN JOAQUIN VALLEY AIR BASIN			X	
- City of Sutter Creek	X				SOUTH CENTRAL COAST AIR BASIN				
- Remainder of County			X		San Luis Obispo County				X
Calaveras County			X		Santa Barbara County				X
El Dorado County (portion)			X		Ventura County			X	
Mariposa County			X		SOUTH COAST AIR BASIN			X	
Nevada County			X						
Placer County (portion)			X						
Plumas County			X						
Sierra County			X						
Tuolumne County			X						

* The area designated for hydrogen sulfide is a county or portion of a county

(1) 52 Federal Register 29384 (August 7, 1987)

(2) California Code of Regulations, title 17, section 60200(d)

FIGURE 10



Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 10

California Ambient Air Quality Standards
Area Designation for Visibility Reducing Particles

	N	NA-T	U	A		N	NA-T	U	A
GREAT BASIN VALLEYS AIR BASIN			X		SACRAMENTO VALLEY AIR BASIN			X	
LAKE COUNTY AIR BASIN				X	SALTON SEA AIR BASIN			X	
LAKE TAHOE AIR BASIN			X		SAN DIEGO AIR BASIN			X	
MOJAVE DESERT AIR BASIN			X		SAN FRANCISCO BAY AREA AIR BASIN			X	
MOUNTAIN COUNTIES AIR BASIN			X		SAN JOAQUIN VALLEY AIR BASIN			X	
NORTH CENTRAL COAST AIR BASIN			X		SOUTH CENTRAL COAST AIR BASIN			X	
NORTH COAST AIR BASIN			X		SOUTH COAST AIR BASIN			X	
NORTHEAST PLATEAU AIR BASIN			X						

Area Designations for the National Ambient Air Quality Standards

The following maps and tables show the area designations for each pollutant with a national ambient air quality standard. Additional information about the federal area designations is available on the U.S. EPA website:

https://www.epa.gov/green-book

Over the last several years, U.S. EPA has been reviewing the levels of the various national standards. The agency has already promulgated new standard levels for some pollutants and is considering revising the levels for others. Information about the status of these reviews is available on the U.S. EPA website:

https://www.epa.gov/criteria-air-pollutants

<u>Designation Categories</u>

Suspended Particulate Matter (PM_{10}). The U.S. EPA uses three categories to designate areas with respect to PM_{10}:

- Attainment
- Nonattainment
- Unclassifiable

Ozone, Fine Suspended Particulate Matter ($PM_{2.5}$), Carbon Monoxide (CO), and Nitrogen Dioxide (NO_2). The U.S. EPA uses two categories to designate areas with respect to these standards:

- Nonattainment
- Unclassifiable/Attainment

The national 1-hour ozone standard was revoked effective June 15, 2005, and the area designations map reflects the 2015 national 8-hour ozone standard of 0.070 ppm. Original designations were finalized on August 3, 2018.

On December 14, 2012, the U.S. EPA established a new national annual primary $PM_{2.5}$ standard of 12.0 $\mu g/m^3$. New area designations reflecting this revised standard became final in December 2014. The current designation map reflects the most recently revised (2012) annual average standard of 12.0 $\mu g/m^3$ as well as the 24-hour standard of 35 $\mu g/m^3$, revised in 2006.

On January 22, 2010, the U.S. EPA established a new national 1-hour NO_2 standard of 100 parts per billion (ppb) and retained the annual average standard of 53 ppb. Designations for the primary NO_2 standard became effective on February 29, 2012. All areas of California meet this standard.

Sulfur Dioxide (SO_2). The U.S. EPA uses three categories to designate areas with respect to the 24-hour and annual average sulfur dioxide standards. These designation categories are:

- Nonattainment,
- Unclassifiable, and
- Attainment/Unclassifiable.

On June 2, 2010, the U.S. EPA established a new primary 1-hour SO_2 standard of 75 parts per billion (ppb). At the same time, U.S. EPA revoked the 24-hour and annual average standards. Area designations for the 1-hour SO_2 standard were finalized on December 21, 2017 and are reflected in the area designations map.

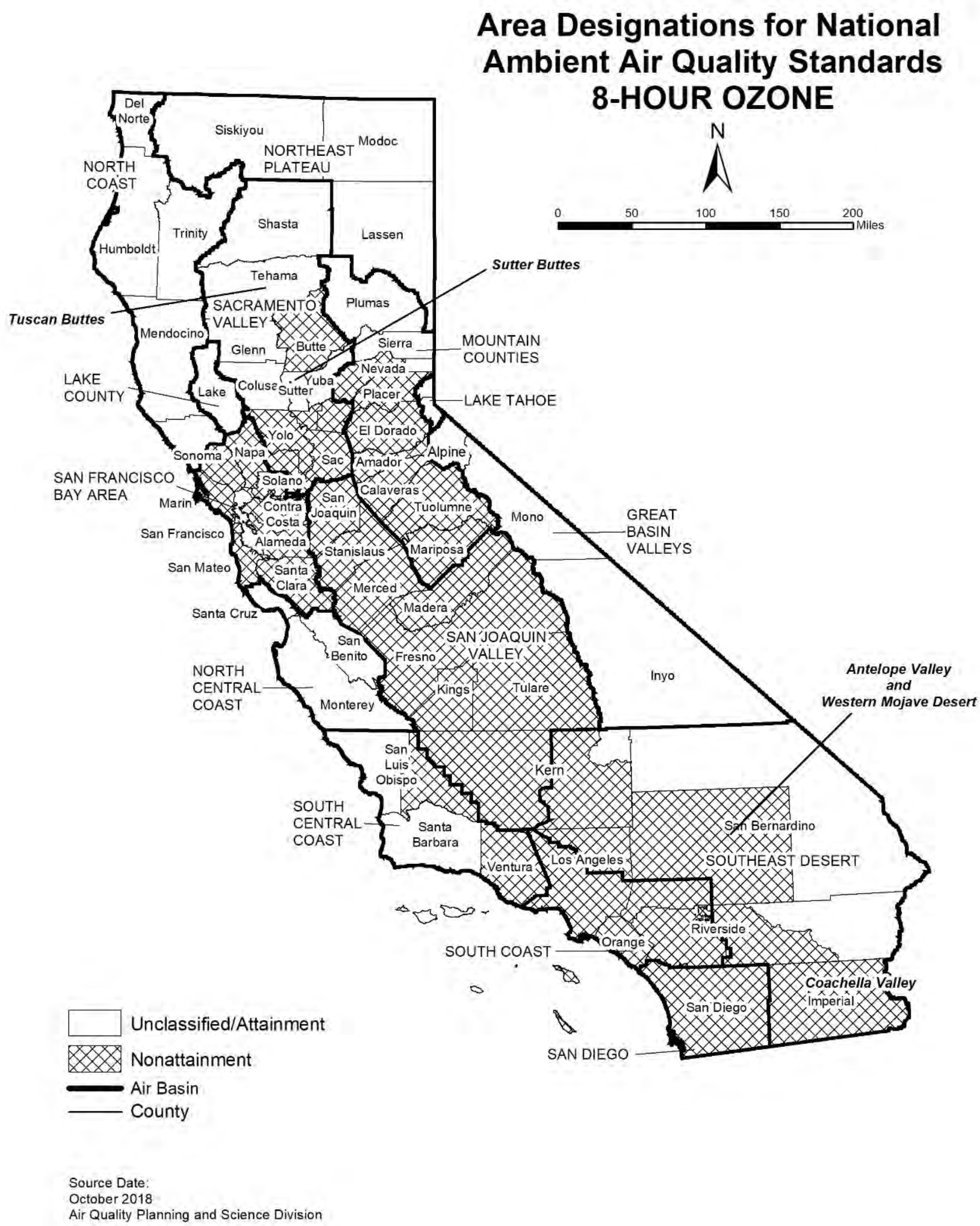
Lead (particulate). The U.S. EPA promulgated a new rolling 3-month average lead standard in October 2008 of 0.15 µg/m^3. Designations were made for this standard in November 2010.

Designation Areas

From time to time, the boundaries of the California air basins have been changed to facilitate the planning process. CARB generally initiates these changes, and they are not always reflected in the U.S. EPA's area designations. For purposes of consistency, the maps in this attachment reflect area designation boundaries and nomenclature as promulgated by the U.S. EPA. In some cases, these may not be the same as those adopted by CARB. For example, the national area designations reflect the former Southeast Desert Air Basin. In accordance with Health and Safety Code section 39606.1, CARB redefined this area in 1996 to be the Mojave Desert Air Basin and Salton Sea Air Basin. The definitions and boundaries for all areas designated for the national standards can be found in Title 40, Code of Federal Regulations (CFR), Chapter I, Subchapter C, Part 81.305. They are available on the web at:

https://ecfr.io/Title-40/se40.20.81_1305

FIGURE 11



Area Designations for National Ambient Air Quality Standards
8-HOUR OZONE
N
0 50 100 150 200 Miles
Del Norte
Siskiyou
Modoc
NORTHEAST PLATEAU
NORTH COAST
Trinity
Shasta
Lassen
Humboldt
Tehama
Sutter Buttes
Tuscan Buttes
SACRAMENTO VALLEY
Plumas
Mendocino
Glenn
Butte
Sierra
MOUNTAIN COUNTIES
Nevada
LAKE COUNTY
Lake
Colusa
Yuba
Sutter
Placer
LAKE TAHOE
El Dorado
Yolo
Sonoma
Napa
Sac
Alpine
Amador
SAN FRANCISCO BAY AREA
Solano
Marin
San Joaquin
Calaveras
Contra Costa
Tuolumne
Mono
GREAT BASIN VALLEYS
San Francisco
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Santa Cruz
Madera
San Benito
SAN JOAQUIN VALLEY
Fresno
Inyo
Antelope Valley and Western Mojave Desert
NORTH CENTRAL COAST
Kings
Tulare
Monterey
San Luis Obispo
Kern
SOUTH CENTRAL COAST
Santa Barbara
San Bernardino
Ventura
Los Angeles
SOUTHEAST DESERT
Riverside
Orange
SOUTH COAST
Coachella Valley
San Diego
Imperial
SAN DIEGO
Unclassified/Attainment
Nonattainment
Air Basin
County
Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 11

National Ambient Air Quality Standards
Area Designations for 8-Hour Ozone*

	N	U/A		N	U/A
GREAT BASIN VALLEYS AIR BASIN		X	SACRAMENTO VALLEY AIR BASIN (cont.)		
LAKE COUNTY AIR BASIN		X	Yolo County (2)	X	
LAKE TAHOE AIR BASIN		X	Yuba County		X
MOUNTAIN COUNTIES AIR BASIN			SAN DIEGO COUNTY	X	
Amador County	X		SAN FRANCISCO BAY AREA AIR BASIN	X	
Calaveras County	X		SAN JOAQUIN VALLEY AIR BASIN	X	
El Dorado County (portion) (2)	X		SOUTH CENTRAL COAST AIR BASIN (1)		
Mariposa County	X		San Luis Obispo County		
Nevada County			- Eastern San Luis Obispo County	X	
- Western Nevada County	X		- Remainder of County		X
- Remainder of County		X	Santa Barbara County		X
Placer County (portion) (2)	X		Ventura County		
Plumas County		X	- Area excluding Anacapa and San Nicolas Islands	X	
Sierra County		X	- Channel Islands (1)		X
Tuolumne County	X		SOUTH COAST AIR BASIN (1)	X	
NORTH CENTRAL COAST AIR BASIN		X	SOUTHEAST DESERT AIR BASIN		
NORTH COAST AIR BASIN		X	Kern County (portion)	X	
NORTHEAST PLATEAU AIR BASIN		X	- Indian Wells Valley		X
SACRAMENTO VALLEY AIR BASIN			Imperial County	X	
Butte County	X		Los Angeles County (portion)	X	
Colusa County		X	Riverside County (portion)		
Glenn County		X	- Coachella Valley	X	
Sacramento Metro Area (2)	X		- Non-AQMA portion		X
Shasta County		X	San Bernardino County		
Sutter County			- Western portion (AQMA)	X	
- Sutter Buttes	X		- Eastern portion (non-AQMA)		X
- Southern portion of Sutter County (2)	X				
- Remainder of Sutter County		X			
Tehama County					
- Tuscan Buttes	X				
- Remainder of Tehama County		X			

* Definitions and references for all areas can be found in 40 CFR, Chapter I, Part 81.305.

NOTE: This map and table reflect the 2015 8-hour ozone standard of 0.070 ppm.

(1) South Central Coast Air Basin Channel Islands:
Santa Barbara County includes Santa Cruz, San Miguel, Santa Rosa, and Santa Barbara Islands.
Ventura County includes Anacapa and San Nicolas Islands.
South Coast Air Basin:
Los Angeles County includes San Clemente and Santa Catalina Islands.

(2) For this purpose, the Sacramento Metro Area comprises all of Sacramento and Yolo Counties, the Sacramento Valley Air Basin portion of Solano County, the southern portion of Sutter County, and the Sacramento Valley and Mountain Counties Air Basins portions of Placer and El Dorado counties.

FIGURE 12


Area Designations for National Ambient Air Quality Standards PM10
N
0 50 100 150 200 Miles
Del Norte
Siskiyou
Modoc
NORTHEAST PLATEAU
NORTH COAST
Shasta
Lassen
Trinity
Humboldt
Tehema
SACRAMENTO VALLEY
Plumas
Mendocino
Glenn
Butte
Sierra
Nevada
MOUNTAIN COUNTIES
LAKE COUNTY
Colusa
Yuba
Lake
Sutter
Placer
LAKE TAHOE
Yolo
El Dorado
Alpine
Sacramento County
Sonoma
Napa
Sac
Amador
Mono
SAN FRANCISCO BAY AREA
Marin
Solano
Calaveras
Mono Basin
San Joaquin
Tuolumne
Mammoth Lake
Contra Costa
San Francisco
GREAT BASIN VALLEYS
Alameda
Mariposa
Stanislaus
San Mateo
Santa Clara
Merced
Madera
Inyo
Santa Cruz
San Benito
SAN JOAQUIN VALLEY
Owens Valley
Fresno
Tulare
Coso Junction
NORTH CENTRAL COAST
Monterey
Kings
Trona
San Luis Obispo
Kern
Indian Wells Valley
San Bernardino
SOUTHEAST DESERT
SOUTH CENTRAL COAST
Santa Barbara
Ventura
Los Angeles
Riverside
Coachella Valley
SOUTH COAST
Orange
Imperial
San Diego
SAN DIEGO COUNTY
Unclassified
Attainment
Nonattainment
Air Basin
County
Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 12

National Ambient Air Quality Standards
Area Designations for Suspended Particulate Matter (PM10)*

	N	U	A		N	U	A
GREAT BASIN VALLEYS AIR BASIN				SAN DIEGO COUNTY		X	
Alpine County		X		SAN FRANCISCO BAY AREA AIR BASIN		X	
Inyo County				SAN JOAQUIN VALLEY AIR BASIN			X
- Owens Valley Planning Area	X			SOUTH CENTRAL COAST AIR BASIN		X	
- Coso Junction			X	SOUTH COAST AIR BASIN			X
- Remainder of County		X		SOUTHEAST DESERT AIR BASIN			
Mono County				Eastern Kern County			
- Mammoth Lake Planning Area			X	- Indian Wells Valley			X
- Mono Lake Basin	X			- Portion within San Joaquin Valley Planning Area	X		
- Remainder of County		X		- Remainder of County		X	
LAKE COUNTY AIR BASIN		X		Imperial County			
LAKE TAHOE AIR BASIN		X		- Imperial Valley Planning Area	X		
MOUNTAIN COUNTIES AIR BASIN				- Remainder of County		X	
Placer County (portion) (2)		X		Los Angeles County (portion)		X	
Remainder of Air Basin		X		Riverside County (portion)			
NORTH CENTRAL COAST AIR BASIN		X		- Coachella Valley (3)	X		
NORTH COAST AIR BASIN		X		- Non-AQMA portion		X	
NORTHEAST PLATEAU AIR BASIN		X		San Bernardino County			
SACRAMENTO VALLEY AIR BASIN				- Trona	X		
Butte County		X		- Remainder of County	X		
Colusa County		X					
Glenn County		X					
Placer County (portion) (2)		X					
Sacramento County (1)			X				
Shasta County		X					
Solano County (portion)		X					
Sutter County		X					
Tehama County		X					
Yolo County		X					
Yuba County		X					

* Definitions and references for all areas can be found in 40 CFR, Chapter I, Part 81.305.
(1) Air quality in Sacramento County meets the national PM10 standards. The request for redesignation to attainment was approved by U.S. EPA in September 2013.
(2) U.S. EPA designation puts the Sacramento Valley Air Basin portion of Placer County in the Mountain Counties Air Basin.
(3) Air quality in Coachella Valley meets the national PM10 standards. A request for redesignation to attainment has been submitted to U.S. EPA.

FIGURE 13


Area Designations for National Ambient Air Quality Standards PM2.5
N
0 50 100 150 200 Miles
NORTH COAST
Del Norte
Siskiyou
Modoc
NORTHEAST PLATEAU
Humboldt
Trinity
Shasta
Lassen
Tehama
SACRAMENTO VALLEY
Plumas
Glenn
Butte
Sierra
MOUNTAIN COUNTIES
Mendocino
Nevada
LAKE COUNTY
Colusa
Yuba
Placer
Lake
Sutter
LAKE TAHOE
Yolo
El Dorado
Sonoma
Napa
Sacramento
Alpine
Amador
Solano
Calaveras
GREAT BASIN VALLEYS
SAN FRANCISCO BAY AREA
Marin
Tuolumne
Contra Costa
San Joaquin
Mono
Alameda
Stanislaus
Mariposa
San Mateo
Merced
Santa Clara
Madera
Santa Cruz
Fresno
NORTH CENTRAL COAST
San Benito
SAN JOAQUIN VALLEY
Inyo
Tulare
Monterey
Kings
San Luis Obispo
Kern
San Bernardino
SOUTH CENTRAL COAST
Santa Barbara
SOUTHEAST DESERT
Ventura
Los Angeles
Riverside
Orange
SOUTH COAST
Unclassified/Attainment
Nonattainment
Air Basin
County
San Diego
Imperial
SAN DIEGO COUNTY
Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 13

National Ambient Air Quality Standards
Area Designations for Fine Particulate Matter (PM2.5)*

	N	U/A		N	U/A
GREAT BASIN VALLEYS AIR BASIN		X	SAN DIEGO COUNTY		X
LAKE COUNTY AIR BASIN		X	SAN FRANCISCO BAY AREA AIR BASIN (2)	X	
LAKE TAHOE AIR BASIN		X	SAN JOAQUIN VALLEY AIR BASIN	X	
MOUNTAIN COUNTIES AIR BASIN			SOUTH CENTRAL COAST AIR BASIN		X
Plumas County			SOUTH COAST AIR BASIN (3)	X	
- Portola Valley Portion of Plumas	X		SOUTHEAST DESERT AIR BASIN		
- Remainder of Plumas County		X	Imperial County (portion) (4)	X	
Remainder of Air Basin		X	Remainder of Air Basin		X
NORTH CENTRAL COAST AIR BASIN		X			
NORTH COAST AIR BASIN		X			
NORTHEAST PLATEAU AIR BASIN		X			
SACRAMENTO VALLEY AIR BASIN					
Sacramento Metro Area (1)	X				
Sutter County		X			
Yuba County (portion)		X			
Remainder of Air Basin		X			

* Definitions and references for all areas can be found in 40 CFR, Chapter I, Part 81.305. This map reflects the 2006 24-hour PM2.5 standard as well as the 1997 and 2012 PM2.5 annual standards.

(1) For this purpose, Sacramento Metro Area comprises all of Sacramento and portions of El Dorado, Placer, Solano, and Yolo Counties. Air quality in this area meets the national PM2.5 standards. A Determination of Attainment for the 2006 24-hour PM2.5 standard was made by U.S. EPA in June 2017.

(2) Air quality in this area meets the national PM2.5 standards. A Determination of Attainment for the 2006 24-hour PM2.5 standard was made by U.S. EPA in June 2017.

(3) Those lands of the Santa Rosa Band of Cahulla Mission Indians in Riverside County are designated Unclassifiable/Attainment.

(4) That portion of Imperial County encompassing the urban and surrounding areas of Brawley, Calexico, El Centro, Heber, Holtville, Imperial, Seeley, and Westmorland. Air quality in this area meets the national PM2.5 standards. A Determination of Attainment for the 2006 24-hour PM2.5 standard was made by U.S. EPA in June 2017.

FIGURE 14


Area Designations for National Ambient Air Quality Standards
CARBON MONOXIDE
N
0 50 100 150 200 Miles
Del Norte
Siskiyou
Modoc
NORTHEAST PLATEAU
NORTH COAST
Shasta
Lassen
Trinity
Humboldt
Tehama
SACRAMENTO VALLEY
Plumas
Mendocino
Glenn
Butte
Sierra
MOUNTAIN COUNTIES
Nevada
Colusa
Yuba
Lake
Sutter
Placer
LAKE TAHOE
LAKE COUNTY
Yolo
El Dorado
Napa
Alpine
Sonoma
Sac
Amador
SAN FRANCISCO BAY AREA
Solano
Marin
Calaveras
Contra Costa
San Joaquin
Tuolumne
Mono
GREAT BASIN VALLEYS
San Francisco
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Santa Cruz
Madera
SAN JOAQUIN VALLEY
San Benito
Fresno
NORTH CENTRAL COAST
Inyo
Tulare
Monterey
Kings
San Luis Obispo
Kern
SOUTH CENTRAL COAST
SOUTHEAST DESERT
Santa Barbara
Ventura
Los Angeles
San Bernardino
Riverside
Orange
SOUTH COAST
San Diego
Imperial
SAN DIEGO COUNTY
Unclassified/Attainment
Air Basin
County
Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 14

National Ambient Air Quality Standards
Area Designations for Carbon Monoxide*

	N	U/A		N	U/A
GREAT BASIN VALLEYS AIR BASIN		X	SACRAMENTO VALLEY AIR BASIN		X
LAKE COUNTY AIR BASIN		X	SAN DIEGO COUNTY		X
LAKE TAHOE AIR BASIN		X	SAN FRANCISCO BAY AREA AIR BASIN		X
MOUNTAIN COUNTIES AIR BASIN		X	SAN JOAQUIN VALLEY AIR BASIN		X
NORTH CENTRAL COAST AIR BASIN		X	SOUTH CENTRAL COAST AIR BASIN		X
NORTH COAST AIR BASIN		X	SOUTH COAST AIR BASIN		X
NORTHEAST PLATEAU AIR BASIN		X	SOUTHEAST DESERT AIR BASIN		X

* Definitions and references for all areas can be found in 40 CFR, Chapter I, Part 81.305.

FIGURE 15


Area Designations for National Ambient Air Quality Standards NITROGEN DIOXIDE
N
0 50 100 150 200 Miles
Del Norte
Siskiyou
Modoc
NORTHEAST PLATEAU
NORTH COAST
Shasta
Lassen
Trinity
Humboldt
Tehema
Plumas
SACRAMENTO VALLEY
Mendocino
Glenn
Butte
Sierra
Nevada
MOUNTAIN COUNTIES
Colusa
Yuba
LAKE COUNTY
Lake
Sutter
Placer
LAKE TAHOE
Yolo
El Dorado
Napa
Sonoma
Alpine
Sac
Amador
SAN FRANCISCO BAY AREA
Marin
Solano
Calaveras
Contra Costa
San Joaquin
Tuolumne
Mono
GREAT BASIN VALLEYS
San Francisco
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Santa Cruz
Madera
SAN JOAQUIN VALLEY
San Benito
NORTH CENTRAL COAST
Fresno
Inyo
Tulare
Monterey
Kings
San Luis Obispo
Kern
SOUTH CENTRAL COAST
SOUTHEAST DESERT
Santa Barbara
Los Angeles
San Bernardino
Ventura
Riverside
Orange
SOUTH COAST
San Diego
Imperial
SAN DIEGO COUNTY
Unclassified/Attainment
Air Basin
County
Source Date:
October 2018
Air Quality Planning and Science Division

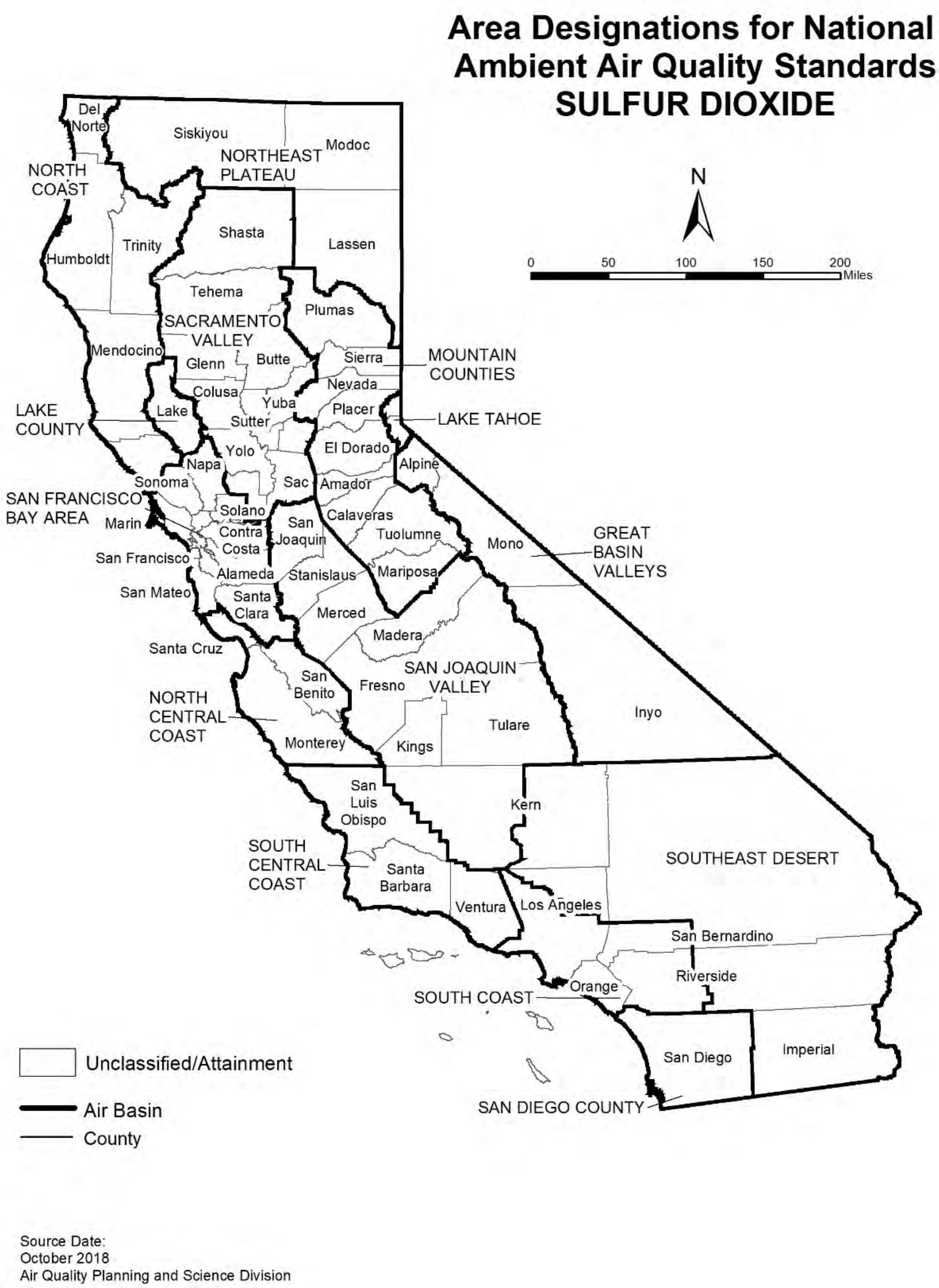
TABLE 15

National Ambient Air Quality Standards
Area Designations for Nitrogen Dioxide*

	N	U/A		N	U/A
GREAT BASIN VALLEYS AIR BASIN		X	SACRAMENTO VALLEY AIR BASIN		X
LAKE COUNTY AIR BASIN		X	SAN DIEGO COUNTY		X
LAKE TAHOE AIR BASIN		X	SAN FRANCISCO BAY AREA AIR BASIN		X
MOUNTAIN COUNTIES AIR BASIN		X	SAN JOAQUIN VALLEY AIR BASIN		X
NORTH CENTRAL COAST AIR BASIN		X	SOUTH CENTRAL COAST AIR BASIN		X
NORTH COAST AIR BASIN		X	SOUTH COAST AIR BASIN		X
NORTHEAST PLATEAU AIR BASIN		X	SOUTHEAST DESERT AIR BASIN		X

* Definitions and references for all areas can be found in 40 CFR, Chapter I, Part 81.305.

FIGURE 16



Area Designations for National Ambient Air Quality Standards SULFUR DIOXIDE
N
0
50
100
150
200
Miles
Del Norte
Siskiyou
Modoc
NORTHEAST PLATEAU
NORTH COAST
Shasta
Lassen
Trinity
Humboldt
Tehema
Plumas
SACRAMENTO VALLEY
Mendocino
Glenn
Butte
Sierra
MOUNTAIN COUNTIES
Colusa
Nevada
Yuba
LAKE COUNTY
Lake
Sutter
Placer
LAKE TAHOE
Yolo
El Dorado
Napa
Alpine
Sonoma
Sac
Amador
SAN FRANCISCO BAY AREA
Solano
Marin
Calaveras
Contra Costa
San Joaquin
Tuolumne
Mono
GREAT BASIN VALLEYS
San Francisco
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Madera
Santa Cruz
SAN JOAQUIN VALLEY
San Benito
Fresno
NORTH CENTRAL COAST
Inyo
Tulare
Monterey
Kings
San Luis Obispo
Kern
SOUTH CENTRAL COAST
Santa Barbara
SOUTHEAST DESERT
Ventura
Los Angeles
San Bernardino
Riverside
Orange
SOUTH COAST
San Diego
Imperial
SAN DIEGO COUNTY
Unclassified/Attainment
Air Basin
County
Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 16

National Ambient Air Quality Standards
Area Designations for Sulfur Dioxide*

	N	U/A		N	U/A
GREAT BASIN VALLEYS AIR BASIN		X	SOUTH CENTRAL COAST AIR BASIN		
LAKE COUNTY AIR BASIN		X	San Luis Obispo County		X
LAKE TAHOE AIR BASIN		X	Santa Barbara County		X
MOUNTAIN COUNTIES AIR BASIN		X	Ventura County		X
NORTH CENTRAL COAST AIR BASIN		X	Channel Islands (1)		X
NORTH COAST AIR BASIN		X	SOUTH COAST AIR BASIN		X
NORTHEAST PLATEAU AIR BASIN		X	SOUTHEAST DESERT AIR BASIN		
SACRAMENTO VALLEY AIR BASIN		X	Imperial County		X
SAN DIEGO COUNTY		X	Remainder of Air Basin		X
SAN FRANCISCO BAY AREA AIR BASIN		X			
SAN JOAQUIN VALLEY AIR BASIN					
Fresno County		X			
Kern County (portion)		X			
Kings County		X			
Madera County		X			
Merced County		X			
San Joaquin County		X			
Stanislaus County		X			
Tulare County		X			

* Definitions and references for all areas can be found in 40 CFR, Chapter I, Part 81.305.

NOTE: This map and table reflect the 2010 1-hour SO_2 standard of 75 ppb.

(1) South Central Coast Air Basin Channel Islands:

Santa Barbara County includes Santa Cruz, San Miguel, Santa Rosa, and Santa Barbara Islands.

Ventura County includes Anacapa and San Nicolas Islands.

Note that the San Clemente and Santa Catalina Islands are considered part of Los Angeles County, and therefore, are included as part of the South Coast Air Basin.

FIGURE 17


Area Designations for National Ambient Air Quality Standards
LEAD
N
0 50 100 150 200 Miles
Del Norte
Siskiyou
Modoc
NORTHEAST PLATEAU
NORTH COAST
Shasta
Lassen
Trinity
Humboldt
Tehama
SACRAMENTO VALLEY
Plumas
Mendocino
Glenn
Butte
Sierra
MOUNTAIN COUNTIES
Nevada
Colusa
Yuba
Lake
Sutter
Placer
LAKE TAHOE
LAKE COUNTY
Yolo
El Dorado
Napa
Alpine
Sonoma
Sac
Amador
SAN FRANCISCO BAY AREA
Solano
Calaveras
Marin
San Joaquin
Contra Costa
Tuolumne
Mono
GREAT BASIN VALLEYS
San Francisco
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Santa Cruz
Madera
SAN JOAQUIN VALLEY
San Benito
Fresno
NORTH CENTRAL COAST
Inyo
Tulare
Monterey
Kings
San Luis Obispo
Kern
SOUTH CENTRAL COAST
SOUTHEAST DESERT
Santa Barbara
Ventura
Los Angeles
San Bernardino
Riverside
Orange
SOUTH COAST
San Diego
Imperial
SAN DIEGO COUNTY
Unclassified/Attainment
Nonattainment
Air Basin
County
Source Date:
October 2018
Air Quality Planning and Science Division

TABLE 17

National Ambient Air Quality Standards
Area Designations for Lead (particulate)

	N	U/A		N	U/A
GREAT BASIN VALLEYS AIR BASIN		X	SAN DIEGO COUNTY		X
LAKE COUNTY AIR BASIN		X	SAN FRANCISCO BAY AREA AIR BASIN		X
LAKE TAHOE AIR BASIN		X	SAN JOAQUIN VALLEY AIR BASIN		X
MOUNTAIN COUNTIES AIR BASIN		X	SOUTH CENTRAL COAST AIR BASIN		X
NORTH CENTRAL COAST AIR BASIN		X	SOUTH COAST AIR BASIN		
NORTH COAST AIR BASIN		X	Los Angeles County (portion) (1)	X	
NORTHEAST PLATEAU AIR BASIN		X	Remainder of Air Basin		X
SACRAMENTO VALLEY AIR BASIN		X	SOUTHEAST DESERT AIR BASIN		X

(1) Portion of County in Air Basin, not including Channel Islands

This page intentionally left blank

APPENDIX 3.1:

CALEEMOD EMISSIONS MODEL OUTPUTS

Murrieta Canyon Academy (Unmitigated)

Riverside-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
High School	41.50	1000sqft	0.95	41,500.00	0
Other Asphalt Surfaces	0.53	Acre	0.53	23,086.80	0
Other Non-Asphalt Surfaces	2.59	Acre	2.59	112,820.40	0
Parking Lot	48.00	Space	0.44	19,200.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.4 **Precipitation Freq (Days)** 28

Climate Zone 10 **Operational Year** 2023

Utility Company Southern California Edison

CO2 Intensity (lb/MWhr) 702.44 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Total Project Area analyzed is 4.51 acres. The existing parking area (approximately 0.49 acres) in the southern portion of the site will remain and has been excluded from this anlaysis.

Construction Phase - Constructure schedule based on 2023 Opening Year and information provided by the Project Applicant.

Off-road Equipment - Hours are based on an 8-hour workday.

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Off-road Equipment -

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Trips and VMT - Per information provided by the Project Applicant, demolition activities will result in 100 truck trips.

Demolition -

Grading - It is assumed that 5 acres can be graded per day

Architectural Coating - Rule 1113

Vehicle Trips - Based on information provided in the Murrieta Canyon Academy Expansion Traffic Impact Study by RK Engineering Groupn, Inc.

Vehicle Emission Factors - EMFAC2017

Vehicle Emission Factors - EMFAC2017

Vehicle Emission Factors - EMFAC2017

Energy Use - The Project will design building shells and building components to meet 2019 Title 24 Standards which expects 30% less energy for nonresidential uses

Construction Off-road Equipment Mitigation - Rule 403

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	100.00	50.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	50.00
tblConstructionPhase	NumDays	18.00	20.00
tblConstructionPhase	NumDays	230.00	190.00
tblConstructionPhase	NumDays	20.00	30.00

tblConstructionPhase	NumDays	8.00	45.00
tblConstructionPhase	NumDays	18.00	20.00
tblConstructionPhase	NumDays	5.00	45.00
tblEnergyUse	LightingElect	3.03	2.12
tblEnergyUse	T24E	2.78	1.95
tblEnergyUse	T24NG	6.97	4.88
tblGrading	AcresOfGrading	90.00	225.00
tblGrading	AcresOfGrading	90.00	225.00
tblGrading	MaterialExported	0.00	6,000.00
tblLandUse	LotAcreage	0.43	0.44
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblTripsAndVMT	HaulingTripNumber	102.00	100.00
tblVehicleEF	HHD	0.96	0.03
tblVehicleEF	HHD	0.03	0.02
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	2.07	8.39
tblVehicleEF	HHD	0.41	0.21
tblVehicleEF	HHD	1.44	2.6410e-003

tblVehicleEF	HHD	6,147.84	1,374.55
tblVehicleEF	HHD	1,399.88	1,256.69
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	17.43	6.82
tblVehicleEF	HHD	0.97	1.92
tblVehicleEF	HHD	5.1890e-003	2.7370e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	4.9650e-003	2.6180e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.8620e-003	8.8950e-003
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	7.3000e-005	1.0000e-006
tblVehicleEF	HHD	2.3430e-003	5.3000e-005
tblVehicleEF	HHD	0.55	0.57
tblVehicleEF	HHD	4.3000e-005	1.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.5400e-004	2.3900e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.06	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.1000e-005	0.00
tblVehicleEF	HHD	7.3000e-005	1.0000e-006
tblVehicleEF	HHD	2.3430e-003	5.3000e-005

tblVehicleEF	HHD	0.63	0.65
tblVehicleEF	HHD	4.3000e-005	1.0000e-006
tblVehicleEF	HHD	0.08	0.04
tblVehicleEF	HHD	1.5400e-004	2.3900e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.91	0.03
tblVehicleEF	HHD	0.03	0.02
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	1.50	8.28
tblVehicleEF	HHD	0.41	0.21
tblVehicleEF	HHD	1.38	2.5010e-003
tblVehicleEF	HHD	6,513.09	1,357.07
tblVehicleEF	HHD	1,399.88	1,256.69
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	17.99	6.49
tblVehicleEF	HHD	0.91	1.81
tblVehicleEF	HHD	4.3760e-003	2.4170e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	4.1860e-003	2.3130e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.8620e-003	8.8950e-003
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	1.4000e-004	3.0000e-006

tblVehicleEF	HHD	2.6540e-003	5.8000e-005
tblVehicleEF	HHD	0.51	0.60
tblVehicleEF	HHD	8.2000e-005	2.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.5700e-004	2.4200e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.06	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.0000e-005	0.00
tblVehicleEF	HHD	1.4000e-004	3.0000e-006
tblVehicleEF	HHD	2.6540e-003	5.8000e-005
tblVehicleEF	HHD	0.59	0.69
tblVehicleEF	HHD	8.2000e-005	2.0000e-006
tblVehicleEF	HHD	0.08	0.04
tblVehicleEF	HHD	1.5700e-004	2.4200e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	1.04	0.02
tblVehicleEF	HHD	0.03	8.7800e-004
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	2.85	8.52
tblVehicleEF	HHD	0.41	0.16
tblVehicleEF	HHD	1.46	2.6330e-003
tblVehicleEF	HHD	5,643.45	1,394.57
tblVehicleEF	HHD	1,399.88	1,245.20
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	16.66	7.25
tblVehicleEF	HHD	0.96	1.90

tblVehicleEF	HHD	6.3140e-003	3.1380e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	6.0400e-003	3.0020e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	5.5000e-005	1.0000e-006
tblVehicleEF	HHD	2.4340e-003	5.8000e-005
tblVehicleEF	HHD	0.59	0.52
tblVehicleEF	HHD	3.6000e-005	1.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.6500e-004	2.5400e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.05	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.1000e-005	0.00
tblVehicleEF	HHD	5.5000e-005	1.0000e-006
tblVehicleEF	HHD	2.4340e-003	5.8000e-005
tblVehicleEF	HHD	0.68	0.59
tblVehicleEF	HHD	3.6000e-005	1.0000e-006
tblVehicleEF	HHD	0.08	0.02
tblVehicleEF	HHD	1.6500e-004	2.5400e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	LDA	3.3240e-003	1.9160e-003

tblVehicleEF	LDA	4.1920e-003	0.04
tblVehicleEF	LDA	0.51	0.57
tblVehicleEF	LDA	0.96	2.01
tblVehicleEF	LDA	235.32	250.08
tblVehicleEF	LDA	54.50	51.54
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.04	0.06
tblVehicleEF	LDA	0.09	0.09
tblVehicleEF	LDA	0.03	0.05
tblVehicleEF	LDA	8.3520e-003	7.0950e-003
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.06	0.19
tblVehicleEF	LDA	2.3560e-003	2.4740e-003
tblVehicleEF	LDA	5.6100e-004	5.1000e-004
tblVehicleEF	LDA	0.04	0.06
tblVehicleEF	LDA	0.09	0.09
tblVehicleEF	LDA	0.03	0.05
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.06	0.21
tblVehicleEF	LDA	3.7650e-003	2.1830e-003
tblVehicleEF	LDA	3.6350e-003	0.04
tblVehicleEF	LDA	0.62	0.70

tblVehicleEF	LDA	0.85	1.77
tblVehicleEF	LDA	256.22	271.87
tblVehicleEF	LDA	54.50	51.08
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.09	0.12
tblVehicleEF	LDA	0.10	0.11
tblVehicleEF	LDA	0.06	0.09
tblVehicleEF	LDA	9.4470e-003	8.0120e-003
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.05	0.17
tblVehicleEF	LDA	2.5670e-003	2.6900e-003
tblVehicleEF	LDA	5.5900e-004	5.0600e-004
tblVehicleEF	LDA	0.09	0.12
tblVehicleEF	LDA	0.10	0.11
tblVehicleEF	LDA	0.06	0.09
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.05	0.18
tblVehicleEF	LDA	3.2080e-003	1.8500e-003
tblVehicleEF	LDA	4.3060e-003	0.05
tblVehicleEF	LDA	0.48	0.54
tblVehicleEF	LDA	0.98	2.05
tblVehicleEF	LDA	229.53	244.11

tblVehicleEF	LDA	54.50	51.61
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.10	0.10
tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	8.0650e-003	6.8540e-003
tblVehicleEF	LDA	0.04	0.22
tblVehicleEF	LDA	0.06	0.19
tblVehicleEF	LDA	2.2980e-003	2.4150e-003
tblVehicleEF	LDA	5.6100e-004	5.1100e-004
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.10	0.10
tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	0.01	9.9700e-003
tblVehicleEF	LDA	0.04	0.22
tblVehicleEF	LDA	0.06	0.21
tblVehicleEF	LDT1	9.2940e-003	5.9940e-003
tblVehicleEF	LDT1	0.01	0.07
tblVehicleEF	LDT1	1.18	1.28
tblVehicleEF	LDT1	2.73	2.25
tblVehicleEF	LDT1	295.40	299.04
tblVehicleEF	LDT1	68.37	62.77
tblVehicleEF	LDT1	0.11	0.11

tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.18	0.19
tblVehicleEF	LDT1	0.30	0.23
tblVehicleEF	LDT1	0.12	0.13
tblVehicleEF	LDT1	0.02	0.03
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.19	0.35
tblVehicleEF	LDT1	2.9680e-003	2.9590e-003
tblVehicleEF	LDT1	7.3100e-004	6.2100e-004
tblVehicleEF	LDT1	0.18	0.19
tblVehicleEF	LDT1	0.30	0.23
tblVehicleEF	LDT1	0.12	0.13
tblVehicleEF	LDT1	0.03	0.04
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.21	0.39
tblVehicleEF	LDT1	0.01	6.7740e-003
tblVehicleEF	LDT1	0.01	0.06
tblVehicleEF	LDT1	1.43	1.55
tblVehicleEF	LDT1	2.40	1.99
tblVehicleEF	LDT1	320.93	322.22
tblVehicleEF	LDT1	68.37	62.22
tblVehicleEF	LDT1	0.11	0.10
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003

tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.36	0.37
tblVehicleEF	LDT1	0.37	0.28
tblVehicleEF	LDT1	0.24	0.25
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.16	0.31
tblVehicleEF	LDT1	3.2270e-003	3.1890e-003
tblVehicleEF	LDT1	7.2500e-004	6.1600e-004
tblVehicleEF	LDT1	0.36	0.37
tblVehicleEF	LDT1	0.37	0.28
tblVehicleEF	LDT1	0.24	0.25
tblVehicleEF	LDT1	0.04	0.04
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.18	0.34
tblVehicleEF	LDT1	8.9360e-003	5.7650e-003
tblVehicleEF	LDT1	0.01	0.07
tblVehicleEF	LDT1	1.11	1.19
tblVehicleEF	LDT1	2.78	2.30
tblVehicleEF	LDT1	287.77	292.00
tblVehicleEF	LDT1	68.37	62.89
tblVehicleEF	LDT1	0.11	0.10
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003

tblVehicleEF	LDT1	0.16	0.16
tblVehicleEF	LDT1	0.33	0.25
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.02	0.03
tblVehicleEF	LDT1	0.21	0.85
tblVehicleEF	LDT1	0.19	0.36
tblVehicleEF	LDT1	2.8910e-003	2.8900e-003
tblVehicleEF	LDT1	7.3200e-004	6.2200e-004
tblVehicleEF	LDT1	0.16	0.16
tblVehicleEF	LDT1	0.33	0.25
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.03	0.04
tblVehicleEF	LDT1	0.21	0.85
tblVehicleEF	LDT1	0.21	0.40
tblVehicleEF	LDT2	4.7540e-003	3.3780e-003
tblVehicleEF	LDT2	5.7630e-003	0.06
tblVehicleEF	LDT2	0.68	0.83
tblVehicleEF	LDT2	1.27	2.55
tblVehicleEF	LDT2	330.23	314.65
tblVehicleEF	LDT2	76.02	66.37
tblVehicleEF	LDT2	0.06	0.07
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.06	0.10
tblVehicleEF	LDT2	0.10	0.13

tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.08	0.28
tblVehicleEF	LDT2	3.3070e-003	3.1130e-003
tblVehicleEF	LDT2	7.8100e-004	6.5700e-004
tblVehicleEF	LDT2	0.06	0.10
tblVehicleEF	LDT2	0.10	0.13
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.09	0.31
tblVehicleEF	LDT2	5.3890e-003	3.8410e-003
tblVehicleEF	LDT2	5.0030e-003	0.05
tblVehicleEF	LDT2	0.83	1.02
tblVehicleEF	LDT2	1.13	2.26
tblVehicleEF	LDT2	359.32	336.75
tblVehicleEF	LDT2	76.02	65.79
tblVehicleEF	LDT2	0.06	0.06
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.12	0.20
tblVehicleEF	LDT2	0.12	0.15
tblVehicleEF	LDT2	0.10	0.15
tblVehicleEF	LDT2	0.01	0.02

tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.07	0.25
tblVehicleEF	LDT2	3.6000e-003	3.3320e-003
tblVehicleEF	LDT2	7.7900e-004	6.5100e-004
tblVehicleEF	LDT2	0.12	0.20
tblVehicleEF	LDT2	0.12	0.15
tblVehicleEF	LDT2	0.10	0.15
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.07	0.27
tblVehicleEF	LDT2	4.5710e-003	3.2420e-003
tblVehicleEF	LDT2	5.9350e-003	0.06
tblVehicleEF	LDT2	0.63	0.78
tblVehicleEF	LDT2	1.30	2.62
tblVehicleEF	LDT2	321.50	307.92
tblVehicleEF	LDT2	76.02	66.50
tblVehicleEF	LDT2	0.06	0.07
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.11	0.13
tblVehicleEF	LDT2	0.04	0.07
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.07	0.47
tblVehicleEF	LDT2	0.08	0.29

tblVehicleEF	LDT2	3.2190e-003	3.0460e-003
tblVehicleEF	LDT2	7.8200e-004	6.5800e-004
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.11	0.13
tblVehicleEF	LDT2	0.04	0.07
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.07	0.47
tblVehicleEF	LDT2	0.09	0.32
tblVehicleEF	LHD1	4.9950e-003	4.6360e-003
tblVehicleEF	LHD1	8.5970e-003	4.3560e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.81	0.59
tblVehicleEF	LHD1	2.14	0.90
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.59
tblVehicleEF	LHD1	29.33	10.19
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.91	1.31
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004

tblVehicleEF	LHD1	3.6750e-003	2.8510e-003
tblVehicleEF	LHD1	0.10	0.07
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.8430e-003	1.4280e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.31	0.45
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3400e-004	1.0100e-004
tblVehicleEF	LHD1	3.6750e-003	2.8510e-003
tblVehicleEF	LHD1	0.10	0.07
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.8430e-003	1.4280e-003
tblVehicleEF	LHD1	0.08	0.06
tblVehicleEF	LHD1	0.31	0.45
tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD1	4.9950e-003	4.6470e-003
tblVehicleEF	LHD1	8.7610e-003	4.4230e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.82	0.60
tblVehicleEF	LHD1	2.04	0.86
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.61
tblVehicleEF	LHD1	29.33	10.11
tblVehicleEF	LHD1	0.09	0.08

tblVehicleEF	LHD1	1.80	1.24
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	6.8550e-003	5.3200e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	3.4810e-003	2.7140e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.32	0.46
tblVehicleEF	LHD1	0.22	0.06
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3200e-004	1.0000e-004
tblVehicleEF	LHD1	6.8550e-003	5.3200e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	3.4810e-003	2.7140e-003
tblVehicleEF	LHD1	0.09	0.06
tblVehicleEF	LHD1	0.32	0.46
tblVehicleEF	LHD1	0.24	0.07
tblVehicleEF	LHD1	4.9950e-003	4.6350e-003

tblVehicleEF	LHD1	8.5850e-003	4.3480e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.81	0.59
tblVehicleEF	LHD1	2.14	0.90
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.59
tblVehicleEF	LHD1	29.33	10.19
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.89	1.30
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	3.2380e-003	2.5030e-003
tblVehicleEF	LHD1	0.11	0.08
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.6810e-003	1.2970e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.33	0.49
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003

tblVehicleEF	LHD1	3.3400e-004	1.0100e-004
tblVehicleEF	LHD1	3.2380e-003	2.5030e-003
tblVehicleEF	LHD1	0.11	0.08
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.6810e-003	1.2970e-003
tblVehicleEF	LHD1	0.08	0.06
tblVehicleEF	LHD1	0.33	0.49
tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD2	3.3070e-003	3.0000e-003
tblVehicleEF	LHD2	3.5370e-003	3.2750e-003
tblVehicleEF	LHD2	6.6670e-003	7.9190e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.44
tblVehicleEF	LHD2	1.03	0.52
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.68
tblVehicleEF	LHD2	22.93	7.02
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.29	1.45
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005

tblVehicleEF	LHD2	1.3090e-003	1.5300e-003
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	7.0300e-004	7.9000e-004
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4800e-004	6.9000e-005
tblVehicleEF	LHD2	1.3090e-003	1.5300e-003
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	7.0300e-004	7.9000e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	LHD2	3.3070e-003	3.0070e-003
tblVehicleEF	LHD2	3.5730e-003	3.2970e-003
tblVehicleEF	LHD2	6.4430e-003	7.6530e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.45
tblVehicleEF	LHD2	0.98	0.50
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.69
tblVehicleEF	LHD2	22.93	6.98
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.22	1.37

tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005
tblVehicleEF	LHD2	2.4680e-003	2.8830e-003
tblVehicleEF	LHD2	0.04	0.05
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	1.3130e-003	1.4920e-003
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4700e-004	6.9000e-005
tblVehicleEF	LHD2	2.4680e-003	2.8830e-003
tblVehicleEF	LHD2	0.04	0.05
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	1.3130e-003	1.4920e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	LHD2	3.3070e-003	2.9980e-003
tblVehicleEF	LHD2	3.5300e-003	3.2690e-003
tblVehicleEF	LHD2	6.7050e-003	7.9760e-003

tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.44
tblVehicleEF	LHD2	1.03	0.52
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.68
tblVehicleEF	LHD2	22.93	7.03
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.28	1.44
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005
tblVehicleEF	LHD2	1.0230e-003	1.1840e-003
tblVehicleEF	LHD2	0.04	0.04
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	5.9800e-004	6.5900e-004
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.08	0.24
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4800e-004	7.0000e-005
tblVehicleEF	LHD2	1.0230e-003	1.1840e-003
tblVehicleEF	LHD2	0.04	0.04

tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	5.9800e-004	6.5900e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.08	0.24
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	MCY	0.43	0.32
tblVehicleEF	MCY	0.15	0.24
tblVehicleEF	MCY	18.81	18.95
tblVehicleEF	MCY	9.70	8.59
tblVehicleEF	MCY	166.71	208.09
tblVehicleEF	MCY	45.36	60.09
tblVehicleEF	MCY	1.12	1.12
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	1.69	1.67
tblVehicleEF	MCY	0.83	0.84
tblVehicleEF	MCY	0.92	0.90
tblVehicleEF	MCY	2.11	2.12
tblVehicleEF	MCY	0.55	1.77
tblVehicleEF	MCY	2.05	1.81
tblVehicleEF	MCY	2.0360e-003	2.0590e-003
tblVehicleEF	MCY	6.7200e-004	5.9500e-004
tblVehicleEF	MCY	1.69	1.67
tblVehicleEF	MCY	0.83	0.84
tblVehicleEF	MCY	0.92	0.90

tblVehicleEF	MCY	2.61	2.62
tblVehicleEF	MCY	0.55	1.77
tblVehicleEF	MCY	2.23	1.97
tblVehicleEF	MCY	0.42	0.31
tblVehicleEF	MCY	0.13	0.22
tblVehicleEF	MCY	19.51	19.61
tblVehicleEF	MCY	9.10	8.00
tblVehicleEF	MCY	166.71	209.06
tblVehicleEF	MCY	45.36	58.52
tblVehicleEF	MCY	0.97	0.97
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	3.35	3.31
tblVehicleEF	MCY	1.23	1.24
tblVehicleEF	MCY	2.09	2.05
tblVehicleEF	MCY	2.09	2.10
tblVehicleEF	MCY	0.55	1.76
tblVehicleEF	MCY	1.84	1.62
tblVehicleEF	MCY	2.0460e-003	2.0690e-003
tblVehicleEF	MCY	6.5600e-004	5.7900e-004
tblVehicleEF	MCY	3.35	3.31
tblVehicleEF	MCY	1.23	1.24
tblVehicleEF	MCY	2.09	2.05
tblVehicleEF	MCY	2.59	2.60
tblVehicleEF	MCY	0.55	1.76

tblVehicleEF	MCY	2.00	1.76
tblVehicleEF	MCY	0.42	0.31
tblVehicleEF	MCY	0.15	0.24
tblVehicleEF	MCY	18.37	18.50
tblVehicleEF	MCY	9.67	8.54
tblVehicleEF	MCY	166.71	207.36
tblVehicleEF	MCY	45.36	60.03
tblVehicleEF	MCY	1.12	1.12
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	1.59	1.59
tblVehicleEF	MCY	1.02	1.03
tblVehicleEF	MCY	0.73	0.73
tblVehicleEF	MCY	2.11	2.11
tblVehicleEF	MCY	0.63	2.01
tblVehicleEF	MCY	2.06	1.81
tblVehicleEF	MCY	2.0290e-003	2.0520e-003
tblVehicleEF	MCY	6.7200e-004	5.9400e-004
tblVehicleEF	MCY	1.59	1.59
tblVehicleEF	MCY	1.02	1.03
tblVehicleEF	MCY	0.73	0.73
tblVehicleEF	MCY	2.61	2.61
tblVehicleEF	MCY	0.63	2.01
tblVehicleEF	MCY	2.24	1.98
tblVehicleEF	MDV	9.8990e-003	4.3280e-003

tblVehicleEF	MDV	0.01	0.08
tblVehicleEF	MDV	1.15	0.95
tblVehicleEF	MDV	2.62	2.95
tblVehicleEF	MDV	458.82	394.25
tblVehicleEF	MDV	104.21	82.79
tblVehicleEF	MDV	0.13	0.09
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.11	0.12
tblVehicleEF	MDV	0.19	0.16
tblVehicleEF	MDV	0.09	0.11
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.20	0.37
tblVehicleEF	MDV	4.5960e-003	3.8980e-003
tblVehicleEF	MDV	1.0880e-003	8.1900e-004
tblVehicleEF	MDV	0.11	0.12
tblVehicleEF	MDV	0.19	0.16
tblVehicleEF	MDV	0.09	0.11
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.22	0.41
tblVehicleEF	MDV	0.01	4.9300e-003
tblVehicleEF	MDV	0.01	0.07
tblVehicleEF	MDV	1.41	1.16

tblVehicleEF	MDV	2.31	2.60
tblVehicleEF	MDV	498.05	417.67
tblVehicleEF	MDV	104.21	82.07
tblVehicleEF	MDV	0.13	0.08
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.21	0.24
tblVehicleEF	MDV	0.22	0.18
tblVehicleEF	MDV	0.16	0.20
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.17	0.32
tblVehicleEF	MDV	4.9910e-003	4.1290e-003
tblVehicleEF	MDV	1.0820e-003	8.1200e-004
tblVehicleEF	MDV	0.21	0.24
tblVehicleEF	MDV	0.22	0.18
tblVehicleEF	MDV	0.16	0.20
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.19	0.35
tblVehicleEF	MDV	9.5100e-003	4.1550e-003
tblVehicleEF	MDV	0.02	0.08
tblVehicleEF	MDV	1.08	0.89
tblVehicleEF	MDV	2.68	3.02
tblVehicleEF	MDV	447.05	387.19

tblVehicleEF	MDV	104.21	82.93
tblVehicleEF	MDV	0.13	0.09
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.08	0.10
tblVehicleEF	MDV	0.20	0.17
tblVehicleEF	MDV	0.08	0.09
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.13	0.54
tblVehicleEF	MDV	0.20	0.38
tblVehicleEF	MDV	4.4770e-003	3.8280e-003
tblVehicleEF	MDV	1.0890e-003	8.2100e-004
tblVehicleEF	MDV	0.08	0.10
tblVehicleEF	MDV	0.20	0.17
tblVehicleEF	MDV	0.08	0.09
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.13	0.54
tblVehicleEF	MDV	0.22	0.42
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	2.00	0.32
tblVehicleEF	MH	5.24	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.48	4.16

tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.08	0.00
tblVehicleEF	MH	0.49	0.00
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.31	0.00
tblVehicleEF	MH	9.8680e-003	8.7750e-003
tblVehicleEF	MH	6.6300e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.08	0.00
tblVehicleEF	MH	0.49	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.34	0.00
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	2.05	0.32
tblVehicleEF	MH	4.88	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.37	3.92

tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	2.52	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.94	0.00
tblVehicleEF	MH	0.08	0.07
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.30	0.00
tblVehicleEF	MH	9.8690e-003	8.7750e-003
tblVehicleEF	MH	6.5700e-004	0.00
tblVehicleEF	MH	2.52	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.94	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.32	0.00
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	1.99	0.32
tblVehicleEF	MH	5.28	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.46	4.12

tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.47	0.00
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.03	0.00
tblVehicleEF	MH	0.31	0.00
tblVehicleEF	MH	9.8680e-003	8.7750e-003
tblVehicleEF	MH	6.6300e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.47	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.03	0.00
tblVehicleEF	MH	0.34	0.00
tblVehicleEF	MHD	0.02	3.2310e-003
tblVehicleEF	MHD	2.5650e-003	1.3290e-003
tblVehicleEF	MHD	0.05	8.5180e-003
tblVehicleEF	MHD	0.32	0.36
tblVehicleEF	MHD	0.21	0.17
tblVehicleEF	MHD	5.07	0.97
tblVehicleEF	MHD	148.43	69.20

tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.50
tblVehicleEF	MHD	0.41	0.40
tblVehicleEF	MHD	0.47	0.90
tblVehicleEF	MHD	1.3500e-004	4.2800e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.2900e-004	4.0900e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	1.5020e-003	6.5600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	7.6500e-004	3.3500e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.31	0.04
tblVehicleEF	MHD	1.4270e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3400e-004	8.4000e-005
tblVehicleEF	MHD	1.5020e-003	6.5600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	7.6500e-004	3.3500e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.34	0.05

tblVehicleEF	MHD	0.02	3.0750e-003
tblVehicleEF	MHD	2.5980e-003	1.3500e-003
tblVehicleEF	MHD	0.05	8.2390e-003
tblVehicleEF	MHD	0.23	0.31
tblVehicleEF	MHD	0.21	0.18
tblVehicleEF	MHD	4.84	0.93
tblVehicleEF	MHD	157.22	69.18
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.42
tblVehicleEF	MHD	0.42	0.39
tblVehicleEF	MHD	0.44	0.85
tblVehicleEF	MHD	1.1400e-004	3.6400e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.0900e-004	3.4800e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	2.8970e-003	1.2520e-003
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	1.4710e-003	6.4800e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.30	0.04
tblVehicleEF	MHD	1.5100e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3000e-004	8.3000e-005

tblVehicleEF	MHD	2.8970e-003	1.2520e-003
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	1.4710e-003	6.4800e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.33	0.05
tblVehicleEF	MHD	0.02	3.4570e-003
tblVehicleEF	MHD	2.5410e-003	1.3140e-003
tblVehicleEF	MHD	0.05	8.5940e-003
tblVehicleEF	MHD	0.44	0.42
tblVehicleEF	MHD	0.21	0.17
tblVehicleEF	MHD	5.15	0.99
tblVehicleEF	MHD	136.28	69.22
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.52
tblVehicleEF	MHD	0.39	0.41
tblVehicleEF	MHD	0.46	0.89
tblVehicleEF	MHD	1.6400e-004	5.1700e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.5700e-004	4.9400e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	1.0970e-003	4.9200e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02

tblVehicleEF	MHD	5.9600e-004	2.6700e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.31	0.05
tblVehicleEF	MHD	1.3130e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3600e-004	8.4000e-005
tblVehicleEF	MHD	1.0970e-003	4.9200e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	5.9600e-004	2.6700e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.34	0.05
tblVehicleEF	OBUS	0.01	8.5500e-003
tblVehicleEF	OBUS	5.6790e-003	4.7720e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.25	0.50
tblVehicleEF	OBUS	0.39	0.58
tblVehicleEF	OBUS	5.52	2.45
tblVehicleEF	OBUS	68.59	68.17
tblVehicleEF	OBUS	1,085.33	1,337.43
tblVehicleEF	OBUS	69.49	20.30
tblVehicleEF	OBUS	0.13	0.25
tblVehicleEF	OBUS	0.35	0.81
tblVehicleEF	OBUS	1.2000e-005	8.2000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003

tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.1000e-005	7.8000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	2.0910e-003	2.6360e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	9.0600e-004	1.1390e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.34	0.12
tblVehicleEF	OBUS	6.6700e-004	6.5100e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.9200e-004	2.0100e-004
tblVehicleEF	OBUS	2.0910e-003	2.6360e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.04	0.06
tblVehicleEF	OBUS	9.0600e-004	1.1390e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.38	0.13
tblVehicleEF	OBUS	0.01	8.6200e-003
tblVehicleEF	OBUS	5.7930e-003	4.8760e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.24	0.50
tblVehicleEF	OBUS	0.40	0.59
tblVehicleEF	OBUS	5.16	2.29

tblVehicleEF	OBUS	71.65	67.44
tblVehicleEF	OBUS	1,085.33	1,337.45
tblVehicleEF	OBUS	69.49	20.03
tblVehicleEF	OBUS	0.14	0.23
tblVehicleEF	OBUS	0.33	0.75
tblVehicleEF	OBUS	1.0000e-005	7.3000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.0000e-005	6.9000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	3.8840e-003	4.8010e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	1.7290e-003	2.1640e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.33	0.11
tblVehicleEF	OBUS	6.9600e-004	6.4400e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.8600e-004	1.9800e-004
tblVehicleEF	OBUS	3.8840e-003	4.8010e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.04	0.06
tblVehicleEF	OBUS	1.7290e-003	2.1640e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.27

tblVehicleEF	OBUS	0.36	0.12
tblVehicleEF	OBUS	0.01	8.4810e-003
tblVehicleEF	OBUS	5.6610e-003	4.7410e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.25	0.51
tblVehicleEF	OBUS	0.39	0.58
tblVehicleEF	OBUS	5.57	2.48
tblVehicleEF	OBUS	64.36	69.17
tblVehicleEF	OBUS	1,085.33	1,337.43
tblVehicleEF	OBUS	69.49	20.34
tblVehicleEF	OBUS	0.13	0.26
tblVehicleEF	OBUS	0.35	0.81
tblVehicleEF	OBUS	1.5000e-005	9.4000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.4000e-005	9.0000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	1.7990e-003	2.3770e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	8.3400e-004	1.0810e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.28
tblVehicleEF	OBUS	0.35	0.12
tblVehicleEF	OBUS	6.2600e-004	6.6000e-004
tblVehicleEF	OBUS	0.01	0.01

tblVehicleEF	OBUS	7.9300e-004	2.0100e-004
tblVehicleEF	OBUS	1.7990e-003	2.3770e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.06
tblVehicleEF	OBUS	8.3400e-004	1.0810e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.28
tblVehicleEF	OBUS	0.38	0.13
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.5650e-003	6.1380e-003
tblVehicleEF	SBUS	0.06	7.1540e-003
tblVehicleEF	SBUS	7.84	3.12
tblVehicleEF	SBUS	0.57	0.50
tblVehicleEF	SBUS	6.44	0.94
tblVehicleEF	SBUS	1,128.57	363.20
tblVehicleEF	SBUS	1,093.03	1,093.96
tblVehicleEF	SBUS	55.12	6.12
tblVehicleEF	SBUS	8.81	3.37
tblVehicleEF	SBUS	3.97	4.43
tblVehicleEF	SBUS	8.4250e-003	3.4460e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	8.0610e-003	3.2970e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005

tblVehicleEF	SBUS	5.0680e-003	1.5010e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.93	0.37
tblVehicleEF	SBUS	2.4310e-003	7.2500e-004
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.36	0.04
tblVehicleEF	SBUS	0.01	3.4700e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.6300e-004	6.1000e-005
tblVehicleEF	SBUS	5.0680e-003	1.5010e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	2.4310e-003	7.2500e-004
tblVehicleEF	SBUS	0.12	0.10
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.39	0.05
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.7050e-003	6.2090e-003
tblVehicleEF	SBUS	0.05	5.9970e-003
tblVehicleEF	SBUS	7.74	3.09
tblVehicleEF	SBUS	0.58	0.50
tblVehicleEF	SBUS	4.67	0.68
tblVehicleEF	SBUS	1,179.47	372.25
tblVehicleEF	SBUS	1,093.03	1,093.97
tblVehicleEF	SBUS	55.12	5.68
tblVehicleEF	SBUS	9.10	3.45

tblVehicleEF	SBUS	3.73	4.17
tblVehicleEF	SBUS	7.1020e-003	2.9130e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	6.7950e-003	2.7870e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	9.1290e-003	2.7020e-003
tblVehicleEF	SBUS	0.04	0.01
tblVehicleEF	SBUS	0.92	0.37
tblVehicleEF	SBUS	4.4980e-003	1.3370e-003
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.30	0.03
tblVehicleEF	SBUS	0.01	3.5550e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.3300e-004	5.6000e-005
tblVehicleEF	SBUS	9.1290e-003	2.7020e-003
tblVehicleEF	SBUS	0.04	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	4.4980e-003	1.3370e-003
tblVehicleEF	SBUS	0.12	0.11
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.33	0.04
tblVehicleEF	SBUS	0.82	0.08

tblVehicleEF	SBUS	9.5210e-003	6.1310e-003
tblVehicleEF	SBUS	0.06	7.4110e-003
tblVehicleEF	SBUS	8.00	3.17
tblVehicleEF	SBUS	0.57	0.50
tblVehicleEF	SBUS	6.79	0.98
tblVehicleEF	SBUS	1,058.28	350.71
tblVehicleEF	SBUS	1,093.03	1,093.96
tblVehicleEF	SBUS	55.12	6.19
tblVehicleEF	SBUS	8.43	3.26
tblVehicleEF	SBUS	3.93	4.40
tblVehicleEF	SBUS	0.01	4.1830e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	9.8080e-003	4.0020e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	4.3640e-003	1.2920e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.93	0.37
tblVehicleEF	SBUS	2.3310e-003	6.9700e-004
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.07
tblVehicleEF	SBUS	0.37	0.04
tblVehicleEF	SBUS	0.01	3.3520e-003
tblVehicleEF	SBUS	0.01	0.01

tblVehicleEF	SBUS	6.6900e-004	6.1000e-005
tblVehicleEF	SBUS	4.3640e-003	1.2920e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	2.3310e-003	6.9700e-004
tblVehicleEF	SBUS	0.12	0.10
tblVehicleEF	SBUS	0.02	0.07
tblVehicleEF	SBUS	0.40	0.05
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.08	0.02
tblVehicleEF	UBUS	7.52	26.09
tblVehicleEF	UBUS	13.83	1.44
tblVehicleEF	UBUS	1,788.21	1,610.65
tblVehicleEF	UBUS	153.17	17.72
tblVehicleEF	UBUS	3.79	0.32
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	9.0420e-003	1.9590e-003
tblVehicleEF	UBUS	0.10	0.01
tblVehicleEF	UBUS	4.5390e-003	8.8500e-004
tblVehicleEF	UBUS	0.42	0.05

tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.09	0.07
tblVehicleEF	UBUS	9.5090e-003	4.8150e-003
tblVehicleEF	UBUS	1.7820e-003	1.7500e-004
tblVehicleEF	UBUS	9.0420e-003	1.9590e-003
tblVehicleEF	UBUS	0.10	0.01
tblVehicleEF	UBUS	4.5390e-003	8.8500e-004
tblVehicleEF	UBUS	1.82	3.43
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.19	0.08
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.07	0.02
tblVehicleEF	UBUS	7.58	26.09
tblVehicleEF	UBUS	11.85	1.22
tblVehicleEF	UBUS	1,788.21	1,610.66
tblVehicleEF	UBUS	153.17	17.36
tblVehicleEF	UBUS	3.53	0.31
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	0.02	3.4780e-003
tblVehicleEF	UBUS	0.13	0.01

tblVehicleEF	UBUS	9.0520e-003	1.7490e-003
tblVehicleEF	UBUS	0.43	0.05
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	0.99	0.07
tblVehicleEF	UBUS	9.5110e-003	4.8150e-003
tblVehicleEF	UBUS	1.7480e-003	1.7200e-004
tblVehicleEF	UBUS	0.02	3.4780e-003
tblVehicleEF	UBUS	0.13	0.01
tblVehicleEF	UBUS	9.0520e-003	1.7490e-003
tblVehicleEF	UBUS	1.83	3.43
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.09	0.07
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.08	0.02
tblVehicleEF	UBUS	7.51	26.09
tblVehicleEF	UBUS	14.02	1.42
tblVehicleEF	UBUS	1,788.21	1,610.65
tblVehicleEF	UBUS	153.17	17.70
tblVehicleEF	UBUS	3.75	0.31
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004

tblVehicleEF	UBUS	8.1990e-003	1.9860e-003
tblVehicleEF	UBUS	0.12	0.01
tblVehicleEF	UBUS	4.1400e-003	9.2700e-004
tblVehicleEF	UBUS	0.42	0.05
tblVehicleEF	UBUS	0.03	0.07
tblVehicleEF	UBUS	1.10	0.07
tblVehicleEF	UBUS	9.5090e-003	4.8150e-003
tblVehicleEF	UBUS	1.7850e-003	1.7500e-004
tblVehicleEF	UBUS	8.1990e-003	1.9860e-003
tblVehicleEF	UBUS	0.12	0.01
tblVehicleEF	UBUS	4.1400e-003	9.2700e-004
tblVehicleEF	UBUS	1.82	3.43
tblVehicleEF	UBUS	0.03	0.07
tblVehicleEF	UBUS	1.20	0.08
tblVehicleTrips	WD_TR	12.89	30.10

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	7.6318	87.6451	37.0962	0.1166	35.3706	3.5208	38.8914	14.5663	3.2395	17.8058	0.0000	11,418.2405	11,418.2405	3.2392	0.0000	11,499.2209
2023	16.6636	44.4754	38.5330	0.0942	1.5462	1.8699	3.4161	0.4147	1.7449	2.1596	0.0000	9,123.3105	9,123.3105	2.0251	0.0000	9,173.9375
Maximum	**16.6636**	**87.6451**	**38.5330**	**0.1166**	**35.3706**	**3.5208**	**38.8914**	**14.5663**	**3.2395**	**17.8058**	**0.0000**	**11,418.2405**	**11,418.2405**	**3.2392**	**0.0000**	**11,499.2209**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	7.6318	87.6451	37.0962	0.1166	14.1974	3.5208	17.7182	5.7893	3.2395	9.0288	0.0000	11,418.2405	11,418.2405	3.2392	0.0000	11,499.2209
2023	16.6636	44.4754	38.5330	0.0942	1.5462	1.8699	3.4161	0.4147	1.7449	2.1596	0.0000	9,123.3105	9,123.3105	2.0251	0.0000	9,173.9375
Maximum	**16.6636**	**87.6451**	**38.5330**	**0.1166**	**14.1974**	**3.5208**	**17.7182**	**5.7893**	**3.2395**	**9.0288**	**0.0000**	**11,418.2405**	**11,418.2405**	**3.2392**	**0.0000**	**11,499.2209**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**57.35**	**0.00**	**50.05**	**58.59**	**0.00**	**43.96**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.9947	9.0000e-005	9.4500e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005		0.0203	0.0203	5.0000e-005		0.0216
Energy	8.1800e-003	0.0744	0.0625	4.5000e-004		5.6500e-003	5.6500e-003		5.6500e-003	5.6500e-003		89.2200	89.2200	1.7100e-003	1.6400e-003	89.7502
Mobile	3.2649	13.2202	36.1115	0.1276	11.3606	0.1225	11.4831	3.0369	0.1156	3.1525		13,136.1749	13,136.1749	0.4251		13,146.8031
Total	**4.2678**	**13.2946**	**36.1834**	**0.1281**	**11.3606**	**0.1282**	**11.4888**	**3.0369**	**0.1213**	**3.1582**		**13,225.4151**	**13,225.4151**	**0.4269**	**1.6400e-003**	**13,236.5749**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.9947	9.0000e-005	9.4500e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005		0.0203	0.0203	5.0000e-005		0.0216
Energy	8.1800e-003	0.0744	0.0625	4.5000e-004		5.6500e-003	5.6500e-003		5.6500e-003	5.6500e-003		89.2200	89.2200	1.7100e-003	1.6400e-003	89.7502
Mobile	3.2649	13.2202	36.1115	0.1276	11.3606	0.1225	11.4831	3.0369	0.1156	3.1525		13,136.1749	13,136.1749	0.4251		13,146.8031
Total	**4.2678**	**13.2946**	**36.1834**	**0.1281**	**11.3606**	**0.1282**	**11.4888**	**3.0369**	**0.1213**	**3.1582**		**13,225.4151**	**13,225.4151**	**0.4269**	**1.6400e-003**	**13,236.5749**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/1/2022	9/30/2022	5	45	
2	Grading	Grading	8/1/2022	9/30/2022	5	45	
3	Building Construction	Building Construction	10/1/2022	6/23/2023	5	190	
4	Paving	Paving	5/28/2023	6/23/2023	5	20	
5	Architectural Coating	Architectural Coating	5/28/2023	6/23/2023	5	20	
6	Demolition	Demolition	6/24/2023	8/4/2023	5	30	

Acres of Grading (Site Preparation Phase): 225

Acres of Grading (Grading Phase): 225

Acres of Paving: 3.56

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 62,250; Non-Residential Outdoor: 20,750; Striped Parking Area: 9,306 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Crawler Tractors	4	8.00	212	0.43
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Grading	Crawler Tractors	3	8.00	212	0.43
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Crawler Tractors	3	8.00	212	0.43
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Cement and Mortar Mixers	2	8.00	9	0.56
Paving	Crawler Tractors	1	8.00	212	0.43
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	100.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	750.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	83.00	32.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	17.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					23.3688	0.0000	23.3688	10.5032	0.0000	10.5032			0.0000			0.0000
Off-Road	4.4790	50.4124	20.0053	0.0570		2.1590	2.1590		1.9862	1.9862		5,517.2355	5,517.2355	1.7844		5,561.8451
Total	**4.4790**	**50.4124**	**20.0053**	**0.0570**	**23.3688**	**2.1590**	**25.5277**	**10.5032**	**1.9862**	**12.4895**		**5,517.2355**	**5,517.2355**	**1.7844**		**5,561.8451**

3.2 Site Preparation - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0798	0.0438	0.6138	1.8500e-003	0.2012	1.1500e-003	0.2024	0.0534	1.0600e-003	0.0544		184.6523	184.6523	4.1000e-003		184.7549
Total	**0.0798**	**0.0438**	**0.6138**	**1.8500e-003**	**0.2012**	**1.1500e-003**	**0.2024**	**0.0534**	**1.0600e-003**	**0.0544**		**184.6523**	**184.6523**	**4.1000e-003**		**184.7549**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.1138	0.0000	9.1138	4.0963	0.0000	4.0963			0.0000			0.0000
Off-Road	4.4790	50.4124	20.0053	0.0570		2.1590	2.1590		1.9862	1.9862	0.0000	5,517.2355	5,517.2355	1.7844		5,561.8451
Total	**4.4790**	**50.4124**	**20.0053**	**0.0570**	**9.1138**	**2.1590**	**11.2728**	**4.0963**	**1.9862**	**6.0825**	**0.0000**	**5,517.2355**	**5,517.2355**	**1.7844**		**5,561.8451**

3.2 Site Preparation - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0798	0.0438	0.6138	1.8500e-003	0.2012	1.1500e-003	0.2024	0.0534	1.0600e-003	0.0544		184.6523	184.6523	4.1000e-003		184.7549
Total	**0.0798**	**0.0438**	**0.6138**	**1.8500e-003**	**0.2012**	**1.1500e-003**	**0.2024**	**0.0534**	**1.0600e-003**	**0.0544**		**184.6523**	**184.6523**	**4.1000e-003**		**184.7549**

3.3 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					11.3415	0.0000	11.3415	3.8853	0.0000	3.8853			0.0000			0.0000
Off-Road	2.9303	33.8518	15.5033	0.0438		1.3506	1.3506		1.2426	1.2426		4,245.4266	4,245.4266	1.3731		4,279.7531
Total	**2.9303**	**33.8518**	**15.5033**	**0.0438**	**11.3415**	**1.3506**	**12.6921**	**3.8853**	**1.2426**	**5.1279**		**4,245.4266**	**4,245.4266**	**1.3731**		**4,279.7531**

3.3 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0762	3.3008	0.4623	0.0124	0.2915	9.1400e-003	0.3007	0.0799	8.7400e-003	0.0887		1,317.0492	1,317.0492	0.0743		1,318.9054
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0665	0.0365	0.5115	1.5400e-003	0.1677	9.6000e-004	0.1686	0.0445	8.9000e-004	0.0454		153.8769	153.8769	3.4200e-003		153.9624
Total	**0.1427**	**3.3372**	**0.9738**	**0.0139**	**0.4592**	**0.0101**	**0.4693**	**0.1244**	**9.6300e-003**	**0.1340**		**1,470.9261**	**1,470.9261**	**0.0777**		**1,472.8678**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.4232	0.0000	4.4232	1.5153	0.0000	1.5153			0.0000			0.0000
Off-Road	2.9303	33.8518	15.5033	0.0438		1.3506	1.3506		1.2426	1.2426	0.0000	4,245.4266	4,245.4266	1.3731		4,279.7530
Total	**2.9303**	**33.8518**	**15.5033**	**0.0438**	**4.4232**	**1.3506**	**5.7738**	**1.5153**	**1.2426**	**2.7579**	**0.0000**	**4,245.4266**	**4,245.4266**	**1.3731**		**4,279.7530**

3.3 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0762	3.3008	0.4623	0.0124	0.2915	9.1400e-003	0.3007	0.0799	8.7400e-003	0.0887		1,317.0492	1,317.0492	0.0743		1,318.9054
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0665	0.0365	0.5115	1.5400e-003	0.1677	9.6000e-004	0.1686	0.0445	8.9000e-004	0.0454		153.8769	153.8769	3.4200e-003		153.9624
Total	**0.1427**	**3.3372**	**0.9738**	**0.0139**	**0.4592**	**0.0101**	**0.4693**	**0.1244**	**9.6300e-003**	**0.1340**		**1,470.9261**	**1,470.9261**	**0.0777**		**1,472.8678**

3.4 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.7963	29.7637	17.6698	0.0430		1.2743	1.2743		1.1892	1.1892		4,110.5322	4,110.5322	1.1153		4,138.4135
Total	**2.7963**	**29.7637**	**17.6698**	**0.0430**		**1.2743**	**1.2743**		**1.1892**	**1.1892**		**4,110.5322**	**4,110.5322**	**1.1153**		**4,138.4135**

3.4 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0697	2.7939	0.4914	8.2200e-003	0.2049	4.7400e-003	0.2096	0.0590	4.5300e-003	0.0635		866.9606	866.9606	0.0592		868.4417
Worker	0.3681	0.2017	2.8304	8.5400e-003	0.9277	5.3200e-003	0.9331	0.2460	4.9000e-003	0.2509		851.4522	851.4522	0.0189		851.9254
Total	**0.4377**	**2.9956**	**3.3218**	**0.0168**	**1.1326**	**0.0101**	**1.1427**	**0.3050**	**9.4300e-003**	**0.3145**		**1,718.4128**	**1,718.4128**	**0.0782**		**1,720.3671**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.7963	29.7637	17.6698	0.0430		1.2743	1.2743		1.1892	1.1892	0.0000	4,110.5322	4,110.5322	1.1153		4,138.4135
Total	**2.7963**	**29.7637**	**17.6698**	**0.0430**		**1.2743**	**1.2743**		**1.1892**	**1.1892**	**0.0000**	**4,110.5322**	**4,110.5322**	**1.1153**		**4,138.4135**

3.4 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0697	2.7939	0.4914	8.2200e-003	0.2049	4.7400e-003	0.2096	0.0590	4.5300e-003	0.0635		866.9606	866.9606	0.0592		868.4417
Worker	0.3681	0.2017	2.8304	8.5400e-003	0.9277	5.3200e-003	0.9331	0.2460	4.9000e-003	0.2509		851.4522	851.4522	0.0189		851.9254
Total	**0.4377**	**2.9956**	**3.3218**	**0.0168**	**1.1326**	**0.0101**	**1.1427**	**0.3050**	**9.4300e-003**	**0.3145**		**1,718.4128**	**1,718.4128**	**0.0782**		**1,720.3671**

3.4 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5519	26.2044	17.3471	0.0430		1.1169	1.1169		1.0422	1.0422		4,108.2392	4,108.2392	1.1101		4,135.9924
Total	**2.5519**	**26.2044**	**17.3471**	**0.0430**		**1.1169**	**1.1169**		**1.0422**	**1.0422**		**4,108.2392**	**4,108.2392**	**1.1101**		**4,135.9924**

3.4 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0534	2.1009	0.4331	8.0000e-003	0.2049	2.1100e-003	0.2070	0.0590	2.0200e-003	0.0610		843.9026	843.9026	0.0455		845.0391
Worker	0.3451	0.1819	2.6121	8.2200e-003	0.9277	5.2000e-003	0.9329	0.2460	4.7800e-003	0.2508		819.0948	819.0948	0.0170		819.5195
Total	**0.3985**	**2.2828**	**3.0453**	**0.0162**	**1.1326**	**7.3100e-003**	**1.1399**	**0.3050**	**6.8000e-003**	**0.3118**		**1,662.9974**	**1,662.9974**	**0.0625**		**1,664.5586**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5519	26.2044	17.3471	0.0430		1.1169	1.1169		1.0422	1.0422	0.0000	4,108.2392	4,108.2392	1.1101		4,135.9924
Total	**2.5519**	**26.2044**	**17.3471**	**0.0430**		**1.1169**	**1.1169**		**1.0422**	**1.0422**	**0.0000**	**4,108.2392**	**4,108.2392**	**1.1101**		**4,135.9924**

3.4 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0534	2.1009	0.4331	8.0000e-003	0.2049	2.1100e-003	0.2070	0.0590	2.0200e-003	0.0610		843.9026	843.9026	0.0455		845.0391
Worker	0.3451	0.1819	2.6121	8.2200e-003	0.9277	5.2000e-003	0.9329	0.2460	4.7800e-003	0.2508		819.0948	819.0948	0.0170		819.5195
Total	**0.3985**	**2.2828**	**3.0453**	**0.0162**	**1.1326**	**7.3100e-003**	**1.1399**	**0.3050**	**6.8000e-003**	**0.3118**		**1,662.9974**	**1,662.9974**	**0.0625**		**1,664.5586**

3.5 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4025	14.1698	14.5615	0.0274		0.6490	0.6490		0.5994	0.5994		2,611.6712	2,611.6712	0.8225		2,632.2332
Paving	0.1271					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.5296**	**14.1698**	**14.5615**	**0.0274**		**0.6490**	**0.6490**		**0.5994**	**0.5994**		**2,611.6712**	**2,611.6712**	**0.8225**		**2,632.2332**

3.5 Paving - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0832	0.0438	0.6294	1.9800e-003	0.2236	1.2500e-003	0.2248	0.0593	1.1500e-003	0.0604		197.3722	197.3722	4.0900e-003		197.4746
Total	**0.0832**	**0.0438**	**0.6294**	**1.9800e-003**	**0.2236**	**1.2500e-003**	**0.2248**	**0.0593**	**1.1500e-003**	**0.0604**		**197.3722**	**197.3722**	**4.0900e-003**		**197.4746**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4025	14.1698	14.5615	0.0274		0.6490	0.6490		0.5994	0.5994	0.0000	2,611.6712	2,611.6712	0.8225		2,632.2332
Paving	0.1271					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.5296**	**14.1698**	**14.5615**	**0.0274**		**0.6490**	**0.6490**		**0.5994**	**0.5994**	**0.0000**	**2,611.6712**	**2,611.6712**	**0.8225**		**2,632.2332**

3.5 Paving - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0832	0.0438	0.6294	1.9800e-003	0.2236	1.2500e-003	0.2248	0.0593	1.1500e-003	0.0604		197.3722	197.3722	4.0900e-003		197.4746
Total	**0.0832**	**0.0438**	**0.6294**	**1.9800e-003**	**0.2236**	**1.2500e-003**	**0.2248**	**0.0593**	**1.1500e-003**	**0.0604**		**197.3722**	**197.3722**	**4.0900e-003**		**197.4746**

3.6 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.7743					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2556	1.7373	2.4148	3.9600e-003		0.0944	0.0944		0.0944	0.0944		375.2641	375.2641	0.0225		375.8253
Total	**12.0298**	**1.7373**	**2.4148**	**3.9600e-003**		**0.0944**	**0.0944**		**0.0944**	**0.0944**		**375.2641**	**375.2641**	**0.0225**		**375.8253**

3.6 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0707	0.0373	0.5350	1.6800e-003	0.1900	1.0600e-003	0.1911	0.0504	9.8000e-004	0.0514		167.7664	167.7664	3.4800e-003		167.8534
Total	**0.0707**	**0.0373**	**0.5350**	**1.6800e-003**	**0.1900**	**1.0600e-003**	**0.1911**	**0.0504**	**9.8000e-004**	**0.0514**		**167.7664**	**167.7664**	**3.4800e-003**		**167.8534**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.7743					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2556	1.7373	2.4148	3.9600e-003		0.0944	0.0944		0.0944	0.0944	0.0000	375.2641	375.2641	0.0225		375.8253
Total	**12.0298**	**1.7373**	**2.4148**	**3.9600e-003**		**0.0944**	**0.0944**		**0.0944**	**0.0944**	**0.0000**	**375.2641**	**375.2641**	**0.0225**		**375.8253**

3.6 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0707	0.0373	0.5350	1.6800e-003	0.1900	1.0600e-003	0.1911	0.0504	9.8000e-004	0.0514		167.7664	167.7664	3.4800e-003		167.8534
Total	**0.0707**	**0.0373**	**0.5350**	**1.6800e-003**	**0.1900**	**1.0600e-003**	**0.1911**	**0.0504**	**9.8000e-004**	**0.0514**		**167.7664**	**167.7664**	**3.4800e-003**		**167.8534**

3.7 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7428	0.0000	0.7428	0.1125	0.0000	0.1125			0.0000			0.0000
Off-Road	2.2691	21.4844	19.6434	0.0388		0.9975	0.9975		0.9280	0.9280		3,746.984 0	3,746.984 0	1.0494		3,773.218 3
Total	**2.2691**	**21.4844**	**19.6434**	**0.0388**	**0.7428**	**0.9975**	**1.7404**	**0.1125**	**0.9280**	**1.0405**		**3,746.984 0**	**3,746.984 0**	**1.0494**		**3,773.218 3**

3.7 Demolition - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0106	0.4162	0.0815	2.4000e-003	0.0583	7.9000e-004	0.0591	0.0160	7.6000e-004	0.0167		254.6743	254.6743	0.0120		254.9736
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0624	0.0329	0.4721	1.4900e-003	0.1677	9.4000e-004	0.1686	0.0445	8.6000e-004	0.0453		148.0292	148.0292	3.0700e-003		148.1059
Total	**0.0730**	**0.4490**	**0.5536**	**3.8900e-003**	**0.2260**	**1.7300e-003**	**0.2277**	**0.0605**	**1.6200e-003**	**0.0621**		**402.7035**	**402.7035**	**0.0150**		**403.0795**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2897	0.0000	0.2897	0.0439	0.0000	0.0439			0.0000			0.0000
Off-Road	2.2691	21.4844	19.6434	0.0388		0.9975	0.9975		0.9280	0.9280	0.0000	3,746.9840	3,746.9840	1.0494		3,773.2183
Total	**2.2691**	**21.4844**	**19.6434**	**0.0388**	**0.2897**	**0.9975**	**1.2872**	**0.0439**	**0.9280**	**0.9719**	**0.0000**	**3,746.9840**	**3,746.9840**	**1.0494**		**3,773.2183**

3.7 Demolition - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0106	0.4162	0.0815	2.4000e-003	0.0583	7.9000e-004	0.0591	0.0160	7.6000e-004	0.0167		254.6743	254.6743	0.0120		254.9736
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0624	0.0329	0.4721	1.4900e-003	0.1677	9.4000e-004	0.1686	0.0445	8.6000e-004	0.0453		148.0292	148.0292	3.0700e-003		148.1059
Total	**0.0730**	**0.4490**	**0.5536**	**3.8900e-003**	**0.2260**	**1.7300e-003**	**0.2277**	**0.0605**	**1.6200e-003**	**0.0621**		**402.7035**	**402.7035**	**0.0150**		**403.0795**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Mitigated	3.2649	13.2202	36.1115	0.1276	11.3606	0.1225	11.4831	3.0369	0.1156	3.1525		13,136.17 49	13,136.17 49	0.4251		13,146.80 31
Unmitigated	3.2649	13.2202	36.1115	0.1276	11.3606	0.1225	11.4831	3.0369	0.1156	3.1525		13,136.17 49	13,136.17 49	0.4251		13,146.80 31

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
High School	1,249.00	181.36	74.29	3,966,119	3,966,119
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	1,249.00	181.36	74.29	3,966,119	3,966,119

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
High School	16.60	8.40	6.90	77.80	17.20	5.00	75	19	6
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
High School	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898
Other Asphalt Surfaces	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898
Other Non-Asphalt Surfaces	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898
Parking Lot	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	8.1800e-003	0.0744	0.0625	4.5000e-004		5.6500e-003	5.6500e-003		5.6500e-003	5.6500e-003		89.2200	89.2200	1.7100e-003	1.6400e-003	89.7502
NaturalGas Unmitigated	8.1800e-003	0.0744	0.0625	4.5000e-004		5.6500e-003	5.6500e-003		5.6500e-003	5.6500e-003		89.2200	89.2200	1.7100e-003	1.6400e-003	89.7502

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
High School	758.37	8.1800e-003	0.0744	0.0625	4.5000e-004		5.6500e-003	5.6500e-003		5.6500e-003	5.6500e-003		89.2200	89.2200	1.7100e-003	1.6400e-003	89.7502
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**8.1800e-003**	**0.0744**	**0.0625**	**4.5000e-004**		**5.6500e-003**	**5.6500e-003**		**5.6500e-003**	**5.6500e-003**		**89.2200**	**89.2200**	**1.7100e-003**	**1.6400e-003**	**89.7502**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
High School	0.75837	8.1800e-003	0.0744	0.0625	4.5000e-004		5.6500e-003	5.6500e-003		5.6500e-003	5.6500e-003		89.2200	89.2200	1.7100e-003	1.6400e-003	89.7502
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**8.1800e-003**	**0.0744**	**0.0625**	**4.5000e-004**		**5.6500e-003**	**5.6500e-003**		**5.6500e-003**	**5.6500e-003**		**89.2200**	**89.2200**	**1.7100e-003**	**1.6400e-003**	**89.7502**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.9947	9.0000e-005	9.4500e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005		0.0203	0.0203	5.0000e-005		0.0216
Unmitigated	0.9947	9.0000e-005	9.4500e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005		0.0203	0.0203	5.0000e-005		0.0216

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.1172					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.8766					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	8.8000e-004	9.0000e-005	9.4500e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005		0.0203	0.0203	5.0000e-005		0.0216
Total	**0.9947**	**9.0000e-005**	**9.4500e-003**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**		**0.0203**	**0.0203**	**5.0000e-005**		**0.0216**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.1172					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.8766					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	8.8000e-004	9.0000e-005	9.4500e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005		0.0203	0.0203	5.0000e-005		0.0216
Total	**0.9947**	**9.0000e-005**	**9.4500e-003**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**		**0.0203**	**0.0203**	**5.0000e-005**		**0.0216**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Murrieta Canyon Academy (Unmitigated)

Riverside-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
High School	41.50	1000sqft	0.95	41,500.00	0
Other Asphalt Surfaces	0.53	Acre	0.53	23,086.80	0
Other Non-Asphalt Surfaces	2.59	Acre	2.59	112,820.40	0
Parking Lot	48.00	Space	0.44	19,200.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.4 **Precipitation Freq (Days)** 28

Climate Zone 10 **Operational Year** 2023

Utility Company Southern California Edison

CO2 Intensity (lb/MWhr) 702.44 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Total Project Area analyzed is 4.51 acres. The existing parking area (approximately 0.49 acres) in the southern portion of the site will remain and has been excluded from this anlaysis.

Construction Phase - Constructure schedule based on 2023 Opening Year and information provided by the Project Applicant.

Off-road Equipment - Hours are based on an 8-hour workday.

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Off-road Equipment -

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Trips and VMT - Per information provided by the Project Applicant, demolition activities will result in 100 truck trips.

Demolition -

Grading - It is assumed that 5 acres can be graded per day

Architectural Coating - Rule 1113

Vehicle Trips - Based on information provided in the Murrieta Canyon Academy Expansion Traffic Impact Study by RK Engineering Groupn, Inc.

Vehicle Emission Factors - EMFAC2017

Vehicle Emission Factors - EMFAC2017

Vehicle Emission Factors - EMFAC2017

Energy Use - The Project will design building shells and building components to meet 2019 Title 24 Standards which expects 30% less energy for nonresidential uses

Construction Off-road Equipment Mitigation - Rule 403

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	100.00	50.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	50.00
tblConstructionPhase	NumDays	18.00	20.00
tblConstructionPhase	NumDays	230.00	190.00
tblConstructionPhase	NumDays	20.00	30.00

tblConstructionPhase	NumDays	8.00	45.00
tblConstructionPhase	NumDays	18.00	20.00
tblConstructionPhase	NumDays	5.00	45.00
tblEnergyUse	LightingElect	3.03	2.12
tblEnergyUse	T24E	2.78	1.95
tblEnergyUse	T24NG	6.97	4.88
tblGrading	AcresOfGrading	90.00	225.00
tblGrading	AcresOfGrading	90.00	225.00
tblGrading	MaterialExported	0.00	6,000.00
tblLandUse	LotAcreage	0.43	0.44
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblTripsAndVMT	HaulingTripNumber	102.00	100.00
tblVehicleEF	HHD	0.96	0.03
tblVehicleEF	HHD	0.03	0.02
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	2.07	8.39
tblVehicleEF	HHD	0.41	0.21
tblVehicleEF	HHD	1.44	2.6410e-003

tblVehicleEF	HHD	6,147.84	1,374.55
tblVehicleEF	HHD	1,399.88	1,256.69
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	17.43	6.82
tblVehicleEF	HHD	0.97	1.92
tblVehicleEF	HHD	5.1890e-003	2.7370e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	4.9650e-003	2.6180e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.8620e-003	8.8950e-003
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	7.3000e-005	1.0000e-006
tblVehicleEF	HHD	2.3430e-003	5.3000e-005
tblVehicleEF	HHD	0.55	0.57
tblVehicleEF	HHD	4.3000e-005	1.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.5400e-004	2.3900e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.06	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.1000e-005	0.00
tblVehicleEF	HHD	7.3000e-005	1.0000e-006
tblVehicleEF	HHD	2.3430e-003	5.3000e-005

tblVehicleEF	HHD	0.63	0.65
tblVehicleEF	HHD	4.3000e-005	1.0000e-006
tblVehicleEF	HHD	0.08	0.04
tblVehicleEF	HHD	1.5400e-004	2.3900e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.91	0.03
tblVehicleEF	HHD	0.03	0.02
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	1.50	8.28
tblVehicleEF	HHD	0.41	0.21
tblVehicleEF	HHD	1.38	2.5010e-003
tblVehicleEF	HHD	6,513.09	1,357.07
tblVehicleEF	HHD	1,399.88	1,256.69
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	17.99	6.49
tblVehicleEF	HHD	0.91	1.81
tblVehicleEF	HHD	4.3760e-003	2.4170e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	4.1860e-003	2.3130e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.8620e-003	8.8950e-003
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	1.4000e-004	3.0000e-006

tblVehicleEF	HHD	2.6540e-003	5.8000e-005
tblVehicleEF	HHD	0.51	0.60
tblVehicleEF	HHD	8.2000e-005	2.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.5700e-004	2.4200e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.06	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.0000e-005	0.00
tblVehicleEF	HHD	1.4000e-004	3.0000e-006
tblVehicleEF	HHD	2.6540e-003	5.8000e-005
tblVehicleEF	HHD	0.59	0.69
tblVehicleEF	HHD	8.2000e-005	2.0000e-006
tblVehicleEF	HHD	0.08	0.04
tblVehicleEF	HHD	1.5700e-004	2.4200e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	1.04	0.02
tblVehicleEF	HHD	0.03	8.7800e-004
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	2.85	8.52
tblVehicleEF	HHD	0.41	0.16
tblVehicleEF	HHD	1.46	2.6330e-003
tblVehicleEF	HHD	5,643.45	1,394.57
tblVehicleEF	HHD	1,399.88	1,245.20
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	16.66	7.25
tblVehicleEF	HHD	0.96	1.90

tblVehicleEF	HHD	6.3140e-003	3.1380e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	6.0400e-003	3.0020e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	5.5000e-005	1.0000e-006
tblVehicleEF	HHD	2.4340e-003	5.8000e-005
tblVehicleEF	HHD	0.59	0.52
tblVehicleEF	HHD	3.6000e-005	1.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.6500e-004	2.5400e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.05	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.1000e-005	0.00
tblVehicleEF	HHD	5.5000e-005	1.0000e-006
tblVehicleEF	HHD	2.4340e-003	5.8000e-005
tblVehicleEF	HHD	0.68	0.59
tblVehicleEF	HHD	3.6000e-005	1.0000e-006
tblVehicleEF	HHD	0.08	0.02
tblVehicleEF	HHD	1.6500e-004	2.5400e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	LDA	3.3240e-003	1.9160e-003

tblVehicleEF	LDA	4.1920e-003	0.04
tblVehicleEF	LDA	0.51	0.57
tblVehicleEF	LDA	0.96	2.01
tblVehicleEF	LDA	235.32	250.08
tblVehicleEF	LDA	54.50	51.54
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.04	0.06
tblVehicleEF	LDA	0.09	0.09
tblVehicleEF	LDA	0.03	0.05
tblVehicleEF	LDA	8.3520e-003	7.0950e-003
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.06	0.19
tblVehicleEF	LDA	2.3560e-003	2.4740e-003
tblVehicleEF	LDA	5.6100e-004	5.1000e-004
tblVehicleEF	LDA	0.04	0.06
tblVehicleEF	LDA	0.09	0.09
tblVehicleEF	LDA	0.03	0.05
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.06	0.21
tblVehicleEF	LDA	3.7650e-003	2.1830e-003
tblVehicleEF	LDA	3.6350e-003	0.04
tblVehicleEF	LDA	0.62	0.70

tblVehicleEF	LDA	0.85	1.77
tblVehicleEF	LDA	256.22	271.87
tblVehicleEF	LDA	54.50	51.08
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.09	0.12
tblVehicleEF	LDA	0.10	0.11
tblVehicleEF	LDA	0.06	0.09
tblVehicleEF	LDA	9.4470e-003	8.0120e-003
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.05	0.17
tblVehicleEF	LDA	2.5670e-003	2.6900e-003
tblVehicleEF	LDA	5.5900e-004	5.0600e-004
tblVehicleEF	LDA	0.09	0.12
tblVehicleEF	LDA	0.10	0.11
tblVehicleEF	LDA	0.06	0.09
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.05	0.18
tblVehicleEF	LDA	3.2080e-003	1.8500e-003
tblVehicleEF	LDA	4.3060e-003	0.05
tblVehicleEF	LDA	0.48	0.54
tblVehicleEF	LDA	0.98	2.05
tblVehicleEF	LDA	229.53	244.11

tblVehicleEF	LDA	54.50	51.61
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.10	0.10
tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	8.0650e-003	6.8540e-003
tblVehicleEF	LDA	0.04	0.22
tblVehicleEF	LDA	0.06	0.19
tblVehicleEF	LDA	2.2980e-003	2.4150e-003
tblVehicleEF	LDA	5.6100e-004	5.1100e-004
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.10	0.10
tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	0.01	9.9700e-003
tblVehicleEF	LDA	0.04	0.22
tblVehicleEF	LDA	0.06	0.21
tblVehicleEF	LDT1	9.2940e-003	5.9940e-003
tblVehicleEF	LDT1	0.01	0.07
tblVehicleEF	LDT1	1.18	1.28
tblVehicleEF	LDT1	2.73	2.25
tblVehicleEF	LDT1	295.40	299.04
tblVehicleEF	LDT1	68.37	62.77
tblVehicleEF	LDT1	0.11	0.11

tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.18	0.19
tblVehicleEF	LDT1	0.30	0.23
tblVehicleEF	LDT1	0.12	0.13
tblVehicleEF	LDT1	0.02	0.03
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.19	0.35
tblVehicleEF	LDT1	2.9680e-003	2.9590e-003
tblVehicleEF	LDT1	7.3100e-004	6.2100e-004
tblVehicleEF	LDT1	0.18	0.19
tblVehicleEF	LDT1	0.30	0.23
tblVehicleEF	LDT1	0.12	0.13
tblVehicleEF	LDT1	0.03	0.04
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.21	0.39
tblVehicleEF	LDT1	0.01	6.7740e-003
tblVehicleEF	LDT1	0.01	0.06
tblVehicleEF	LDT1	1.43	1.55
tblVehicleEF	LDT1	2.40	1.99
tblVehicleEF	LDT1	320.93	322.22
tblVehicleEF	LDT1	68.37	62.22
tblVehicleEF	LDT1	0.11	0.10
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003

tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.36	0.37
tblVehicleEF	LDT1	0.37	0.28
tblVehicleEF	LDT1	0.24	0.25
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.16	0.31
tblVehicleEF	LDT1	3.2270e-003	3.1890e-003
tblVehicleEF	LDT1	7.2500e-004	6.1600e-004
tblVehicleEF	LDT1	0.36	0.37
tblVehicleEF	LDT1	0.37	0.28
tblVehicleEF	LDT1	0.24	0.25
tblVehicleEF	LDT1	0.04	0.04
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.18	0.34
tblVehicleEF	LDT1	8.9360e-003	5.7650e-003
tblVehicleEF	LDT1	0.01	0.07
tblVehicleEF	LDT1	1.11	1.19
tblVehicleEF	LDT1	2.78	2.30
tblVehicleEF	LDT1	287.77	292.00
tblVehicleEF	LDT1	68.37	62.89
tblVehicleEF	LDT1	0.11	0.10
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003

tblVehicleEF	LDT1	0.16	0.16
tblVehicleEF	LDT1	0.33	0.25
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.02	0.03
tblVehicleEF	LDT1	0.21	0.85
tblVehicleEF	LDT1	0.19	0.36
tblVehicleEF	LDT1	2.8910e-003	2.8900e-003
tblVehicleEF	LDT1	7.3200e-004	6.2200e-004
tblVehicleEF	LDT1	0.16	0.16
tblVehicleEF	LDT1	0.33	0.25
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.03	0.04
tblVehicleEF	LDT1	0.21	0.85
tblVehicleEF	LDT1	0.21	0.40
tblVehicleEF	LDT2	4.7540e-003	3.3780e-003
tblVehicleEF	LDT2	5.7630e-003	0.06
tblVehicleEF	LDT2	0.68	0.83
tblVehicleEF	LDT2	1.27	2.55
tblVehicleEF	LDT2	330.23	314.65
tblVehicleEF	LDT2	76.02	66.37
tblVehicleEF	LDT2	0.06	0.07
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.06	0.10
tblVehicleEF	LDT2	0.10	0.13

tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.08	0.28
tblVehicleEF	LDT2	3.3070e-003	3.1130e-003
tblVehicleEF	LDT2	7.8100e-004	6.5700e-004
tblVehicleEF	LDT2	0.06	0.10
tblVehicleEF	LDT2	0.10	0.13
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.09	0.31
tblVehicleEF	LDT2	5.3890e-003	3.8410e-003
tblVehicleEF	LDT2	5.0030e-003	0.05
tblVehicleEF	LDT2	0.83	1.02
tblVehicleEF	LDT2	1.13	2.26
tblVehicleEF	LDT2	359.32	336.75
tblVehicleEF	LDT2	76.02	65.79
tblVehicleEF	LDT2	0.06	0.06
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.12	0.20
tblVehicleEF	LDT2	0.12	0.15
tblVehicleEF	LDT2	0.10	0.15
tblVehicleEF	LDT2	0.01	0.02

tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.07	0.25
tblVehicleEF	LDT2	3.6000e-003	3.3320e-003
tblVehicleEF	LDT2	7.7900e-004	6.5100e-004
tblVehicleEF	LDT2	0.12	0.20
tblVehicleEF	LDT2	0.12	0.15
tblVehicleEF	LDT2	0.10	0.15
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.07	0.27
tblVehicleEF	LDT2	4.5710e-003	3.2420e-003
tblVehicleEF	LDT2	5.9350e-003	0.06
tblVehicleEF	LDT2	0.63	0.78
tblVehicleEF	LDT2	1.30	2.62
tblVehicleEF	LDT2	321.50	307.92
tblVehicleEF	LDT2	76.02	66.50
tblVehicleEF	LDT2	0.06	0.07
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.11	0.13
tblVehicleEF	LDT2	0.04	0.07
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.07	0.47
tblVehicleEF	LDT2	0.08	0.29

tblVehicleEF	LDT2	3.2190e-003	3.0460e-003
tblVehicleEF	LDT2	7.8200e-004	6.5800e-004
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.11	0.13
tblVehicleEF	LDT2	0.04	0.07
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.07	0.47
tblVehicleEF	LDT2	0.09	0.32
tblVehicleEF	LHD1	4.9950e-003	4.6360e-003
tblVehicleEF	LHD1	8.5970e-003	4.3560e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.81	0.59
tblVehicleEF	LHD1	2.14	0.90
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.59
tblVehicleEF	LHD1	29.33	10.19
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.91	1.31
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004

tblVehicleEF	LHD1	3.6750e-003	2.8510e-003
tblVehicleEF	LHD1	0.10	0.07
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.8430e-003	1.4280e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.31	0.45
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3400e-004	1.0100e-004
tblVehicleEF	LHD1	3.6750e-003	2.8510e-003
tblVehicleEF	LHD1	0.10	0.07
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.8430e-003	1.4280e-003
tblVehicleEF	LHD1	0.08	0.06
tblVehicleEF	LHD1	0.31	0.45
tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD1	4.9950e-003	4.6470e-003
tblVehicleEF	LHD1	8.7610e-003	4.4230e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.82	0.60
tblVehicleEF	LHD1	2.04	0.86
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.61
tblVehicleEF	LHD1	29.33	10.11
tblVehicleEF	LHD1	0.09	0.08

tblVehicleEF	LHD1	1.80	1.24
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	6.8550e-003	5.3200e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	3.4810e-003	2.7140e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.32	0.46
tblVehicleEF	LHD1	0.22	0.06
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3200e-004	1.0000e-004
tblVehicleEF	LHD1	6.8550e-003	5.3200e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	3.4810e-003	2.7140e-003
tblVehicleEF	LHD1	0.09	0.06
tblVehicleEF	LHD1	0.32	0.46
tblVehicleEF	LHD1	0.24	0.07
tblVehicleEF	LHD1	4.9950e-003	4.6350e-003

tblVehicleEF	LHD1	8.5850e-003	4.3480e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.81	0.59
tblVehicleEF	LHD1	2.14	0.90
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.59
tblVehicleEF	LHD1	29.33	10.19
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.89	1.30
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	3.2380e-003	2.5030e-003
tblVehicleEF	LHD1	0.11	0.08
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.6810e-003	1.2970e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.33	0.49
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003

tblVehicleEF	LHD1	3.3400e-004	1.0100e-004
tblVehicleEF	LHD1	3.2380e-003	2.5030e-003
tblVehicleEF	LHD1	0.11	0.08
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.6810e-003	1.2970e-003
tblVehicleEF	LHD1	0.08	0.06
tblVehicleEF	LHD1	0.33	0.49
tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD2	3.3070e-003	3.0000e-003
tblVehicleEF	LHD2	3.5370e-003	3.2750e-003
tblVehicleEF	LHD2	6.6670e-003	7.9190e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.44
tblVehicleEF	LHD2	1.03	0.52
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.68
tblVehicleEF	LHD2	22.93	7.02
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.29	1.45
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005

tblVehicleEF	LHD2	1.3090e-003	1.5300e-003
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	7.0300e-004	7.9000e-004
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4800e-004	6.9000e-005
tblVehicleEF	LHD2	1.3090e-003	1.5300e-003
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	7.0300e-004	7.9000e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	LHD2	3.3070e-003	3.0070e-003
tblVehicleEF	LHD2	3.5730e-003	3.2970e-003
tblVehicleEF	LHD2	6.4430e-003	7.6530e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.45
tblVehicleEF	LHD2	0.98	0.50
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.69
tblVehicleEF	LHD2	22.93	6.98
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.22	1.37

tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005
tblVehicleEF	LHD2	2.4680e-003	2.8830e-003
tblVehicleEF	LHD2	0.04	0.05
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	1.3130e-003	1.4920e-003
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4700e-004	6.9000e-005
tblVehicleEF	LHD2	2.4680e-003	2.8830e-003
tblVehicleEF	LHD2	0.04	0.05
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	1.3130e-003	1.4920e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	LHD2	3.3070e-003	2.9980e-003
tblVehicleEF	LHD2	3.5300e-003	3.2690e-003
tblVehicleEF	LHD2	6.7050e-003	7.9760e-003

tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.44
tblVehicleEF	LHD2	1.03	0.52
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.68
tblVehicleEF	LHD2	22.93	7.03
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.28	1.44
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005
tblVehicleEF	LHD2	1.0230e-003	1.1840e-003
tblVehicleEF	LHD2	0.04	0.04
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	5.9800e-004	6.5900e-004
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.08	0.24
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4800e-004	7.0000e-005
tblVehicleEF	LHD2	1.0230e-003	1.1840e-003
tblVehicleEF	LHD2	0.04	0.04

tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	5.9800e-004	6.5900e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.08	0.24
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	MCY	0.43	0.32
tblVehicleEF	MCY	0.15	0.24
tblVehicleEF	MCY	18.81	18.95
tblVehicleEF	MCY	9.70	8.59
tblVehicleEF	MCY	166.71	208.09
tblVehicleEF	MCY	45.36	60.09
tblVehicleEF	MCY	1.12	1.12
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	1.69	1.67
tblVehicleEF	MCY	0.83	0.84
tblVehicleEF	MCY	0.92	0.90
tblVehicleEF	MCY	2.11	2.12
tblVehicleEF	MCY	0.55	1.77
tblVehicleEF	MCY	2.05	1.81
tblVehicleEF	MCY	2.0360e-003	2.0590e-003
tblVehicleEF	MCY	6.7200e-004	5.9500e-004
tblVehicleEF	MCY	1.69	1.67
tblVehicleEF	MCY	0.83	0.84
tblVehicleEF	MCY	0.92	0.90

tblVehicleEF	MCY	2.61	2.62
tblVehicleEF	MCY	0.55	1.77
tblVehicleEF	MCY	2.23	1.97
tblVehicleEF	MCY	0.42	0.31
tblVehicleEF	MCY	0.13	0.22
tblVehicleEF	MCY	19.51	19.61
tblVehicleEF	MCY	9.10	8.00
tblVehicleEF	MCY	166.71	209.06
tblVehicleEF	MCY	45.36	58.52
tblVehicleEF	MCY	0.97	0.97
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	3.35	3.31
tblVehicleEF	MCY	1.23	1.24
tblVehicleEF	MCY	2.09	2.05
tblVehicleEF	MCY	2.09	2.10
tblVehicleEF	MCY	0.55	1.76
tblVehicleEF	MCY	1.84	1.62
tblVehicleEF	MCY	2.0460e-003	2.0690e-003
tblVehicleEF	MCY	6.5600e-004	5.7900e-004
tblVehicleEF	MCY	3.35	3.31
tblVehicleEF	MCY	1.23	1.24
tblVehicleEF	MCY	2.09	2.05
tblVehicleEF	MCY	2.59	2.60
tblVehicleEF	MCY	0.55	1.76

tblVehicleEF	MCY	2.00	1.76
tblVehicleEF	MCY	0.42	0.31
tblVehicleEF	MCY	0.15	0.24
tblVehicleEF	MCY	18.37	18.50
tblVehicleEF	MCY	9.67	8.54
tblVehicleEF	MCY	166.71	207.36
tblVehicleEF	MCY	45.36	60.03
tblVehicleEF	MCY	1.12	1.12
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	1.59	1.59
tblVehicleEF	MCY	1.02	1.03
tblVehicleEF	MCY	0.73	0.73
tblVehicleEF	MCY	2.11	2.11
tblVehicleEF	MCY	0.63	2.01
tblVehicleEF	MCY	2.06	1.81
tblVehicleEF	MCY	2.0290e-003	2.0520e-003
tblVehicleEF	MCY	6.7200e-004	5.9400e-004
tblVehicleEF	MCY	1.59	1.59
tblVehicleEF	MCY	1.02	1.03
tblVehicleEF	MCY	0.73	0.73
tblVehicleEF	MCY	2.61	2.61
tblVehicleEF	MCY	0.63	2.01
tblVehicleEF	MCY	2.24	1.98
tblVehicleEF	MDV	9.8990e-003	4.3280e-003

tblVehicleEF	MDV	0.01	0.08
tblVehicleEF	MDV	1.15	0.95
tblVehicleEF	MDV	2.62	2.95
tblVehicleEF	MDV	458.82	394.25
tblVehicleEF	MDV	104.21	82.79
tblVehicleEF	MDV	0.13	0.09
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.11	0.12
tblVehicleEF	MDV	0.19	0.16
tblVehicleEF	MDV	0.09	0.11
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.20	0.37
tblVehicleEF	MDV	4.5960e-003	3.8980e-003
tblVehicleEF	MDV	1.0880e-003	8.1900e-004
tblVehicleEF	MDV	0.11	0.12
tblVehicleEF	MDV	0.19	0.16
tblVehicleEF	MDV	0.09	0.11
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.22	0.41
tblVehicleEF	MDV	0.01	4.9300e-003
tblVehicleEF	MDV	0.01	0.07
tblVehicleEF	MDV	1.41	1.16

tblVehicleEF	MDV	2.31	2.60
tblVehicleEF	MDV	498.05	417.67
tblVehicleEF	MDV	104.21	82.07
tblVehicleEF	MDV	0.13	0.08
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.21	0.24
tblVehicleEF	MDV	0.22	0.18
tblVehicleEF	MDV	0.16	0.20
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.17	0.32
tblVehicleEF	MDV	4.9910e-003	4.1290e-003
tblVehicleEF	MDV	1.0820e-003	8.1200e-004
tblVehicleEF	MDV	0.21	0.24
tblVehicleEF	MDV	0.22	0.18
tblVehicleEF	MDV	0.16	0.20
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.19	0.35
tblVehicleEF	MDV	9.5100e-003	4.1550e-003
tblVehicleEF	MDV	0.02	0.08
tblVehicleEF	MDV	1.08	0.89
tblVehicleEF	MDV	2.68	3.02
tblVehicleEF	MDV	447.05	387.19

tblVehicleEF	MDV	104.21	82.93
tblVehicleEF	MDV	0.13	0.09
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.08	0.10
tblVehicleEF	MDV	0.20	0.17
tblVehicleEF	MDV	0.08	0.09
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.13	0.54
tblVehicleEF	MDV	0.20	0.38
tblVehicleEF	MDV	4.4770e-003	3.8280e-003
tblVehicleEF	MDV	1.0890e-003	8.2100e-004
tblVehicleEF	MDV	0.08	0.10
tblVehicleEF	MDV	0.20	0.17
tblVehicleEF	MDV	0.08	0.09
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.13	0.54
tblVehicleEF	MDV	0.22	0.42
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	2.00	0.32
tblVehicleEF	MH	5.24	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.48	4.16

tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.08	0.00
tblVehicleEF	MH	0.49	0.00
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.31	0.00
tblVehicleEF	MH	9.8680e-003	8.7750e-003
tblVehicleEF	MH	6.6300e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.08	0.00
tblVehicleEF	MH	0.49	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.34	0.00
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	2.05	0.32
tblVehicleEF	MH	4.88	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.37	3.92

tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	2.52	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.94	0.00
tblVehicleEF	MH	0.08	0.07
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.30	0.00
tblVehicleEF	MH	9.8690e-003	8.7750e-003
tblVehicleEF	MH	6.5700e-004	0.00
tblVehicleEF	MH	2.52	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.94	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.32	0.00
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	1.99	0.32
tblVehicleEF	MH	5.28	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.46	4.12

tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.47	0.00
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.03	0.00
tblVehicleEF	MH	0.31	0.00
tblVehicleEF	MH	9.8680e-003	8.7750e-003
tblVehicleEF	MH	6.6300e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.47	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.03	0.00
tblVehicleEF	MH	0.34	0.00
tblVehicleEF	MHD	0.02	3.2310e-003
tblVehicleEF	MHD	2.5650e-003	1.3290e-003
tblVehicleEF	MHD	0.05	8.5180e-003
tblVehicleEF	MHD	0.32	0.36
tblVehicleEF	MHD	0.21	0.17
tblVehicleEF	MHD	5.07	0.97
tblVehicleEF	MHD	148.43	69.20

tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.50
tblVehicleEF	MHD	0.41	0.40
tblVehicleEF	MHD	0.47	0.90
tblVehicleEF	MHD	1.3500e-004	4.2800e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.2900e-004	4.0900e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	1.5020e-003	6.5600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	7.6500e-004	3.3500e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.31	0.04
tblVehicleEF	MHD	1.4270e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3400e-004	8.4000e-005
tblVehicleEF	MHD	1.5020e-003	6.5600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	7.6500e-004	3.3500e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.34	0.05

tblVehicleEF	MHD	0.02	3.0750e-003
tblVehicleEF	MHD	2.5980e-003	1.3500e-003
tblVehicleEF	MHD	0.05	8.2390e-003
tblVehicleEF	MHD	0.23	0.31
tblVehicleEF	MHD	0.21	0.18
tblVehicleEF	MHD	4.84	0.93
tblVehicleEF	MHD	157.22	69.18
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.42
tblVehicleEF	MHD	0.42	0.39
tblVehicleEF	MHD	0.44	0.85
tblVehicleEF	MHD	1.1400e-004	3.6400e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.0900e-004	3.4800e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	2.8970e-003	1.2520e-003
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	1.4710e-003	6.4800e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.30	0.04
tblVehicleEF	MHD	1.5100e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3000e-004	8.3000e-005

tblVehicleEF	MHD	2.8970e-003	1.2520e-003
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	1.4710e-003	6.4800e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.33	0.05
tblVehicleEF	MHD	0.02	3.4570e-003
tblVehicleEF	MHD	2.5410e-003	1.3140e-003
tblVehicleEF	MHD	0.05	8.5940e-003
tblVehicleEF	MHD	0.44	0.42
tblVehicleEF	MHD	0.21	0.17
tblVehicleEF	MHD	5.15	0.99
tblVehicleEF	MHD	136.28	69.22
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.52
tblVehicleEF	MHD	0.39	0.41
tblVehicleEF	MHD	0.46	0.89
tblVehicleEF	MHD	1.6400e-004	5.1700e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.5700e-004	4.9400e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	1.0970e-003	4.9200e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02

tblVehicleEF	MHD	5.9600e-004	2.6700e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.31	0.05
tblVehicleEF	MHD	1.3130e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3600e-004	8.4000e-005
tblVehicleEF	MHD	1.0970e-003	4.9200e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	5.9600e-004	2.6700e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.34	0.05
tblVehicleEF	OBUS	0.01	8.5500e-003
tblVehicleEF	OBUS	5.6790e-003	4.7720e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.25	0.50
tblVehicleEF	OBUS	0.39	0.58
tblVehicleEF	OBUS	5.52	2.45
tblVehicleEF	OBUS	68.59	68.17
tblVehicleEF	OBUS	1,085.33	1,337.43
tblVehicleEF	OBUS	69.49	20.30
tblVehicleEF	OBUS	0.13	0.25
tblVehicleEF	OBUS	0.35	0.81
tblVehicleEF	OBUS	1.2000e-005	8.2000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003

tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.1000e-005	7.8000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	2.0910e-003	2.6360e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	9.0600e-004	1.1390e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.34	0.12
tblVehicleEF	OBUS	6.6700e-004	6.5100e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.9200e-004	2.0100e-004
tblVehicleEF	OBUS	2.0910e-003	2.6360e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.04	0.06
tblVehicleEF	OBUS	9.0600e-004	1.1390e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.38	0.13
tblVehicleEF	OBUS	0.01	8.6200e-003
tblVehicleEF	OBUS	5.7930e-003	4.8760e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.24	0.50
tblVehicleEF	OBUS	0.40	0.59
tblVehicleEF	OBUS	5.16	2.29

tblVehicleEF	OBUS	71.65	67.44
tblVehicleEF	OBUS	1,085.33	1,337.45
tblVehicleEF	OBUS	69.49	20.03
tblVehicleEF	OBUS	0.14	0.23
tblVehicleEF	OBUS	0.33	0.75
tblVehicleEF	OBUS	1.0000e-005	7.3000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.0000e-005	6.9000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	3.8840e-003	4.8010e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	1.7290e-003	2.1640e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.33	0.11
tblVehicleEF	OBUS	6.9600e-004	6.4400e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.8600e-004	1.9800e-004
tblVehicleEF	OBUS	3.8840e-003	4.8010e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.04	0.06
tblVehicleEF	OBUS	1.7290e-003	2.1640e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.27

tblVehicleEF	OBUS	0.36	0.12
tblVehicleEF	OBUS	0.01	8.4810e-003
tblVehicleEF	OBUS	5.6610e-003	4.7410e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.25	0.51
tblVehicleEF	OBUS	0.39	0.58
tblVehicleEF	OBUS	5.57	2.48
tblVehicleEF	OBUS	64.36	69.17
tblVehicleEF	OBUS	1,085.33	1,337.43
tblVehicleEF	OBUS	69.49	20.34
tblVehicleEF	OBUS	0.13	0.26
tblVehicleEF	OBUS	0.35	0.81
tblVehicleEF	OBUS	1.5000e-005	9.4000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.4000e-005	9.0000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	1.7990e-003	2.3770e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	8.3400e-004	1.0810e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.28
tblVehicleEF	OBUS	0.35	0.12
tblVehicleEF	OBUS	6.2600e-004	6.6000e-004
tblVehicleEF	OBUS	0.01	0.01

tblVehicleEF	OBUS	7.9300e-004	2.0100e-004
tblVehicleEF	OBUS	1.7990e-003	2.3770e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.06
tblVehicleEF	OBUS	8.3400e-004	1.0810e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.28
tblVehicleEF	OBUS	0.38	0.13
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.5650e-003	6.1380e-003
tblVehicleEF	SBUS	0.06	7.1540e-003
tblVehicleEF	SBUS	7.84	3.12
tblVehicleEF	SBUS	0.57	0.50
tblVehicleEF	SBUS	6.44	0.94
tblVehicleEF	SBUS	1,128.57	363.20
tblVehicleEF	SBUS	1,093.03	1,093.96
tblVehicleEF	SBUS	55.12	6.12
tblVehicleEF	SBUS	8.81	3.37
tblVehicleEF	SBUS	3.97	4.43
tblVehicleEF	SBUS	8.4250e-003	3.4460e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	8.0610e-003	3.2970e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005

tblVehicleEF	SBUS	5.0680e-003	1.5010e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.93	0.37
tblVehicleEF	SBUS	2.4310e-003	7.2500e-004
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.36	0.04
tblVehicleEF	SBUS	0.01	3.4700e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.6300e-004	6.1000e-005
tblVehicleEF	SBUS	5.0680e-003	1.5010e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	2.4310e-003	7.2500e-004
tblVehicleEF	SBUS	0.12	0.10
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.39	0.05
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.7050e-003	6.2090e-003
tblVehicleEF	SBUS	0.05	5.9970e-003
tblVehicleEF	SBUS	7.74	3.09
tblVehicleEF	SBUS	0.58	0.50
tblVehicleEF	SBUS	4.67	0.68
tblVehicleEF	SBUS	1,179.47	372.25
tblVehicleEF	SBUS	1,093.03	1,093.97
tblVehicleEF	SBUS	55.12	5.68
tblVehicleEF	SBUS	9.10	3.45

tblVehicleEF	SBUS	3.73	4.17
tblVehicleEF	SBUS	7.1020e-003	2.9130e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	6.7950e-003	2.7870e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	9.1290e-003	2.7020e-003
tblVehicleEF	SBUS	0.04	0.01
tblVehicleEF	SBUS	0.92	0.37
tblVehicleEF	SBUS	4.4980e-003	1.3370e-003
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.30	0.03
tblVehicleEF	SBUS	0.01	3.5550e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.3300e-004	5.6000e-005
tblVehicleEF	SBUS	9.1290e-003	2.7020e-003
tblVehicleEF	SBUS	0.04	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	4.4980e-003	1.3370e-003
tblVehicleEF	SBUS	0.12	0.11
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.33	0.04
tblVehicleEF	SBUS	0.82	0.08

tblVehicleEF	SBUS	9.5210e-003	6.1310e-003
tblVehicleEF	SBUS	0.06	7.4110e-003
tblVehicleEF	SBUS	8.00	3.17
tblVehicleEF	SBUS	0.57	0.50
tblVehicleEF	SBUS	6.79	0.98
tblVehicleEF	SBUS	1,058.28	350.71
tblVehicleEF	SBUS	1,093.03	1,093.96
tblVehicleEF	SBUS	55.12	6.19
tblVehicleEF	SBUS	8.43	3.26
tblVehicleEF	SBUS	3.93	4.40
tblVehicleEF	SBUS	0.01	4.1830e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	9.8080e-003	4.0020e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	4.3640e-003	1.2920e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.93	0.37
tblVehicleEF	SBUS	2.3310e-003	6.9700e-004
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.07
tblVehicleEF	SBUS	0.37	0.04
tblVehicleEF	SBUS	0.01	3.3520e-003
tblVehicleEF	SBUS	0.01	0.01

tblVehicleEF	SBUS	6.6900e-004	6.1000e-005
tblVehicleEF	SBUS	4.3640e-003	1.2920e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	2.3310e-003	6.9700e-004
tblVehicleEF	SBUS	0.12	0.10
tblVehicleEF	SBUS	0.02	0.07
tblVehicleEF	SBUS	0.40	0.05
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.08	0.02
tblVehicleEF	UBUS	7.52	26.09
tblVehicleEF	UBUS	13.83	1.44
tblVehicleEF	UBUS	1,788.21	1,610.65
tblVehicleEF	UBUS	153.17	17.72
tblVehicleEF	UBUS	3.79	0.32
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	9.0420e-003	1.9590e-003
tblVehicleEF	UBUS	0.10	0.01
tblVehicleEF	UBUS	4.5390e-003	8.8500e-004
tblVehicleEF	UBUS	0.42	0.05

tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.09	0.07
tblVehicleEF	UBUS	9.5090e-003	4.8150e-003
tblVehicleEF	UBUS	1.7820e-003	1.7500e-004
tblVehicleEF	UBUS	9.0420e-003	1.9590e-003
tblVehicleEF	UBUS	0.10	0.01
tblVehicleEF	UBUS	4.5390e-003	8.8500e-004
tblVehicleEF	UBUS	1.82	3.43
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.19	0.08
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.07	0.02
tblVehicleEF	UBUS	7.58	26.09
tblVehicleEF	UBUS	11.85	1.22
tblVehicleEF	UBUS	1,788.21	1,610.66
tblVehicleEF	UBUS	153.17	17.36
tblVehicleEF	UBUS	3.53	0.31
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	0.02	3.4780e-003
tblVehicleEF	UBUS	0.13	0.01

tblVehicleEF	UBUS	9.0520e-003	1.7490e-003
tblVehicleEF	UBUS	0.43	0.05
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	0.99	0.07
tblVehicleEF	UBUS	9.5110e-003	4.8150e-003
tblVehicleEF	UBUS	1.7480e-003	1.7200e-004
tblVehicleEF	UBUS	0.02	3.4780e-003
tblVehicleEF	UBUS	0.13	0.01
tblVehicleEF	UBUS	9.0520e-003	1.7490e-003
tblVehicleEF	UBUS	1.83	3.43
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.09	0.07
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.08	0.02
tblVehicleEF	UBUS	7.51	26.09
tblVehicleEF	UBUS	14.02	1.42
tblVehicleEF	UBUS	1,788.21	1,610.65
tblVehicleEF	UBUS	153.17	17.70
tblVehicleEF	UBUS	3.75	0.31
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004

tblVehicleEF	UBUS	8.1990e-003	1.9860e-003
tblVehicleEF	UBUS	0.12	0.01
tblVehicleEF	UBUS	4.1400e-003	9.2700e-004
tblVehicleEF	UBUS	0.42	0.05
tblVehicleEF	UBUS	0.03	0.07
tblVehicleEF	UBUS	1.10	0.07
tblVehicleEF	UBUS	9.5090e-003	4.8150e-003
tblVehicleEF	UBUS	1.7850e-003	1.7500e-004
tblVehicleEF	UBUS	8.1990e-003	1.9860e-003
tblVehicleEF	UBUS	0.12	0.01
tblVehicleEF	UBUS	4.1400e-003	9.2700e-004
tblVehicleEF	UBUS	1.82	3.43
tblVehicleEF	UBUS	0.03	0.07
tblVehicleEF	UBUS	1.20	0.08
tblVehicleTrips	WD_TR	12.89	30.10

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	7.6335	87.6620	36.9534	0.1159	35.3706	3.5210	38.8916	14.5663	3.2396	17.8059	0.0000	11,350.0535	11,350.0535	3.2452	0.0000	11,431.1835
2023	16.6605	44.4556	37.8629	0.0927	1.5462	1.8700	3.4162	0.4147	1.7450	2.1597	0.0000	8,970.1573	8,970.1573	2.0269	0.0000	9,020.8288
Maximum	**16.6605**	**87.6620**	**37.8629**	**0.1159**	**35.3706**	**3.5210**	**38.8916**	**14.5663**	**3.2396**	**17.8059**	**0.0000**	**11,350.0535**	**11,350.0535**	**3.2452**	**0.0000**	**11,431.1835**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	7.6335	87.6620	36.9534	0.1159	14.1974	3.5210	17.7183	5.7893	3.2396	9.0289	0.0000	11,350.0535	11,350.0535	3.2452	0.0000	11,431.1834
2023	16.6605	44.4556	37.8629	0.0927	1.5462	1.8700	3.4162	0.4147	1.7450	2.1597	0.0000	8,970.1573	8,970.1573	2.0269	0.0000	9,020.8288
Maximum	**16.6605**	**87.6620**	**37.8629**	**0.1159**	**14.1974**	**3.5210**	**17.7183**	**5.7893**	**3.2396**	**9.0289**	**0.0000**	**11,350.0535**	**11,350.0535**	**3.2452**	**0.0000**	**11,431.1834**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**57.35**	**0.00**	**50.05**	**58.59**	**0.00**	**43.96**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.9947	9.0000e-005	9.4500e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005		0.0203	0.0203	5.0000e-005		0.0216
Energy	8.1800e-003	0.0744	0.0625	4.5000e-004		5.6500e-003	5.6500e-003		5.6500e-003	5.6500e-003		89.2200	89.2200	1.7100e-003	1.6400e-003	89.7502
Mobile	2.9342	13.7261	30.8479	0.1197	11.3598	0.1226	11.4824	3.0366	0.1157	3.1523		12,306.3091	12,306.3091	0.3925		12,316.1210
Total	**3.9371**	**13.8006**	**30.9198**	**0.1201**	**11.3598**	**0.1283**	**11.4881**	**3.0366**	**0.1214**	**3.1580**		**12,395.5493**	**12,395.5493**	**0.3942**	**1.6400e-003**	**12,405.8928**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.9947	9.0000e-005	9.4500e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005		0.0203	0.0203	5.0000e-005		0.0216
Energy	8.1800e-003	0.0744	0.0625	4.5000e-004		5.6500e-003	5.6500e-003		5.6500e-003	5.6500e-003		89.2200	89.2200	1.7100e-003	1.6400e-003	89.7502
Mobile	2.9342	13.7261	30.8479	0.1197	11.3598	0.1226	11.4824	3.0366	0.1157	3.1523		12,306.3091	12,306.3091	0.3925		12,316.1210
Total	**3.9371**	**13.8006**	**30.9198**	**0.1201**	**11.3598**	**0.1283**	**11.4881**	**3.0366**	**0.1214**	**3.1580**		**12,395.5493**	**12,395.5493**	**0.3942**	**1.6400e-003**	**12,405.8928**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/1/2022	9/30/2022	5	45	
2	Grading	Grading	8/1/2022	9/30/2022	5	45	
3	Building Construction	Building Construction	10/1/2022	6/23/2023	5	190	
4	Paving	Paving	5/28/2023	6/23/2023	5	20	
5	Architectural Coating	Architectural Coating	5/28/2023	6/23/2023	5	20	
6	Demolition	Demolition	6/24/2023	8/4/2023	5	30	

Acres of Grading (Site Preparation Phase): 225

Acres of Grading (Grading Phase): 225

Acres of Paving: 3.56

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 62,250; Non-Residential Outdoor: 20,750; Striped Parking Area: 9,306 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Crawler Tractors	4	8.00	212	0.43
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Grading	Crawler Tractors	3	8.00	212	0.43
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Crawler Tractors	3	8.00	212	0.43
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Cement and Mortar Mixers	2	8.00	9	0.56
Paving	Crawler Tractors	1	8.00	212	0.43
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	100.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	750.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	83.00	32.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	17.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					23.3688	0.0000	23.3688	10.5032	0.0000	10.5032			0.0000			0.0000
Off-Road	4.4790	50.4124	20.0053	0.0570		2.1590	2.1590		1.9862	1.9862		5,517.235 5	5,517.235 5	1.7844		5,561.845 1
Total	**4.4790**	**50.4124**	**20.0053**	**0.0570**	**23.3688**	**2.1590**	**25.5277**	**10.5032**	**1.9862**	**12.4895**		**5,517.235 5**	**5,517.235 5**	**1.7844**		**5,561.845 1**

3.2 Site Preparation - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0786	0.0452	0.4947	1.6600e-003	0.2012	1.1500e-003	0.2024	0.0534	1.0600e-003	0.0544		165.6610	165.6610	3.5700e-003		165.7503
Total	**0.0786**	**0.0452**	**0.4947**	**1.6600e-003**	**0.2012**	**1.1500e-003**	**0.2024**	**0.0534**	**1.0600e-003**	**0.0544**		**165.6610**	**165.6610**	**3.5700e-003**		**165.7503**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.1138	0.0000	9.1138	4.0963	0.0000	4.0963			0.0000			0.0000
Off-Road	4.4790	50.4124	20.0053	0.0570		2.1590	2.1590		1.9862	1.9862	0.0000	5,517.2355	5,517.2355	1.7844		5,561.8451
Total	**4.4790**	**50.4124**	**20.0053**	**0.0570**	**9.1138**	**2.1590**	**11.2728**	**4.0963**	**1.9862**	**6.0825**	**0.0000**	**5,517.2355**	**5,517.2355**	**1.7844**		**5,561.8451**

3.2 Site Preparation - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0786	0.0452	0.4947	1.6600e-003	0.2012	1.1500e-003	0.2024	0.0534	1.0600e-003	0.0544		165.6610	165.6610	3.5700e-003		165.7503
Total	**0.0786**	**0.0452**	**0.4947**	**1.6600e-003**	**0.2012**	**1.1500e-003**	**0.2024**	**0.0534**	**1.0600e-003**	**0.0544**		**165.6610**	**165.6610**	**3.5700e-003**		**165.7503**

3.3 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					11.3415	0.0000	11.3415	3.8853	0.0000	3.8853			0.0000			0.0000
Off-Road	2.9303	33.8518	15.5033	0.0438		1.3506	1.3506		1.2426	1.2426		4,245.4266	4,245.4266	1.3731		4,279.7531
Total	**2.9303**	**33.8518**	**15.5033**	**0.0438**	**11.3415**	**1.3506**	**12.6921**	**3.8853**	**1.2426**	**5.1279**		**4,245.4266**	**4,245.4266**	**1.3731**		**4,279.7531**

3.3 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0803	3.3149	0.5379	0.0121	0.2915	9.2800e-003	0.3008	0.0799	8.8800e-003	0.0888		1,283.6796	1,283.6796	0.0812		1,285.7097
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0655	0.0377	0.4123	1.3800e-003	0.1677	9.6000e-004	0.1686	0.0445	8.9000e-004	0.0454		138.0508	138.0508	2.9800e-003		138.1253
Total	**0.1457**	**3.3526**	**0.9501**	**0.0135**	**0.4592**	**0.0102**	**0.4694**	**0.1244**	**9.7700e-003**	**0.1341**		**1,421.7304**	**1,421.7304**	**0.0842**		**1,423.8350**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.4232	0.0000	4.4232	1.5153	0.0000	1.5153			0.0000			0.0000
Off-Road	2.9303	33.8518	15.5033	0.0438		1.3506	1.3506		1.2426	1.2426	0.0000	4,245.4266	4,245.4266	1.3731		4,279.7530
Total	**2.9303**	**33.8518**	**15.5033**	**0.0438**	**4.4232**	**1.3506**	**5.7738**	**1.5153**	**1.2426**	**2.7579**	**0.0000**	**4,245.4266**	**4,245.4266**	**1.3731**		**4,279.7530**

3.3 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0803	3.3149	0.5379	0.0121	0.2915	9.2800e-003	0.3008	0.0799	8.8800e-003	0.0888		1,283.6796	1,283.6796	0.0812		1,285.7097
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0655	0.0377	0.4123	1.3800e-003	0.1677	9.6000e-004	0.1686	0.0445	8.9000e-004	0.0454		138.0508	138.0508	2.9800e-003		138.1253
Total	**0.1457**	**3.3526**	**0.9501**	**0.0135**	**0.4592**	**0.0102**	**0.4694**	**0.1244**	**9.7700e-003**	**0.1341**		**1,421.7304**	**1,421.7304**	**0.0842**		**1,423.8350**

3.4 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.7963	29.7637	17.6698	0.0430		1.2743	1.2743		1.1892	1.1892		4,110.5322	4,110.5322	1.1153		4,138.4135
Total	**2.7963**	**29.7637**	**17.6698**	**0.0430**		**1.2743**	**1.2743**		**1.1892**	**1.1892**		**4,110.5322**	**4,110.5322**	**1.1153**		**4,138.4135**

3.4 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0741	2.7659	0.5834	7.9100e-003	0.2049	4.8900e-003	0.2098	0.0590	4.6700e-003	0.0637		834.1668	834.1668	0.0661		835.8188
Worker	0.3623	0.2086	2.2812	7.6600e-003	0.9277	5.3200e-003	0.9331	0.2460	4.9000e-003	0.2509		763.8813	763.8813	0.0165		764.2931
Total	**0.4364**	**2.9744**	**2.8646**	**0.0156**	**1.1326**	**0.0102**	**1.1429**	**0.3050**	**9.5700e-003**	**0.3146**		**1,598.0481**	**1,598.0481**	**0.0826**		**1,600.1120**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.7963	29.7637	17.6698	0.0430		1.2743	1.2743		1.1892	1.1892	0.0000	4,110.5322	4,110.5322	1.1153		4,138.4135
Total	**2.7963**	**29.7637**	**17.6698**	**0.0430**		**1.2743**	**1.2743**		**1.1892**	**1.1892**	**0.0000**	**4,110.5322**	**4,110.5322**	**1.1153**		**4,138.4135**

3.4 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0741	2.7659	0.5834	7.9100e-003	0.2049	4.8900e-003	0.2098	0.0590	4.6700e-003	0.0637		834.1668	834.1668	0.0661		835.8188
Worker	0.3623	0.2086	2.2812	7.6600e-003	0.9277	5.3200e-003	0.9331	0.2460	4.9000e-003	0.2509		763.8813	763.8813	0.0165		764.2931
Total	**0.4364**	**2.9744**	**2.8646**	**0.0156**	**1.1326**	**0.0102**	**1.1429**	**0.3050**	**9.5700e-003**	**0.3146**		**1,598.0481**	**1,598.0481**	**0.0826**		**1,600.1120**

3.4 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5519	26.2044	17.3471	0.0430		1.1169	1.1169		1.0422	1.0422		4,108.2392	4,108.2392	1.1101		4,135.9924
Total	**2.5519**	**26.2044**	**17.3471**	**0.0430**		**1.1169**	**1.1169**		**1.0422**	**1.0422**		**4,108.2392**	**4,108.2392**	**1.1101**		**4,135.9924**

3.4 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0566	2.0723	0.5002	7.7000e-003	0.2049	2.1800e-003	0.2071	0.0590	2.0900e-003	0.0611		812.4884	812.4884	0.0504		813.7482
Worker	0.3407	0.1880	2.1022	7.3700e-003	0.9277	5.2000e-003	0.9329	0.2460	4.7800e-003	0.2508		734.8920	734.8920	0.0148		735.2622
Total	**0.3973**	**2.2603**	**2.6025**	**0.0151**	**1.1326**	**7.3800e-003**	**1.1400**	**0.3050**	**6.8700e-003**	**0.3119**		**1,547.3804**	**1,547.3804**	**0.0652**		**1,549.0104**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5519	26.2044	17.3471	0.0430		1.1169	1.1169		1.0422	1.0422	0.0000	4,108.2392	4,108.2392	1.1101		4,135.9924
Total	**2.5519**	**26.2044**	**17.3471**	**0.0430**		**1.1169**	**1.1169**		**1.0422**	**1.0422**	**0.0000**	**4,108.2392**	**4,108.2392**	**1.1101**		**4,135.9924**

3.4 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0566	2.0723	0.5002	7.7000e-003	0.2049	2.1800e-003	0.2071	0.0590	2.0900e-003	0.0611		812.4884	812.4884	0.0504		813.7482
Worker	0.3407	0.1880	2.1022	7.3700e-003	0.9277	5.2000e-003	0.9329	0.2460	4.7800e-003	0.2508		734.8920	734.8920	0.0148		735.2622
Total	**0.3973**	**2.2603**	**2.6025**	**0.0151**	**1.1326**	**7.3800e-003**	**1.1400**	**0.3050**	**6.8700e-003**	**0.3119**		**1,547.3804**	**1,547.3804**	**0.0652**		**1,549.0104**

3.5 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4025	14.1698	14.5615	0.0274		0.6490	0.6490		0.5994	0.5994		2,611.6712	2,611.6712	0.8225		2,632.2332
Paving	0.1271					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.5296**	**14.1698**	**14.5615**	**0.0274**		**0.6490**	**0.6490**		**0.5994**	**0.5994**		**2,611.6712**	**2,611.6712**	**0.8225**		**2,632.2332**

3.5 Paving - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0821	0.0453	0.5066	1.7800e-003	0.2236	1.2500e-003	0.2248	0.0593	1.1500e-003	0.0604		177.0824	177.0824	3.5700e-003		177.1716
Total	**0.0821**	**0.0453**	**0.5066**	**1.7800e-003**	**0.2236**	**1.2500e-003**	**0.2248**	**0.0593**	**1.1500e-003**	**0.0604**		**177.0824**	**177.0824**	**3.5700e-003**		**177.1716**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4025	14.1698	14.5615	0.0274		0.6490	0.6490		0.5994	0.5994	0.0000	2,611.6712	2,611.6712	0.8225		2,632.2332
Paving	0.1271					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.5296**	**14.1698**	**14.5615**	**0.0274**		**0.6490**	**0.6490**		**0.5994**	**0.5994**	**0.0000**	**2,611.6712**	**2,611.6712**	**0.8225**		**2,632.2332**

3.5 Paving - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0821	0.0453	0.5066	1.7800e-003	0.2236	1.2500e-003	0.2248	0.0593	1.1500e-003	0.0604		177.0824	177.0824	3.5700e-003		177.1716
Total	**0.0821**	**0.0453**	**0.5066**	**1.7800e-003**	**0.2236**	**1.2500e-003**	**0.2248**	**0.0593**	**1.1500e-003**	**0.0604**		**177.0824**	**177.0824**	**3.5700e-003**		**177.1716**

3.6 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.7743					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2556	1.7373	2.4148	3.9600e-003		0.0944	0.0944		0.0944	0.0944		375.2641	375.2641	0.0225		375.8253
Total	**12.0298**	**1.7373**	**2.4148**	**3.9600e-003**		**0.0944**	**0.0944**		**0.0944**	**0.0944**		**375.2641**	**375.2641**	**0.0225**		**375.8253**

3.6 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0698	0.0385	0.4306	1.5100e-003	0.1900	1.0600e-003	0.1911	0.0504	9.8000e-004	0.0514		150.5201	150.5201	3.0300e-003		150.5959
Total	**0.0698**	**0.0385**	**0.4306**	**1.5100e-003**	**0.1900**	**1.0600e-003**	**0.1911**	**0.0504**	**9.8000e-004**	**0.0514**		**150.5201**	**150.5201**	**3.0300e-003**		**150.5959**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.7743					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2556	1.7373	2.4148	3.9600e-003		0.0944	0.0944		0.0944	0.0944	0.0000	375.2641	375.2641	0.0225		375.8253
Total	**12.0298**	**1.7373**	**2.4148**	**3.9600e-003**		**0.0944**	**0.0944**		**0.0944**	**0.0944**	**0.0000**	**375.2641**	**375.2641**	**0.0225**		**375.8253**

3.6 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0698	0.0385	0.4306	1.5100e-003	0.1900	1.0600e-003	0.1911	0.0504	9.8000e-004	0.0514		150.5201	150.5201	3.0300e-003		150.5959
Total	**0.0698**	**0.0385**	**0.4306**	**1.5100e-003**	**0.1900**	**1.0600e-003**	**0.1911**	**0.0504**	**9.8000e-004**	**0.0514**		**150.5201**	**150.5201**	**3.0300e-003**		**150.5959**

3.7 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7428	0.0000	0.7428	0.1125	0.0000	0.1125			0.0000			0.0000
Off-Road	2.2691	21.4844	19.6434	0.0388		0.9975	0.9975		0.9280	0.9280		3,746.9840	3,746.9840	1.0494		3,773.2183
Total	**2.2691**	**21.4844**	**19.6434**	**0.0388**	**0.7428**	**0.9975**	**1.7404**	**0.1125**	**0.9280**	**1.0405**		**3,746.9840**	**3,746.9840**	**1.0494**		**3,773.2183**

3.7 Demolition - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0112	0.4136	0.0917	2.3400e-003	0.0583	8.1000e-004	0.0591	0.0160	7.7000e-004	0.0168		248.2836	248.2836	0.0130		248.6078
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0616	0.0340	0.3799	1.3300e-003	0.1677	9.4000e-004	0.1686	0.0445	8.6000e-004	0.0453		132.8118	132.8118	2.6800e-003		132.8787
Total	**0.0727**	**0.4475**	**0.4716**	**3.6700e-003**	**0.2260**	**1.7500e-003**	**0.2277**	**0.0605**	**1.6300e-003**	**0.0621**		**381.0954**	**381.0954**	**0.0157**		**381.4865**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2897	0.0000	0.2897	0.0439	0.0000	0.0439			0.0000			0.0000
Off-Road	2.2691	21.4844	19.6434	0.0388		0.9975	0.9975		0.9280	0.9280	0.0000	3,746.9840	3,746.9840	1.0494		3,773.2183
Total	**2.2691**	**21.4844**	**19.6434**	**0.0388**	**0.2897**	**0.9975**	**1.2872**	**0.0439**	**0.9280**	**0.9719**	**0.0000**	**3,746.9840**	**3,746.9840**	**1.0494**		**3,773.2183**

3.7 Demolition - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0112	0.4136	0.0917	2.3400e-003	0.0583	8.1000e-004	0.0591	0.0160	7.7000e-004	0.0168		248.2836	248.2836	0.0130		248.6078
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0616	0.0340	0.3799	1.3300e-003	0.1677	9.4000e-004	0.1686	0.0445	8.6000e-004	0.0453		132.8118	132.8118	2.6800e-003		132.8787
Total	**0.0727**	**0.4475**	**0.4716**	**3.6700e-003**	**0.2260**	**1.7500e-003**	**0.2277**	**0.0605**	**1.6300e-003**	**0.0621**		**381.0954**	**381.0954**	**0.0157**		**381.4865**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.9342	13.7261	30.8479	0.1197	11.3598	0.1226	11.4824	3.0366	0.1157	3.1523		12,306.3091	12,306.3091	0.3925		12,316.1210
Unmitigated	2.9342	13.7261	30.8479	0.1197	11.3598	0.1226	11.4824	3.0366	0.1157	3.1523		12,306.3091	12,306.3091	0.3925		12,316.1210

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
High School	1,249.00	181.36	74.29	3,966,119	3,966,119
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	1,249.00	181.36	74.29	3,966,119	3,966,119

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
High School	16.60	8.40	6.90	77.80	17.20	5.00	75	19	6
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
High School	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898
Other Asphalt Surfaces	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898
Other Non-Asphalt Surfaces	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898
Parking Lot	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	8.1800e-003	0.0744	0.0625	4.5000e-004		5.6500e-003	5.6500e-003		5.6500e-003	5.6500e-003		89.2200	89.2200	1.7100e-003	1.6400e-003	89.7502
NaturalGas Unmitigated	8.1800e-003	0.0744	0.0625	4.5000e-004		5.6500e-003	5.6500e-003		5.6500e-003	5.6500e-003		89.2200	89.2200	1.7100e-003	1.6400e-003	89.7502

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
High School	758.37	8.1800e-003	0.0744	0.0625	4.5000e-004		5.6500e-003	5.6500e-003		5.6500e-003	5.6500e-003		89.2200	89.2200	1.7100e-003	1.6400e-003	89.7502
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**8.1800e-003**	**0.0744**	**0.0625**	**4.5000e-004**		**5.6500e-003**	**5.6500e-003**		**5.6500e-003**	**5.6500e-003**		**89.2200**	**89.2200**	**1.7100e-003**	**1.6400e-003**	**89.7502**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
High School	0.75837	8.1800e-003	0.0744	0.0625	4.5000e-004		5.6500e-003	5.6500e-003		5.6500e-003	5.6500e-003		89.2200	89.2200	1.7100e-003	1.6400e-003	89.7502
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**8.1800e-003**	**0.0744**	**0.0625**	**4.5000e-004**		**5.6500e-003**	**5.6500e-003**		**5.6500e-003**	**5.6500e-003**		**89.2200**	**89.2200**	**1.7100e-003**	**1.6400e-003**	**89.7502**

6.0 Area Detail

6.1 Mitigation Measures Area

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Mitigated	0.9947	9.0000e-005	9.4500e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005		0.0203	0.0203	5.0000e-005		0.0216
Unmitigated	0.9947	9.0000e-005	9.4500e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005		0.0203	0.0203	5.0000e-005		0.0216

6.2 Area by SubCategory

Unmitigated

SubCategory	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Architectural Coating	0.1172					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.8766					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	8.8000e-004	9.0000e-005	9.4500e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005		0.0203	0.0203	5.0000e-005		0.0216
Total	**0.9947**	**9.0000e-005**	**9.4500e-003**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**		**0.0203**	**0.0203**	**5.0000e-005**		**0.0216**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.1172					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.8766					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	8.8000e-004	9.0000e-005	9.4500e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005		0.0203	0.0203	5.0000e-005		0.0216
Total	**0.9947**	**9.0000e-005**	**9.4500e-003**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**		**0.0203**	**0.0203**	**5.0000e-005**		**0.0216**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

This page intentionally left blank

APPENDIX 3.2:

CALEEMOD EXISTING OPERATIONAL EMISSIONS MODEL OUTPUTS

Murrieta Canyon Academy (Existing - Operations)

Riverside-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
High School	22.50	1000sqft	0.52	22,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Characteristics based on information provided in the Murrieta Canyon Academy Expansion Traffic Impact Study by RK Engineering Group, Inc.

Vehicle Emission Factors - EMFAC2017

Vehicle Emission Factors - EMFAC2017

Vehicle Emission Factors - EMFAC2017

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblVehicleEF	HHD	0.96	0.03
tblVehicleEF	HHD	0.03	0.02
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	2.07	8.39
tblVehicleEF	HHD	0.41	0.21
tblVehicleEF	HHD	1.44	2.6410e-003
tblVehicleEF	HHD	6,147.84	1,374.55
tblVehicleEF	HHD	1,399.88	1,256.69
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	17.43	6.82
tblVehicleEF	HHD	0.97	1.92
tblVehicleEF	HHD	5.1890e-003	2.7370e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	4.9650e-003	2.6180e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.8620e-003	8.8950e-003
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	7.3000e-005	1.0000e-006

tblVehicleEF	HHD	2.3430e-003	5.3000e-005
tblVehicleEF	HHD	0.55	0.57
tblVehicleEF	HHD	4.3000e-005	1.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.5400e-004	2.3900e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.06	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.1000e-005	0.00
tblVehicleEF	HHD	7.3000e-005	1.0000e-006
tblVehicleEF	HHD	2.3430e-003	5.3000e-005
tblVehicleEF	HHD	0.63	0.65
tblVehicleEF	HHD	4.3000e-005	1.0000e-006
tblVehicleEF	HHD	0.08	0.04
tblVehicleEF	HHD	1.5400e-004	2.3900e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.91	0.03
tblVehicleEF	HHD	0.03	0.02
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	1.50	8.28
tblVehicleEF	HHD	0.41	0.21
tblVehicleEF	HHD	1.38	2.5010e-003
tblVehicleEF	HHD	6,513.09	1,357.07
tblVehicleEF	HHD	1,399.88	1,256.69
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	17.99	6.49
tblVehicleEF	HHD	0.91	1.81

tblVehicleEF	HHD	4.3760e-003	2.4170e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	4.1860e-003	2.3130e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.8620e-003	8.8950e-003
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	1.4000e-004	3.0000e-006
tblVehicleEF	HHD	2.6540e-003	5.8000e-005
tblVehicleEF	HHD	0.51	0.60
tblVehicleEF	HHD	8.2000e-005	2.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.5700e-004	2.4200e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.06	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.0000e-005	0.00
tblVehicleEF	HHD	1.4000e-004	3.0000e-006
tblVehicleEF	HHD	2.6540e-003	5.8000e-005
tblVehicleEF	HHD	0.59	0.69
tblVehicleEF	HHD	8.2000e-005	2.0000e-006
tblVehicleEF	HHD	0.08	0.04
tblVehicleEF	HHD	1.5700e-004	2.4200e-004
tblVehicleEF	HHD	0.04	1.0000e-006

tblVehicleEF	HHD	1.04	0.02
tblVehicleEF	HHD	0.03	8.7800e-004
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	2.85	8.52
tblVehicleEF	HHD	0.41	0.16
tblVehicleEF	HHD	1.46	2.6330e-003
tblVehicleEF	HHD	5,643.45	1,394.57
tblVehicleEF	HHD	1,399.88	1,245.20
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	16.66	7.25
tblVehicleEF	HHD	0.96	1.90
tblVehicleEF	HHD	6.3140e-003	3.1380e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	6.0400e-003	3.0020e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	5.5000e-005	1.0000e-006
tblVehicleEF	HHD	2.4340e-003	5.8000e-005
tblVehicleEF	HHD	0.59	0.52
tblVehicleEF	HHD	3.6000e-005	1.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.6500e-004	2.5400e-004
tblVehicleEF	HHD	0.04	1.0000e-006

tblVehicleEF	HHD	0.05	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.1000e-005	0.00
tblVehicleEF	HHD	5.5000e-005	1.0000e-006
tblVehicleEF	HHD	2.4340e-003	5.8000e-005
tblVehicleEF	HHD	0.68	0.59
tblVehicleEF	HHD	3.6000e-005	1.0000e-006
tblVehicleEF	HHD	0.08	0.02
tblVehicleEF	HHD	1.6500e-004	2.5400e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	LDA	3.3240e-003	1.9160e-003
tblVehicleEF	LDA	4.1920e-003	0.04
tblVehicleEF	LDA	0.51	0.57
tblVehicleEF	LDA	0.96	2.01
tblVehicleEF	LDA	235.32	250.08
tblVehicleEF	LDA	54.50	51.54
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.04	0.06
tblVehicleEF	LDA	0.09	0.09
tblVehicleEF	LDA	0.03	0.05
tblVehicleEF	LDA	8.3520e-003	7.0950e-003
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.06	0.19

tblVehicleEF	LDA	2.3560e-003	2.4740e-003
tblVehicleEF	LDA	5.6100e-004	5.1000e-004
tblVehicleEF	LDA	0.04	0.06
tblVehicleEF	LDA	0.09	0.09
tblVehicleEF	LDA	0.03	0.05
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.06	0.21
tblVehicleEF	LDA	3.7650e-003	2.1830e-003
tblVehicleEF	LDA	3.6350e-003	0.04
tblVehicleEF	LDA	0.62	0.70
tblVehicleEF	LDA	0.85	1.77
tblVehicleEF	LDA	256.22	271.87
tblVehicleEF	LDA	54.50	51.08
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.09	0.12
tblVehicleEF	LDA	0.10	0.11
tblVehicleEF	LDA	0.06	0.09
tblVehicleEF	LDA	9.4470e-003	8.0120e-003
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.05	0.17
tblVehicleEF	LDA	2.5670e-003	2.6900e-003
tblVehicleEF	LDA	5.5900e-004	5.0600e-004

tblVehicleEF	LDA	0.09	0.12
tblVehicleEF	LDA	0.10	0.11
tblVehicleEF	LDA	0.06	0.09
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.05	0.18
tblVehicleEF	LDA	3.2080e-003	1.8500e-003
tblVehicleEF	LDA	4.3060e-003	0.05
tblVehicleEF	LDA	0.48	0.54
tblVehicleEF	LDA	0.98	2.05
tblVehicleEF	LDA	229.53	244.11
tblVehicleEF	LDA	54.50	51.61
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.10	0.10
tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	8.0650e-003	6.8540e-003
tblVehicleEF	LDA	0.04	0.22
tblVehicleEF	LDA	0.06	0.19
tblVehicleEF	LDA	2.2980e-003	2.4150e-003
tblVehicleEF	LDA	5.6100e-004	5.1100e-004
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.10	0.10

tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	0.01	9.9700e-003
tblVehicleEF	LDA	0.04	0.22
tblVehicleEF	LDA	0.06	0.21
tblVehicleEF	LDT1	9.2940e-003	5.9940e-003
tblVehicleEF	LDT1	0.01	0.07
tblVehicleEF	LDT1	1.18	1.28
tblVehicleEF	LDT1	2.73	2.25
tblVehicleEF	LDT1	295.40	299.04
tblVehicleEF	LDT1	68.37	62.77
tblVehicleEF	LDT1	0.11	0.11
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.18	0.19
tblVehicleEF	LDT1	0.30	0.23
tblVehicleEF	LDT1	0.12	0.13
tblVehicleEF	LDT1	0.02	0.03
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.19	0.35
tblVehicleEF	LDT1	2.9680e-003	2.9590e-003
tblVehicleEF	LDT1	7.3100e-004	6.2100e-004
tblVehicleEF	LDT1	0.18	0.19
tblVehicleEF	LDT1	0.30	0.23
tblVehicleEF	LDT1	0.12	0.13
tblVehicleEF	LDT1	0.03	0.04

tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.21	0.39
tblVehicleEF	LDT1	0.01	6.7740e-003
tblVehicleEF	LDT1	0.01	0.06
tblVehicleEF	LDT1	1.43	1.55
tblVehicleEF	LDT1	2.40	1.99
tblVehicleEF	LDT1	320.93	322.22
tblVehicleEF	LDT1	68.37	62.22
tblVehicleEF	LDT1	0.11	0.10
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.36	0.37
tblVehicleEF	LDT1	0.37	0.28
tblVehicleEF	LDT1	0.24	0.25
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.16	0.31
tblVehicleEF	LDT1	3.2270e-003	3.1890e-003
tblVehicleEF	LDT1	7.2500e-004	6.1600e-004
tblVehicleEF	LDT1	0.36	0.37
tblVehicleEF	LDT1	0.37	0.28
tblVehicleEF	LDT1	0.24	0.25
tblVehicleEF	LDT1	0.04	0.04
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.18	0.34

tblVehicleEF	LDT1	8.9360e-003	5.7650e-003
tblVehicleEF	LDT1	0.01	0.07
tblVehicleEF	LDT1	1.11	1.19
tblVehicleEF	LDT1	2.78	2.30
tblVehicleEF	LDT1	287.77	292.00
tblVehicleEF	LDT1	68.37	62.89
tblVehicleEF	LDT1	0.11	0.10
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.16	0.16
tblVehicleEF	LDT1	0.33	0.25
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.02	0.03
tblVehicleEF	LDT1	0.21	0.85
tblVehicleEF	LDT1	0.19	0.36
tblVehicleEF	LDT1	2.8910e-003	2.8900e-003
tblVehicleEF	LDT1	7.3200e-004	6.2200e-004
tblVehicleEF	LDT1	0.16	0.16
tblVehicleEF	LDT1	0.33	0.25
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.03	0.04
tblVehicleEF	LDT1	0.21	0.85
tblVehicleEF	LDT1	0.21	0.40
tblVehicleEF	LDT2	4.7540e-003	3.3780e-003
tblVehicleEF	LDT2	5.7630e-003	0.06

tblVehicleEF	LDT2	0.68	0.83
tblVehicleEF	LDT2	1.27	2.55
tblVehicleEF	LDT2	330.23	314.65
tblVehicleEF	LDT2	76.02	66.37
tblVehicleEF	LDT2	0.06	0.07
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.06	0.10
tblVehicleEF	LDT2	0.10	0.13
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.08	0.28
tblVehicleEF	LDT2	3.3070e-003	3.1130e-003
tblVehicleEF	LDT2	7.8100e-004	6.5700e-004
tblVehicleEF	LDT2	0.06	0.10
tblVehicleEF	LDT2	0.10	0.13
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.09	0.31
tblVehicleEF	LDT2	5.3890e-003	3.8410e-003
tblVehicleEF	LDT2	5.0030e-003	0.05
tblVehicleEF	LDT2	0.83	1.02
tblVehicleEF	LDT2	1.13	2.26

tblVehicleEF	LDT2	359.32	336.75
tblVehicleEF	LDT2	76.02	65.79
tblVehicleEF	LDT2	0.06	0.06
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.12	0.20
tblVehicleEF	LDT2	0.12	0.15
tblVehicleEF	LDT2	0.10	0.15
tblVehicleEF	LDT2	0.01	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.07	0.25
tblVehicleEF	LDT2	3.6000e-003	3.3320e-003
tblVehicleEF	LDT2	7.7900e-004	6.5100e-004
tblVehicleEF	LDT2	0.12	0.20
tblVehicleEF	LDT2	0.12	0.15
tblVehicleEF	LDT2	0.10	0.15
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.07	0.27
tblVehicleEF	LDT2	4.5710e-003	3.2420e-003
tblVehicleEF	LDT2	5.9350e-003	0.06
tblVehicleEF	LDT2	0.63	0.78
tblVehicleEF	LDT2	1.30	2.62
tblVehicleEF	LDT2	321.50	307.92
tblVehicleEF	LDT2	76.02	66.50

tblVehicleEF	LDT2	0.06	0.07
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.11	0.13
tblVehicleEF	LDT2	0.04	0.07
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.07	0.47
tblVehicleEF	LDT2	0.08	0.29
tblVehicleEF	LDT2	3.2190e-003	3.0460e-003
tblVehicleEF	LDT2	7.8200e-004	6.5800e-004
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.11	0.13
tblVehicleEF	LDT2	0.04	0.07
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.07	0.47
tblVehicleEF	LDT2	0.09	0.32
tblVehicleEF	LHD1	4.9950e-003	4.6360e-003
tblVehicleEF	LHD1	8.5970e-003	4.3560e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.81	0.59
tblVehicleEF	LHD1	2.14	0.90
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.59

tblVehicleEF	LHD1	29.33	10.19
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.91	1.31
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	3.6750e-003	2.8510e-003
tblVehicleEF	LHD1	0.10	0.07
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.8430e-003	1.4280e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.31	0.45
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3400e-004	1.0100e-004
tblVehicleEF	LHD1	3.6750e-003	2.8510e-003
tblVehicleEF	LHD1	0.10	0.07
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.8430e-003	1.4280e-003
tblVehicleEF	LHD1	0.08	0.06
tblVehicleEF	LHD1	0.31	0.45

tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD1	4.9950e-003	4.6470e-003
tblVehicleEF	LHD1	8.7610e-003	4.4230e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.82	0.60
tblVehicleEF	LHD1	2.04	0.86
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.61
tblVehicleEF	LHD1	29.33	10.11
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.80	1.24
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	6.8550e-003	5.3200e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	3.4810e-003	2.7140e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.32	0.46
tblVehicleEF	LHD1	0.22	0.06

tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3200e-004	1.0000e-004
tblVehicleEF	LHD1	6.8550e-003	5.3200e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	3.4810e-003	2.7140e-003
tblVehicleEF	LHD1	0.09	0.06
tblVehicleEF	LHD1	0.32	0.46
tblVehicleEF	LHD1	0.24	0.07
tblVehicleEF	LHD1	4.9950e-003	4.6350e-003
tblVehicleEF	LHD1	8.5850e-003	4.3480e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.81	0.59
tblVehicleEF	LHD1	2.14	0.90
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.59
tblVehicleEF	LHD1	29.33	10.19
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.89	1.30
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003

tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	3.2380e-003	2.5030e-003
tblVehicleEF	LHD1	0.11	0.08
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.6810e-003	1.2970e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.33	0.49
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3400e-004	1.0100e-004
tblVehicleEF	LHD1	3.2380e-003	2.5030e-003
tblVehicleEF	LHD1	0.11	0.08
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.6810e-003	1.2970e-003
tblVehicleEF	LHD1	0.08	0.06
tblVehicleEF	LHD1	0.33	0.49
tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD2	3.3070e-003	3.0000e-003
tblVehicleEF	LHD2	3.5370e-003	3.2750e-003
tblVehicleEF	LHD2	6.6670e-003	7.9190e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.44
tblVehicleEF	LHD2	1.03	0.52
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.68

tblVehicleEF	LHD2	22.93	7.02
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.29	1.45
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005
tblVehicleEF	LHD2	1.3090e-003	1.5300e-003
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	7.0300e-004	7.9000e-004
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4800e-004	6.9000e-005
tblVehicleEF	LHD2	1.3090e-003	1.5300e-003
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	7.0300e-004	7.9000e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.10	0.04

tblVehicleEF	LHD2	3.3070e-003	3.0070e-003
tblVehicleEF	LHD2	3.5730e-003	3.2970e-003
tblVehicleEF	LHD2	6.4430e-003	7.6530e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.45
tblVehicleEF	LHD2	0.98	0.50
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.69
tblVehicleEF	LHD2	22.93	6.98
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.22	1.37
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005
tblVehicleEF	LHD2	2.4680e-003	2.8830e-003
tblVehicleEF	LHD2	0.04	0.05
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	1.3130e-003	1.4920e-003
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003

tblVehicleEF	LHD2	2.4700e-004	6.9000e-005
tblVehicleEF	LHD2	2.4680e-003	2.8830e-003
tblVehicleEF	LHD2	0.04	0.05
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	1.3130e-003	1.4920e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	LHD2	3.3070e-003	2.9980e-003
tblVehicleEF	LHD2	3.5300e-003	3.2690e-003
tblVehicleEF	LHD2	6.7050e-003	7.9760e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.44
tblVehicleEF	LHD2	1.03	0.52
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.68
tblVehicleEF	LHD2	22.93	7.03
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.28	1.44
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005

tblVehicleEF	LHD2	1.0230e-003	1.1840e-003
tblVehicleEF	LHD2	0.04	0.04
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	5.9800e-004	6.5900e-004
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.08	0.24
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4800e-004	7.0000e-005
tblVehicleEF	LHD2	1.0230e-003	1.1840e-003
tblVehicleEF	LHD2	0.04	0.04
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	5.9800e-004	6.5900e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.08	0.24
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	MCY	0.43	0.32
tblVehicleEF	MCY	0.15	0.24
tblVehicleEF	MCY	18.81	18.95
tblVehicleEF	MCY	9.70	8.59
tblVehicleEF	MCY	166.71	208.09
tblVehicleEF	MCY	45.36	60.09
tblVehicleEF	MCY	1.12	1.12
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003

tblVehicleEF	MCY	1.69	1.67
tblVehicleEF	MCY	0.83	0.84
tblVehicleEF	MCY	0.92	0.90
tblVehicleEF	MCY	2.11	2.12
tblVehicleEF	MCY	0.55	1.77
tblVehicleEF	MCY	2.05	1.81
tblVehicleEF	MCY	2.0360e-003	2.0590e-003
tblVehicleEF	MCY	6.7200e-004	5.9500e-004
tblVehicleEF	MCY	1.69	1.67
tblVehicleEF	MCY	0.83	0.84
tblVehicleEF	MCY	0.92	0.90
tblVehicleEF	MCY	2.61	2.62
tblVehicleEF	MCY	0.55	1.77
tblVehicleEF	MCY	2.23	1.97
tblVehicleEF	MCY	0.42	0.31
tblVehicleEF	MCY	0.13	0.22
tblVehicleEF	MCY	19.51	19.61
tblVehicleEF	MCY	9.10	8.00
tblVehicleEF	MCY	166.71	209.06
tblVehicleEF	MCY	45.36	58.52
tblVehicleEF	MCY	0.97	0.97
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	3.35	3.31
tblVehicleEF	MCY	1.23	1.24

tblVehicleEF	MCY	2.09	2.05
tblVehicleEF	MCY	2.09	2.10
tblVehicleEF	MCY	0.55	1.76
tblVehicleEF	MCY	1.84	1.62
tblVehicleEF	MCY	2.0460e-003	2.0690e-003
tblVehicleEF	MCY	6.5600e-004	5.7900e-004
tblVehicleEF	MCY	3.35	3.31
tblVehicleEF	MCY	1.23	1.24
tblVehicleEF	MCY	2.09	2.05
tblVehicleEF	MCY	2.59	2.60
tblVehicleEF	MCY	0.55	1.76
tblVehicleEF	MCY	2.00	1.76
tblVehicleEF	MCY	0.42	0.31
tblVehicleEF	MCY	0.15	0.24
tblVehicleEF	MCY	18.37	18.50
tblVehicleEF	MCY	9.67	8.54
tblVehicleEF	MCY	166.71	207.36
tblVehicleEF	MCY	45.36	60.03
tblVehicleEF	MCY	1.12	1.12
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	1.59	1.59
tblVehicleEF	MCY	1.02	1.03
tblVehicleEF	MCY	0.73	0.73
tblVehicleEF	MCY	2.11	2.11

tblVehicleEF	MCY	0.63	2.01
tblVehicleEF	MCY	2.06	1.81
tblVehicleEF	MCY	2.0290e-003	2.0520e-003
tblVehicleEF	MCY	6.7200e-004	5.9400e-004
tblVehicleEF	MCY	1.59	1.59
tblVehicleEF	MCY	1.02	1.03
tblVehicleEF	MCY	0.73	0.73
tblVehicleEF	MCY	2.61	2.61
tblVehicleEF	MCY	0.63	2.01
tblVehicleEF	MCY	2.24	1.98
tblVehicleEF	MDV	9.8990e-003	4.3280e-003
tblVehicleEF	MDV	0.01	0.08
tblVehicleEF	MDV	1.15	0.95
tblVehicleEF	MDV	2.62	2.95
tblVehicleEF	MDV	458.82	394.25
tblVehicleEF	MDV	104.21	82.79
tblVehicleEF	MDV	0.13	0.09
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.11	0.12
tblVehicleEF	MDV	0.19	0.16
tblVehicleEF	MDV	0.09	0.11
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.20	0.37

tblVehicleEF	MDV	4.5960e-003	3.8980e-003
tblVehicleEF	MDV	1.0880e-003	8.1900e-004
tblVehicleEF	MDV	0.11	0.12
tblVehicleEF	MDV	0.19	0.16
tblVehicleEF	MDV	0.09	0.11
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.22	0.41
tblVehicleEF	MDV	0.01	4.9300e-003
tblVehicleEF	MDV	0.01	0.07
tblVehicleEF	MDV	1.41	1.16
tblVehicleEF	MDV	2.31	2.60
tblVehicleEF	MDV	498.05	417.67
tblVehicleEF	MDV	104.21	82.07
tblVehicleEF	MDV	0.13	0.08
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.21	0.24
tblVehicleEF	MDV	0.22	0.18
tblVehicleEF	MDV	0.16	0.20
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.17	0.32
tblVehicleEF	MDV	4.9910e-003	4.1290e-003
tblVehicleEF	MDV	1.0820e-003	8.1200e-004

tblVehicleEF	MDV	0.21	0.24
tblVehicleEF	MDV	0.22	0.18
tblVehicleEF	MDV	0.16	0.20
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.19	0.35
tblVehicleEF	MDV	9.5100e-003	4.1550e-003
tblVehicleEF	MDV	0.02	0.08
tblVehicleEF	MDV	1.08	0.89
tblVehicleEF	MDV	2.68	3.02
tblVehicleEF	MDV	447.05	387.19
tblVehicleEF	MDV	104.21	82.93
tblVehicleEF	MDV	0.13	0.09
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.08	0.10
tblVehicleEF	MDV	0.20	0.17
tblVehicleEF	MDV	0.08	0.09
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.13	0.54
tblVehicleEF	MDV	0.20	0.38
tblVehicleEF	MDV	4.4770e-003	3.8280e-003
tblVehicleEF	MDV	1.0890e-003	8.2100e-004
tblVehicleEF	MDV	0.08	0.10
tblVehicleEF	MDV	0.20	0.17

tblVehicleEF	MDV	0.08	0.09
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.13	0.54
tblVehicleEF	MDV	0.22	0.42
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	2.00	0.32
tblVehicleEF	MH	5.24	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.48	4.16
tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.08	0.00
tblVehicleEF	MH	0.49	0.00
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.31	0.00
tblVehicleEF	MH	9.8680e-003	8.7750e-003
tblVehicleEF	MH	6.6300e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.08	0.00

tblVehicleEF	MH	0.49	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.34	0.00
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	2.05	0.32
tblVehicleEF	MH	4.88	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.37	3.92
tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	2.52	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.94	0.00
tblVehicleEF	MH	0.08	0.07
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.30	0.00
tblVehicleEF	MH	9.8690e-003	8.7750e-003
tblVehicleEF	MH	6.5700e-004	0.00
tblVehicleEF	MH	2.52	0.00
tblVehicleEF	MH	0.09	0.00

tblVehicleEF	MH	0.94	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.32	0.00
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	1.99	0.32
tblVehicleEF	MH	5.28	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.46	4.12
tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.47	0.00
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.03	0.00
tblVehicleEF	MH	0.31	0.00
tblVehicleEF	MH	9.8680e-003	8.7750e-003
tblVehicleEF	MH	6.6300e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.09	0.00

tblVehicleEF	MH	0.47	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.03	0.00
tblVehicleEF	MH	0.34	0.00
tblVehicleEF	MHD	0.02	3.2310e-003
tblVehicleEF	MHD	2.5650e-003	1.3290e-003
tblVehicleEF	MHD	0.05	8.5180e-003
tblVehicleEF	MHD	0.32	0.36
tblVehicleEF	MHD	0.21	0.17
tblVehicleEF	MHD	5.07	0.97
tblVehicleEF	MHD	148.43	69.20
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.50
tblVehicleEF	MHD	0.41	0.40
tblVehicleEF	MHD	0.47	0.90
tblVehicleEF	MHD	1.3500e-004	4.2800e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.2900e-004	4.0900e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	1.5020e-003	6.5600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	7.6500e-004	3.3500e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10

tblVehicleEF	MHD	0.31	0.04
tblVehicleEF	MHD	1.4270e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3400e-004	8.4000e-005
tblVehicleEF	MHD	1.5020e-003	6.5600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	7.6500e-004	3.3500e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.34	0.05
tblVehicleEF	MHD	0.02	3.0750e-003
tblVehicleEF	MHD	2.5980e-003	1.3500e-003
tblVehicleEF	MHD	0.05	8.2390e-003
tblVehicleEF	MHD	0.23	0.31
tblVehicleEF	MHD	0.21	0.18
tblVehicleEF	MHD	4.84	0.93
tblVehicleEF	MHD	157.22	69.18
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.42
tblVehicleEF	MHD	0.42	0.39
tblVehicleEF	MHD	0.44	0.85
tblVehicleEF	MHD	1.1400e-004	3.6400e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.0900e-004	3.4800e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003

tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	2.8970e-003	1.2520e-003
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	1.4710e-003	6.4800e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.30	0.04
tblVehicleEF	MHD	1.5100e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3000e-004	8.3000e-005
tblVehicleEF	MHD	2.8970e-003	1.2520e-003
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	1.4710e-003	6.4800e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.33	0.05
tblVehicleEF	MHD	0.02	3.4570e-003
tblVehicleEF	MHD	2.5410e-003	1.3140e-003
tblVehicleEF	MHD	0.05	8.5940e-003
tblVehicleEF	MHD	0.44	0.42
tblVehicleEF	MHD	0.21	0.17
tblVehicleEF	MHD	5.15	0.99
tblVehicleEF	MHD	136.28	69.22
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.52

tblVehicleEF	MHD	0.39	0.41
tblVehicleEF	MHD	0.46	0.89
tblVehicleEF	MHD	1.6400e-004	5.1700e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.5700e-004	4.9400e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	1.0970e-003	4.9200e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	5.9600e-004	2.6700e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.31	0.05
tblVehicleEF	MHD	1.3130e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3600e-004	8.4000e-005
tblVehicleEF	MHD	1.0970e-003	4.9200e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	5.9600e-004	2.6700e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.34	0.05
tblVehicleEF	OBUS	0.01	8.5500e-003
tblVehicleEF	OBUS	5.6790e-003	4.7720e-003

tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.25	0.50
tblVehicleEF	OBUS	0.39	0.58
tblVehicleEF	OBUS	5.52	2.45
tblVehicleEF	OBUS	68.59	68.17
tblVehicleEF	OBUS	1,085.33	1,337.43
tblVehicleEF	OBUS	69.49	20.30
tblVehicleEF	OBUS	0.13	0.25
tblVehicleEF	OBUS	0.35	0.81
tblVehicleEF	OBUS	1.2000e-005	8.2000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.1000e-005	7.8000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	2.0910e-003	2.6360e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	9.0600e-004	1.1390e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.34	0.12
tblVehicleEF	OBUS	6.6700e-004	6.5100e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.9200e-004	2.0100e-004
tblVehicleEF	OBUS	2.0910e-003	2.6360e-003
tblVehicleEF	OBUS	0.02	0.02

tblVehicleEF	OBUS	0.04	0.06
tblVehicleEF	OBUS	9.0600e-004	1.1390e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.38	0.13
tblVehicleEF	OBUS	0.01	8.6200e-003
tblVehicleEF	OBUS	5.7930e-003	4.8760e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.24	0.50
tblVehicleEF	OBUS	0.40	0.59
tblVehicleEF	OBUS	5.16	2.29
tblVehicleEF	OBUS	71.65	67.44
tblVehicleEF	OBUS	1,085.33	1,337.45
tblVehicleEF	OBUS	69.49	20.03
tblVehicleEF	OBUS	0.14	0.23
tblVehicleEF	OBUS	0.33	0.75
tblVehicleEF	OBUS	1.0000e-005	7.3000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.0000e-005	6.9000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	3.8840e-003	4.8010e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	1.7290e-003	2.1640e-003
tblVehicleEF	OBUS	0.02	0.03

tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.33	0.11
tblVehicleEF	OBUS	6.9600e-004	6.4400e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.8600e-004	1.9800e-004
tblVehicleEF	OBUS	3.8840e-003	4.8010e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.04	0.06
tblVehicleEF	OBUS	1.7290e-003	2.1640e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.36	0.12
tblVehicleEF	OBUS	0.01	8.4810e-003
tblVehicleEF	OBUS	5.6610e-003	4.7410e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.25	0.51
tblVehicleEF	OBUS	0.39	0.58
tblVehicleEF	OBUS	5.57	2.48
tblVehicleEF	OBUS	64.36	69.17
tblVehicleEF	OBUS	1,085.33	1,337.43
tblVehicleEF	OBUS	69.49	20.34
tblVehicleEF	OBUS	0.13	0.26
tblVehicleEF	OBUS	0.35	0.81
tblVehicleEF	OBUS	1.5000e-005	9.4000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.4000e-005	9.0000e-005

tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	1.7990e-003	2.3770e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	8.3400e-004	1.0810e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.28
tblVehicleEF	OBUS	0.35	0.12
tblVehicleEF	OBUS	6.2600e-004	6.6000e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.9300e-004	2.0100e-004
tblVehicleEF	OBUS	1.7990e-003	2.3770e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.06
tblVehicleEF	OBUS	8.3400e-004	1.0810e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.28
tblVehicleEF	OBUS	0.38	0.13
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.5650e-003	6.1380e-003
tblVehicleEF	SBUS	0.06	7.1540e-003
tblVehicleEF	SBUS	7.84	3.12
tblVehicleEF	SBUS	0.57	0.50
tblVehicleEF	SBUS	6.44	0.94
tblVehicleEF	SBUS	1,128.57	363.20
tblVehicleEF	SBUS	1,093.03	1,093.96

tblVehicleEF	SBUS	55.12	6.12
tblVehicleEF	SBUS	8.81	3.37
tblVehicleEF	SBUS	3.97	4.43
tblVehicleEF	SBUS	8.4250e-003	3.4460e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	8.0610e-003	3.2970e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	5.0680e-003	1.5010e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.93	0.37
tblVehicleEF	SBUS	2.4310e-003	7.2500e-004
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.36	0.04
tblVehicleEF	SBUS	0.01	3.4700e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.6300e-004	6.1000e-005
tblVehicleEF	SBUS	5.0680e-003	1.5010e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	2.4310e-003	7.2500e-004
tblVehicleEF	SBUS	0.12	0.10
tblVehicleEF	SBUS	0.02	0.06

tblVehicleEF	SBUS	0.39	0.05
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.7050e-003	6.2090e-003
tblVehicleEF	SBUS	0.05	5.9970e-003
tblVehicleEF	SBUS	7.74	3.09
tblVehicleEF	SBUS	0.58	0.50
tblVehicleEF	SBUS	4.67	0.68
tblVehicleEF	SBUS	1,179.47	372.25
tblVehicleEF	SBUS	1,093.03	1,093.97
tblVehicleEF	SBUS	55.12	5.68
tblVehicleEF	SBUS	9.10	3.45
tblVehicleEF	SBUS	3.73	4.17
tblVehicleEF	SBUS	7.1020e-003	2.9130e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	6.7950e-003	2.7870e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	9.1290e-003	2.7020e-003
tblVehicleEF	SBUS	0.04	0.01
tblVehicleEF	SBUS	0.92	0.37
tblVehicleEF	SBUS	4.4980e-003	1.3370e-003
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.30	0.03

tblVehicleEF	SBUS	0.01	3.5550e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.3300e-004	5.6000e-005
tblVehicleEF	SBUS	9.1290e-003	2.7020e-003
tblVehicleEF	SBUS	0.04	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	4.4980e-003	1.3370e-003
tblVehicleEF	SBUS	0.12	0.11
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.33	0.04
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.5210e-003	6.1310e-003
tblVehicleEF	SBUS	0.06	7.4110e-003
tblVehicleEF	SBUS	8.00	3.17
tblVehicleEF	SBUS	0.57	0.50
tblVehicleEF	SBUS	6.79	0.98
tblVehicleEF	SBUS	1,058.28	350.71
tblVehicleEF	SBUS	1,093.03	1,093.96
tblVehicleEF	SBUS	55.12	6.19
tblVehicleEF	SBUS	8.43	3.26
tblVehicleEF	SBUS	3.93	4.40
tblVehicleEF	SBUS	0.01	4.1830e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	9.8080e-003	4.0020e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003

tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	4.3640e-003	1.2920e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.93	0.37
tblVehicleEF	SBUS	2.3310e-003	6.9700e-004
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.07
tblVehicleEF	SBUS	0.37	0.04
tblVehicleEF	SBUS	0.01	3.3520e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.6900e-004	6.1000e-005
tblVehicleEF	SBUS	4.3640e-003	1.2920e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	2.3310e-003	6.9700e-004
tblVehicleEF	SBUS	0.12	0.10
tblVehicleEF	SBUS	0.02	0.07
tblVehicleEF	SBUS	0.40	0.05
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.08	0.02
tblVehicleEF	UBUS	7.52	26.09
tblVehicleEF	UBUS	13.83	1.44
tblVehicleEF	UBUS	1,788.21	1,610.65
tblVehicleEF	UBUS	153.17	17.72
tblVehicleEF	UBUS	3.79	0.32
tblVehicleEF	UBUS	0.49	0.09

tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	9.0420e-003	1.9590e-003
tblVehicleEF	UBUS	0.10	0.01
tblVehicleEF	UBUS	4.5390e-003	8.8500e-004
tblVehicleEF	UBUS	0.42	0.05
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.09	0.07
tblVehicleEF	UBUS	9.5090e-003	4.8150e-003
tblVehicleEF	UBUS	1.7820e-003	1.7500e-004
tblVehicleEF	UBUS	9.0420e-003	1.9590e-003
tblVehicleEF	UBUS	0.10	0.01
tblVehicleEF	UBUS	4.5390e-003	8.8500e-004
tblVehicleEF	UBUS	1.82	3.43
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.19	0.08
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.07	0.02
tblVehicleEF	UBUS	7.58	26.09
tblVehicleEF	UBUS	11.85	1.22
tblVehicleEF	UBUS	1,788.21	1,610.66
tblVehicleEF	UBUS	153.17	17.36

tblVehicleEF	UBUS	3.53	0.31
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	0.02	3.4780e-003
tblVehicleEF	UBUS	0.13	0.01
tblVehicleEF	UBUS	9.0520e-003	1.7490e-003
tblVehicleEF	UBUS	0.43	0.05
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	0.99	0.07
tblVehicleEF	UBUS	9.5110e-003	4.8150e-003
tblVehicleEF	UBUS	1.7480e-003	1.7200e-004
tblVehicleEF	UBUS	0.02	3.4780e-003
tblVehicleEF	UBUS	0.13	0.01
tblVehicleEF	UBUS	9.0520e-003	1.7490e-003
tblVehicleEF	UBUS	1.83	3.43
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.09	0.07
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.08	0.02
tblVehicleEF	UBUS	7.51	26.09
tblVehicleEF	UBUS	14.02	1.42

tblVehicleEF	UBUS	1,788.21	1,610.65
tblVehicleEF	UBUS	153.17	17.70
tblVehicleEF	UBUS	3.75	0.31
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	8.1990e-003	1.9860e-003
tblVehicleEF	UBUS	0.12	0.01
tblVehicleEF	UBUS	4.1400e-003	9.2700e-004
tblVehicleEF	UBUS	0.42	0.05
tblVehicleEF	UBUS	0.03	0.07
tblVehicleEF	UBUS	1.10	0.07
tblVehicleEF	UBUS	9.5090e-003	4.8150e-003
tblVehicleEF	UBUS	1.7850e-003	1.7500e-004
tblVehicleEF	UBUS	8.1990e-003	1.9860e-003
tblVehicleEF	UBUS	0.12	0.01
tblVehicleEF	UBUS	4.1400e-003	9.2700e-004
tblVehicleEF	UBUS	1.82	3.43
tblVehicleEF	UBUS	0.03	0.07
tblVehicleEF	UBUS	1.20	0.08
tblVehicleTrips	WD_TR	12.89	36.09

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.5029	2.0000e-005	2.3000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.9200e-003	4.9200e-003	1.0000e-005		5.2500e-003
Energy	5.8200e-003	0.0529	0.0445	3.2000e-004		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003		63.5294	63.5294	1.2200e-003	1.1600e-003	63.9069
Mobile	2.1225	8.5945	23.4762	0.0830	7.3856	0.0796	7.4652	1.9743	0.0752	2.0495		8,539.8768	8,539.8768	0.2764		8,546.7863
Total	**2.6312**	**8.6475**	**23.5230**	**0.0833**	**7.3856**	**0.0837**	**7.4693**	**1.9743**	**0.0792**	**2.0535**		**8,603.4111**	**8,603.4111**	**0.2776**	**1.1600e-003**	**8,610.6985**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.5029	2.0000e-005	2.3000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.9200e-003	4.9200e-003	1.0000e-005		5.2500e-003
Energy	5.8200e-003	0.0529	0.0445	3.2000e-004		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003		63.5294	63.5294	1.2200e-003	1.1600e-003	63.9069
Mobile	2.1225	8.5945	23.4762	0.0830	7.3856	0.0796	7.4652	1.9743	0.0752	2.0495		8,539.8768	8,539.8768	0.2764		8,546.7863
Total	**2.6312**	**8.6475**	**23.5230**	**0.0833**	**7.3856**	**0.0837**	**7.4693**	**1.9743**	**0.0792**	**2.0535**		**8,603.4111**	**8,603.4111**	**0.2776**	**1.1600e-003**	**8,610.6985**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/1/2022	7/31/2022	5	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Rubber Tired Dozers	0	1.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	0	6.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.1225	8.5945	23.4762	0.0830	7.3856	0.0796	7.4652	1.9743	0.0752	2.0495		8,539.876 8	8,539.876 8	0.2764		8,546.786 3
Unmitigated	2.1225	8.5945	23.4762	0.0830	7.3856	0.0796	7.4652	1.9743	0.0752	2.0495		8,539.876 8	8,539.876 8	0.2764		8,546.786 3

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
High School	811.98	98.33	40.28	2,561,554	2,561,554
Total	811.98	98.33	40.28	2,561,554	2,561,554

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
High School	16.60	8.40	6.90	77.80	17.20	5.00	75	19	6

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
High School	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	5.8200e-003	0.0529	0.0445	3.2000e-004		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003		63.5294	63.5294	1.2200e-003	1.1600e-003	63.9069
NaturalGas Unmitigated	5.8200e-003	0.0529	0.0445	3.2000e-004		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003		63.5294	63.5294	1.2200e-003	1.1600e-003	63.9069

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
High School	540	5.8200e-003	0.0529	0.0445	3.2000e-004		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003		63.5294	63.5294	1.2200e-003	1.1600e-003	63.9069
Total		**5.8200e-003**	**0.0529**	**0.0445**	**3.2000e-004**		**4.0200e-003**	**4.0200e-003**		**4.0200e-003**	**4.0200e-003**		**63.5294**	**63.5294**	**1.2200e-003**	**1.1600e-003**	**63.9069**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
High School	0.54	5.8200e-003	0.0529	0.0445	3.2000e-004		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003		63.5294	63.5294	1.2200e-003	1.1600e-003	63.9069
Total		**5.8200e-003**	**0.0529**	**0.0445**	**3.2000e-004**		**4.0200e-003**	**4.0200e-003**		**4.0200e-003**	**4.0200e-003**		**63.5294**	**63.5294**	**1.2200e-003**	**1.1600e-003**	**63.9069**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.5029	2.0000e-005	2.3000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.9200e-003	4.9200e-003	1.0000e-005		5.2500e-003
Unmitigated	0.5029	2.0000e-005	2.3000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.9200e-003	4.9200e-003	1.0000e-005		5.2500e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0571					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.4455					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.1000e-004	2.0000e-005	2.3000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.9200e-003	4.9200e-003	1.0000e-005		5.2500e-003
Total	**0.5029**	**2.0000e-005**	**2.3000e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**4.9200e-003**	**4.9200e-003**	**1.0000e-005**		**5.2500e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0571					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.4455					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.1000e-004	2.0000e-005	2.3000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.9200e-003	4.9200e-003	1.0000e-005		5.2500e-003
Total	**0.5029**	**2.0000e-005**	**2.3000e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**4.9200e-003**	**4.9200e-003**	**1.0000e-005**		**5.2500e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Murrieta Canyon Academy (Existing - Operations)
Riverside-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
High School	22.50	1000sqft	0.52	22,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Characteristics based on information provided in the Murrieta Canyon Academy Expansion Traffic Impact Study by RK Engineering Group, Inc.

Vehicle Emission Factors - EMFAC2017

Vehicle Emission Factors - EMFAC2017

Vehicle Emission Factors - EMFAC2017

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblVehicleEF	HHD	0.96	0.03
tblVehicleEF	HHD	0.03	0.02
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	2.07	8.39
tblVehicleEF	HHD	0.41	0.21
tblVehicleEF	HHD	1.44	2.6410e-003
tblVehicleEF	HHD	6,147.84	1,374.55
tblVehicleEF	HHD	1,399.88	1,256.69
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	17.43	6.82
tblVehicleEF	HHD	0.97	1.92
tblVehicleEF	HHD	5.1890e-003	2.7370e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	4.9650e-003	2.6180e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.8620e-003	8.8950e-003
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	7.3000e-005	1.0000e-006

tblVehicleEF	HHD	2.3430e-003	5.3000e-005
tblVehicleEF	HHD	0.55	0.57
tblVehicleEF	HHD	4.3000e-005	1.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.5400e-004	2.3900e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.06	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.1000e-005	0.00
tblVehicleEF	HHD	7.3000e-005	1.0000e-006
tblVehicleEF	HHD	2.3430e-003	5.3000e-005
tblVehicleEF	HHD	0.63	0.65
tblVehicleEF	HHD	4.3000e-005	1.0000e-006
tblVehicleEF	HHD	0.08	0.04
tblVehicleEF	HHD	1.5400e-004	2.3900e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.91	0.03
tblVehicleEF	HHD	0.03	0.02
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	1.50	8.28
tblVehicleEF	HHD	0.41	0.21
tblVehicleEF	HHD	1.38	2.5010e-003
tblVehicleEF	HHD	6,513.09	1,357.07
tblVehicleEF	HHD	1,399.88	1,256.69
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	17.99	6.49
tblVehicleEF	HHD	0.91	1.81

tblVehicleEF	HHD	4.3760e-003	2.4170e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	4.1860e-003	2.3130e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.8620e-003	8.8950e-003
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	1.4000e-004	3.0000e-006
tblVehicleEF	HHD	2.6540e-003	5.8000e-005
tblVehicleEF	HHD	0.51	0.60
tblVehicleEF	HHD	8.2000e-005	2.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.5700e-004	2.4200e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.06	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.0000e-005	0.00
tblVehicleEF	HHD	1.4000e-004	3.0000e-006
tblVehicleEF	HHD	2.6540e-003	5.8000e-005
tblVehicleEF	HHD	0.59	0.69
tblVehicleEF	HHD	8.2000e-005	2.0000e-006
tblVehicleEF	HHD	0.08	0.04
tblVehicleEF	HHD	1.5700e-004	2.4200e-004
tblVehicleEF	HHD	0.04	1.0000e-006

tblVehicleEF	HHD	1.04	0.02
tblVehicleEF	HHD	0.03	8.7800e-004
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	2.85	8.52
tblVehicleEF	HHD	0.41	0.16
tblVehicleEF	HHD	1.46	2.6330e-003
tblVehicleEF	HHD	5,643.45	1,394.57
tblVehicleEF	HHD	1,399.88	1,245.20
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	16.66	7.25
tblVehicleEF	HHD	0.96	1.90
tblVehicleEF	HHD	6.3140e-003	3.1380e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	6.0400e-003	3.0020e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	5.5000e-005	1.0000e-006
tblVehicleEF	HHD	2.4340e-003	5.8000e-005
tblVehicleEF	HHD	0.59	0.52
tblVehicleEF	HHD	3.6000e-005	1.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.6500e-004	2.5400e-004
tblVehicleEF	HHD	0.04	1.0000e-006

tblVehicleEF	HHD	0.05	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.1000e-005	0.00
tblVehicleEF	HHD	5.5000e-005	1.0000e-006
tblVehicleEF	HHD	2.4340e-003	5.8000e-005
tblVehicleEF	HHD	0.68	0.59
tblVehicleEF	HHD	3.6000e-005	1.0000e-006
tblVehicleEF	HHD	0.08	0.02
tblVehicleEF	HHD	1.6500e-004	2.5400e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	LDA	3.3240e-003	1.9160e-003
tblVehicleEF	LDA	4.1920e-003	0.04
tblVehicleEF	LDA	0.51	0.57
tblVehicleEF	LDA	0.96	2.01
tblVehicleEF	LDA	235.32	250.08
tblVehicleEF	LDA	54.50	51.54
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.04	0.06
tblVehicleEF	LDA	0.09	0.09
tblVehicleEF	LDA	0.03	0.05
tblVehicleEF	LDA	8.3520e-003	7.0950e-003
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.06	0.19

tblVehicleEF	LDA	2.3560e-003	2.4740e-003
tblVehicleEF	LDA	5.6100e-004	5.1000e-004
tblVehicleEF	LDA	0.04	0.06
tblVehicleEF	LDA	0.09	0.09
tblVehicleEF	LDA	0.03	0.05
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.06	0.21
tblVehicleEF	LDA	3.7650e-003	2.1830e-003
tblVehicleEF	LDA	3.6350e-003	0.04
tblVehicleEF	LDA	0.62	0.70
tblVehicleEF	LDA	0.85	1.77
tblVehicleEF	LDA	256.22	271.87
tblVehicleEF	LDA	54.50	51.08
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.09	0.12
tblVehicleEF	LDA	0.10	0.11
tblVehicleEF	LDA	0.06	0.09
tblVehicleEF	LDA	9.4470e-003	8.0120e-003
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.05	0.17
tblVehicleEF	LDA	2.5670e-003	2.6900e-003
tblVehicleEF	LDA	5.5900e-004	5.0600e-004

tblVehicleEF	LDA	0.09	0.12
tblVehicleEF	LDA	0.10	0.11
tblVehicleEF	LDA	0.06	0.09
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.05	0.18
tblVehicleEF	LDA	3.2080e-003	1.8500e-003
tblVehicleEF	LDA	4.3060e-003	0.05
tblVehicleEF	LDA	0.48	0.54
tblVehicleEF	LDA	0.98	2.05
tblVehicleEF	LDA	229.53	244.11
tblVehicleEF	LDA	54.50	51.61
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.10	0.10
tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	8.0650e-003	6.8540e-003
tblVehicleEF	LDA	0.04	0.22
tblVehicleEF	LDA	0.06	0.19
tblVehicleEF	LDA	2.2980e-003	2.4150e-003
tblVehicleEF	LDA	5.6100e-004	5.1100e-004
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.10	0.10

tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	0.01	9.9700e-003
tblVehicleEF	LDA	0.04	0.22
tblVehicleEF	LDA	0.06	0.21
tblVehicleEF	LDT1	9.2940e-003	5.9940e-003
tblVehicleEF	LDT1	0.01	0.07
tblVehicleEF	LDT1	1.18	1.28
tblVehicleEF	LDT1	2.73	2.25
tblVehicleEF	LDT1	295.40	299.04
tblVehicleEF	LDT1	68.37	62.77
tblVehicleEF	LDT1	0.11	0.11
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.18	0.19
tblVehicleEF	LDT1	0.30	0.23
tblVehicleEF	LDT1	0.12	0.13
tblVehicleEF	LDT1	0.02	0.03
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.19	0.35
tblVehicleEF	LDT1	2.9680e-003	2.9590e-003
tblVehicleEF	LDT1	7.3100e-004	6.2100e-004
tblVehicleEF	LDT1	0.18	0.19
tblVehicleEF	LDT1	0.30	0.23
tblVehicleEF	LDT1	0.12	0.13
tblVehicleEF	LDT1	0.03	0.04

tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.21	0.39
tblVehicleEF	LDT1	0.01	6.7740e-003
tblVehicleEF	LDT1	0.01	0.06
tblVehicleEF	LDT1	1.43	1.55
tblVehicleEF	LDT1	2.40	1.99
tblVehicleEF	LDT1	320.93	322.22
tblVehicleEF	LDT1	68.37	62.22
tblVehicleEF	LDT1	0.11	0.10
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.36	0.37
tblVehicleEF	LDT1	0.37	0.28
tblVehicleEF	LDT1	0.24	0.25
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.16	0.31
tblVehicleEF	LDT1	3.2270e-003	3.1890e-003
tblVehicleEF	LDT1	7.2500e-004	6.1600e-004
tblVehicleEF	LDT1	0.36	0.37
tblVehicleEF	LDT1	0.37	0.28
tblVehicleEF	LDT1	0.24	0.25
tblVehicleEF	LDT1	0.04	0.04
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.18	0.34

tblVehicleEF	LDT1	8.9360e-003	5.7650e-003
tblVehicleEF	LDT1	0.01	0.07
tblVehicleEF	LDT1	1.11	1.19
tblVehicleEF	LDT1	2.78	2.30
tblVehicleEF	LDT1	287.77	292.00
tblVehicleEF	LDT1	68.37	62.89
tblVehicleEF	LDT1	0.11	0.10
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.16	0.16
tblVehicleEF	LDT1	0.33	0.25
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.02	0.03
tblVehicleEF	LDT1	0.21	0.85
tblVehicleEF	LDT1	0.19	0.36
tblVehicleEF	LDT1	2.8910e-003	2.8900e-003
tblVehicleEF	LDT1	7.3200e-004	6.2200e-004
tblVehicleEF	LDT1	0.16	0.16
tblVehicleEF	LDT1	0.33	0.25
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.03	0.04
tblVehicleEF	LDT1	0.21	0.85
tblVehicleEF	LDT1	0.21	0.40
tblVehicleEF	LDT2	4.7540e-003	3.3780e-003
tblVehicleEF	LDT2	5.7630e-003	0.06

tblVehicleEF	LDT2	0.68	0.83
tblVehicleEF	LDT2	1.27	2.55
tblVehicleEF	LDT2	330.23	314.65
tblVehicleEF	LDT2	76.02	66.37
tblVehicleEF	LDT2	0.06	0.07
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.06	0.10
tblVehicleEF	LDT2	0.10	0.13
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.08	0.28
tblVehicleEF	LDT2	3.3070e-003	3.1130e-003
tblVehicleEF	LDT2	7.8100e-004	6.5700e-004
tblVehicleEF	LDT2	0.06	0.10
tblVehicleEF	LDT2	0.10	0.13
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.09	0.31
tblVehicleEF	LDT2	5.3890e-003	3.8410e-003
tblVehicleEF	LDT2	5.0030e-003	0.05
tblVehicleEF	LDT2	0.83	1.02
tblVehicleEF	LDT2	1.13	2.26

tblVehicleEF	LDT2	359.32	336.75
tblVehicleEF	LDT2	76.02	65.79
tblVehicleEF	LDT2	0.06	0.06
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.12	0.20
tblVehicleEF	LDT2	0.12	0.15
tblVehicleEF	LDT2	0.10	0.15
tblVehicleEF	LDT2	0.01	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.07	0.25
tblVehicleEF	LDT2	3.6000e-003	3.3320e-003
tblVehicleEF	LDT2	7.7900e-004	6.5100e-004
tblVehicleEF	LDT2	0.12	0.20
tblVehicleEF	LDT2	0.12	0.15
tblVehicleEF	LDT2	0.10	0.15
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.07	0.27
tblVehicleEF	LDT2	4.5710e-003	3.2420e-003
tblVehicleEF	LDT2	5.9350e-003	0.06
tblVehicleEF	LDT2	0.63	0.78
tblVehicleEF	LDT2	1.30	2.62
tblVehicleEF	LDT2	321.50	307.92
tblVehicleEF	LDT2	76.02	66.50

tblVehicleEF	LDT2	0.06	0.07
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.11	0.13
tblVehicleEF	LDT2	0.04	0.07
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.07	0.47
tblVehicleEF	LDT2	0.08	0.29
tblVehicleEF	LDT2	3.2190e-003	3.0460e-003
tblVehicleEF	LDT2	7.8200e-004	6.5800e-004
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.11	0.13
tblVehicleEF	LDT2	0.04	0.07
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.07	0.47
tblVehicleEF	LDT2	0.09	0.32
tblVehicleEF	LHD1	4.9950e-003	4.6360e-003
tblVehicleEF	LHD1	8.5970e-003	4.3560e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.81	0.59
tblVehicleEF	LHD1	2.14	0.90
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.59

tblVehicleEF	LHD1	29.33	10.19
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.91	1.31
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	3.6750e-003	2.8510e-003
tblVehicleEF	LHD1	0.10	0.07
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.8430e-003	1.4280e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.31	0.45
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3400e-004	1.0100e-004
tblVehicleEF	LHD1	3.6750e-003	2.8510e-003
tblVehicleEF	LHD1	0.10	0.07
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.8430e-003	1.4280e-003
tblVehicleEF	LHD1	0.08	0.06
tblVehicleEF	LHD1	0.31	0.45

tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD1	4.9950e-003	4.6470e-003
tblVehicleEF	LHD1	8.7610e-003	4.4230e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.82	0.60
tblVehicleEF	LHD1	2.04	0.86
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.61
tblVehicleEF	LHD1	29.33	10.11
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.80	1.24
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	6.8550e-003	5.3200e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	3.4810e-003	2.7140e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.32	0.46
tblVehicleEF	LHD1	0.22	0.06

tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3200e-004	1.0000e-004
tblVehicleEF	LHD1	6.8550e-003	5.3200e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	3.4810e-003	2.7140e-003
tblVehicleEF	LHD1	0.09	0.06
tblVehicleEF	LHD1	0.32	0.46
tblVehicleEF	LHD1	0.24	0.07
tblVehicleEF	LHD1	4.9950e-003	4.6350e-003
tblVehicleEF	LHD1	8.5850e-003	4.3480e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.81	0.59
tblVehicleEF	LHD1	2.14	0.90
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.59
tblVehicleEF	LHD1	29.33	10.19
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.89	1.30
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003

tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	3.2380e-003	2.5030e-003
tblVehicleEF	LHD1	0.11	0.08
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.6810e-003	1.2970e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.33	0.49
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3400e-004	1.0100e-004
tblVehicleEF	LHD1	3.2380e-003	2.5030e-003
tblVehicleEF	LHD1	0.11	0.08
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.6810e-003	1.2970e-003
tblVehicleEF	LHD1	0.08	0.06
tblVehicleEF	LHD1	0.33	0.49
tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD2	3.3070e-003	3.0000e-003
tblVehicleEF	LHD2	3.5370e-003	3.2750e-003
tblVehicleEF	LHD2	6.6670e-003	7.9190e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.44
tblVehicleEF	LHD2	1.03	0.52
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.68

tblVehicleEF	LHD2	22.93	7.02
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.29	1.45
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005
tblVehicleEF	LHD2	1.3090e-003	1.5300e-003
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	7.0300e-004	7.9000e-004
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4800e-004	6.9000e-005
tblVehicleEF	LHD2	1.3090e-003	1.5300e-003
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	7.0300e-004	7.9000e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.10	0.04

tblVehicleEF	LHD2	3.3070e-003	3.0070e-003
tblVehicleEF	LHD2	3.5730e-003	3.2970e-003
tblVehicleEF	LHD2	6.4430e-003	7.6530e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.45
tblVehicleEF	LHD2	0.98	0.50
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.69
tblVehicleEF	LHD2	22.93	6.98
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.22	1.37
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005
tblVehicleEF	LHD2	2.4680e-003	2.8830e-003
tblVehicleEF	LHD2	0.04	0.05
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	1.3130e-003	1.4920e-003
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003

tblVehicleEF	LHD2	2.4700e-004	6.9000e-005
tblVehicleEF	LHD2	2.4680e-003	2.8830e-003
tblVehicleEF	LHD2	0.04	0.05
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	1.3130e-003	1.4920e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	LHD2	3.3070e-003	2.9980e-003
tblVehicleEF	LHD2	3.5300e-003	3.2690e-003
tblVehicleEF	LHD2	6.7050e-003	7.9760e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.44
tblVehicleEF	LHD2	1.03	0.52
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.68
tblVehicleEF	LHD2	22.93	7.03
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.28	1.44
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005

tblVehicleEF	LHD2	1.0230e-003	1.1840e-003
tblVehicleEF	LHD2	0.04	0.04
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	5.9800e-004	6.5900e-004
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.08	0.24
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4800e-004	7.0000e-005
tblVehicleEF	LHD2	1.0230e-003	1.1840e-003
tblVehicleEF	LHD2	0.04	0.04
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	5.9800e-004	6.5900e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.08	0.24
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	MCY	0.43	0.32
tblVehicleEF	MCY	0.15	0.24
tblVehicleEF	MCY	18.81	18.95
tblVehicleEF	MCY	9.70	8.59
tblVehicleEF	MCY	166.71	208.09
tblVehicleEF	MCY	45.36	60.09
tblVehicleEF	MCY	1.12	1.12
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003

tblVehicleEF	MCY	1.69	1.67
tblVehicleEF	MCY	0.83	0.84
tblVehicleEF	MCY	0.92	0.90
tblVehicleEF	MCY	2.11	2.12
tblVehicleEF	MCY	0.55	1.77
tblVehicleEF	MCY	2.05	1.81
tblVehicleEF	MCY	2.0360e-003	2.0590e-003
tblVehicleEF	MCY	6.7200e-004	5.9500e-004
tblVehicleEF	MCY	1.69	1.67
tblVehicleEF	MCY	0.83	0.84
tblVehicleEF	MCY	0.92	0.90
tblVehicleEF	MCY	2.61	2.62
tblVehicleEF	MCY	0.55	1.77
tblVehicleEF	MCY	2.23	1.97
tblVehicleEF	MCY	0.42	0.31
tblVehicleEF	MCY	0.13	0.22
tblVehicleEF	MCY	19.51	19.61
tblVehicleEF	MCY	9.10	8.00
tblVehicleEF	MCY	166.71	209.06
tblVehicleEF	MCY	45.36	58.52
tblVehicleEF	MCY	0.97	0.97
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	3.35	3.31
tblVehicleEF	MCY	1.23	1.24

tblVehicleEF	MCY	2.09	2.05
tblVehicleEF	MCY	2.09	2.10
tblVehicleEF	MCY	0.55	1.76
tblVehicleEF	MCY	1.84	1.62
tblVehicleEF	MCY	2.0460e-003	2.0690e-003
tblVehicleEF	MCY	6.5600e-004	5.7900e-004
tblVehicleEF	MCY	3.35	3.31
tblVehicleEF	MCY	1.23	1.24
tblVehicleEF	MCY	2.09	2.05
tblVehicleEF	MCY	2.59	2.60
tblVehicleEF	MCY	0.55	1.76
tblVehicleEF	MCY	2.00	1.76
tblVehicleEF	MCY	0.42	0.31
tblVehicleEF	MCY	0.15	0.24
tblVehicleEF	MCY	18.37	18.50
tblVehicleEF	MCY	9.67	8.54
tblVehicleEF	MCY	166.71	207.36
tblVehicleEF	MCY	45.36	60.03
tblVehicleEF	MCY	1.12	1.12
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	1.59	1.59
tblVehicleEF	MCY	1.02	1.03
tblVehicleEF	MCY	0.73	0.73
tblVehicleEF	MCY	2.11	2.11

tblVehicleEF	MCY	0.63	2.01
tblVehicleEF	MCY	2.06	1.81
tblVehicleEF	MCY	2.0290e-003	2.0520e-003
tblVehicleEF	MCY	6.7200e-004	5.9400e-004
tblVehicleEF	MCY	1.59	1.59
tblVehicleEF	MCY	1.02	1.03
tblVehicleEF	MCY	0.73	0.73
tblVehicleEF	MCY	2.61	2.61
tblVehicleEF	MCY	0.63	2.01
tblVehicleEF	MCY	2.24	1.98
tblVehicleEF	MDV	9.8990e-003	4.3280e-003
tblVehicleEF	MDV	0.01	0.08
tblVehicleEF	MDV	1.15	0.95
tblVehicleEF	MDV	2.62	2.95
tblVehicleEF	MDV	458.82	394.25
tblVehicleEF	MDV	104.21	82.79
tblVehicleEF	MDV	0.13	0.09
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.11	0.12
tblVehicleEF	MDV	0.19	0.16
tblVehicleEF	MDV	0.09	0.11
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.20	0.37

tblVehicleEF	MDV	4.5960e-003	3.8980e-003
tblVehicleEF	MDV	1.0880e-003	8.1900e-004
tblVehicleEF	MDV	0.11	0.12
tblVehicleEF	MDV	0.19	0.16
tblVehicleEF	MDV	0.09	0.11
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.22	0.41
tblVehicleEF	MDV	0.01	4.9300e-003
tblVehicleEF	MDV	0.01	0.07
tblVehicleEF	MDV	1.41	1.16
tblVehicleEF	MDV	2.31	2.60
tblVehicleEF	MDV	498.05	417.67
tblVehicleEF	MDV	104.21	82.07
tblVehicleEF	MDV	0.13	0.08
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.21	0.24
tblVehicleEF	MDV	0.22	0.18
tblVehicleEF	MDV	0.16	0.20
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.17	0.32
tblVehicleEF	MDV	4.9910e-003	4.1290e-003
tblVehicleEF	MDV	1.0820e-003	8.1200e-004

tblVehicleEF	MDV	0.21	0.24
tblVehicleEF	MDV	0.22	0.18
tblVehicleEF	MDV	0.16	0.20
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.19	0.35
tblVehicleEF	MDV	9.5100e-003	4.1550e-003
tblVehicleEF	MDV	0.02	0.08
tblVehicleEF	MDV	1.08	0.89
tblVehicleEF	MDV	2.68	3.02
tblVehicleEF	MDV	447.05	387.19
tblVehicleEF	MDV	104.21	82.93
tblVehicleEF	MDV	0.13	0.09
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.08	0.10
tblVehicleEF	MDV	0.20	0.17
tblVehicleEF	MDV	0.08	0.09
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.13	0.54
tblVehicleEF	MDV	0.20	0.38
tblVehicleEF	MDV	4.4770e-003	3.8280e-003
tblVehicleEF	MDV	1.0890e-003	8.2100e-004
tblVehicleEF	MDV	0.08	0.10
tblVehicleEF	MDV	0.20	0.17

tblVehicleEF	MDV	0.08	0.09
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.13	0.54
tblVehicleEF	MDV	0.22	0.42
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	2.00	0.32
tblVehicleEF	MH	5.24	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.48	4.16
tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.08	0.00
tblVehicleEF	MH	0.49	0.00
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.31	0.00
tblVehicleEF	MH	9.8680e-003	8.7750e-003
tblVehicleEF	MH	6.6300e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.08	0.00

tblVehicleEF	MH	0.49	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.34	0.00
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	2.05	0.32
tblVehicleEF	MH	4.88	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.37	3.92
tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	2.52	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.94	0.00
tblVehicleEF	MH	0.08	0.07
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.30	0.00
tblVehicleEF	MH	9.8690e-003	8.7750e-003
tblVehicleEF	MH	6.5700e-004	0.00
tblVehicleEF	MH	2.52	0.00
tblVehicleEF	MH	0.09	0.00

tblVehicleEF	MH	0.94	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.32	0.00
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	1.99	0.32
tblVehicleEF	MH	5.28	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.46	4.12
tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.47	0.00
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.03	0.00
tblVehicleEF	MH	0.31	0.00
tblVehicleEF	MH	9.8680e-003	8.7750e-003
tblVehicleEF	MH	6.6300e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.09	0.00

tblVehicleEF	MH	0.47	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.03	0.00
tblVehicleEF	MH	0.34	0.00
tblVehicleEF	MHD	0.02	3.2310e-003
tblVehicleEF	MHD	2.5650e-003	1.3290e-003
tblVehicleEF	MHD	0.05	8.5180e-003
tblVehicleEF	MHD	0.32	0.36
tblVehicleEF	MHD	0.21	0.17
tblVehicleEF	MHD	5.07	0.97
tblVehicleEF	MHD	148.43	69.20
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.50
tblVehicleEF	MHD	0.41	0.40
tblVehicleEF	MHD	0.47	0.90
tblVehicleEF	MHD	1.3500e-004	4.2800e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.2900e-004	4.0900e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	1.5020e-003	6.5600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	7.6500e-004	3.3500e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10

tblVehicleEF	MHD	0.31	0.04
tblVehicleEF	MHD	1.4270e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3400e-004	8.4000e-005
tblVehicleEF	MHD	1.5020e-003	6.5600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	7.6500e-004	3.3500e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.34	0.05
tblVehicleEF	MHD	0.02	3.0750e-003
tblVehicleEF	MHD	2.5980e-003	1.3500e-003
tblVehicleEF	MHD	0.05	8.2390e-003
tblVehicleEF	MHD	0.23	0.31
tblVehicleEF	MHD	0.21	0.18
tblVehicleEF	MHD	4.84	0.93
tblVehicleEF	MHD	157.22	69.18
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.42
tblVehicleEF	MHD	0.42	0.39
tblVehicleEF	MHD	0.44	0.85
tblVehicleEF	MHD	1.1400e-004	3.6400e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.0900e-004	3.4800e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003

tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	2.8970e-003	1.2520e-003
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	1.4710e-003	6.4800e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.30	0.04
tblVehicleEF	MHD	1.5100e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3000e-004	8.3000e-005
tblVehicleEF	MHD	2.8970e-003	1.2520e-003
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	1.4710e-003	6.4800e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.33	0.05
tblVehicleEF	MHD	0.02	3.4570e-003
tblVehicleEF	MHD	2.5410e-003	1.3140e-003
tblVehicleEF	MHD	0.05	8.5940e-003
tblVehicleEF	MHD	0.44	0.42
tblVehicleEF	MHD	0.21	0.17
tblVehicleEF	MHD	5.15	0.99
tblVehicleEF	MHD	136.28	69.22
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.52

tblVehicleEF	MHD	0.39	0.41
tblVehicleEF	MHD	0.46	0.89
tblVehicleEF	MHD	1.6400e-004	5.1700e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.5700e-004	4.9400e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	1.0970e-003	4.9200e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	5.9600e-004	2.6700e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.31	0.05
tblVehicleEF	MHD	1.3130e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3600e-004	8.4000e-005
tblVehicleEF	MHD	1.0970e-003	4.9200e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	5.9600e-004	2.6700e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.34	0.05
tblVehicleEF	OBUS	0.01	8.5500e-003
tblVehicleEF	OBUS	5.6790e-003	4.7720e-003

tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.25	0.50
tblVehicleEF	OBUS	0.39	0.58
tblVehicleEF	OBUS	5.52	2.45
tblVehicleEF	OBUS	68.59	68.17
tblVehicleEF	OBUS	1,085.33	1,337.43
tblVehicleEF	OBUS	69.49	20.30
tblVehicleEF	OBUS	0.13	0.25
tblVehicleEF	OBUS	0.35	0.81
tblVehicleEF	OBUS	1.2000e-005	8.2000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.1000e-005	7.8000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	2.0910e-003	2.6360e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	9.0600e-004	1.1390e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.34	0.12
tblVehicleEF	OBUS	6.6700e-004	6.5100e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.9200e-004	2.0100e-004
tblVehicleEF	OBUS	2.0910e-003	2.6360e-003
tblVehicleEF	OBUS	0.02	0.02

tblVehicleEF	OBUS	0.04	0.06
tblVehicleEF	OBUS	9.0600e-004	1.1390e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.38	0.13
tblVehicleEF	OBUS	0.01	8.6200e-003
tblVehicleEF	OBUS	5.7930e-003	4.8760e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.24	0.50
tblVehicleEF	OBUS	0.40	0.59
tblVehicleEF	OBUS	5.16	2.29
tblVehicleEF	OBUS	71.65	67.44
tblVehicleEF	OBUS	1,085.33	1,337.45
tblVehicleEF	OBUS	69.49	20.03
tblVehicleEF	OBUS	0.14	0.23
tblVehicleEF	OBUS	0.33	0.75
tblVehicleEF	OBUS	1.0000e-005	7.3000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.0000e-005	6.9000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	3.8840e-003	4.8010e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	1.7290e-003	2.1640e-003
tblVehicleEF	OBUS	0.02	0.03

tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.33	0.11
tblVehicleEF	OBUS	6.9600e-004	6.4400e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.8600e-004	1.9800e-004
tblVehicleEF	OBUS	3.8840e-003	4.8010e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.04	0.06
tblVehicleEF	OBUS	1.7290e-003	2.1640e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.36	0.12
tblVehicleEF	OBUS	0.01	8.4810e-003
tblVehicleEF	OBUS	5.6610e-003	4.7410e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.25	0.51
tblVehicleEF	OBUS	0.39	0.58
tblVehicleEF	OBUS	5.57	2.48
tblVehicleEF	OBUS	64.36	69.17
tblVehicleEF	OBUS	1,085.33	1,337.43
tblVehicleEF	OBUS	69.49	20.34
tblVehicleEF	OBUS	0.13	0.26
tblVehicleEF	OBUS	0.35	0.81
tblVehicleEF	OBUS	1.5000e-005	9.4000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.4000e-005	9.0000e-005

tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	1.7990e-003	2.3770e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	8.3400e-004	1.0810e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.28
tblVehicleEF	OBUS	0.35	0.12
tblVehicleEF	OBUS	6.2600e-004	6.6000e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.9300e-004	2.0100e-004
tblVehicleEF	OBUS	1.7990e-003	2.3770e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.06
tblVehicleEF	OBUS	8.3400e-004	1.0810e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.28
tblVehicleEF	OBUS	0.38	0.13
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.5650e-003	6.1380e-003
tblVehicleEF	SBUS	0.06	7.1540e-003
tblVehicleEF	SBUS	7.84	3.12
tblVehicleEF	SBUS	0.57	0.50
tblVehicleEF	SBUS	6.44	0.94
tblVehicleEF	SBUS	1,128.57	363.20
tblVehicleEF	SBUS	1,093.03	1,093.96

tblVehicleEF	SBUS	55.12	6.12
tblVehicleEF	SBUS	8.81	3.37
tblVehicleEF	SBUS	3.97	4.43
tblVehicleEF	SBUS	8.4250e-003	3.4460e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	8.0610e-003	3.2970e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	5.0680e-003	1.5010e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.93	0.37
tblVehicleEF	SBUS	2.4310e-003	7.2500e-004
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.36	0.04
tblVehicleEF	SBUS	0.01	3.4700e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.6300e-004	6.1000e-005
tblVehicleEF	SBUS	5.0680e-003	1.5010e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	2.4310e-003	7.2500e-004
tblVehicleEF	SBUS	0.12	0.10
tblVehicleEF	SBUS	0.02	0.06

tblVehicleEF	SBUS	0.39	0.05
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.7050e-003	6.2090e-003
tblVehicleEF	SBUS	0.05	5.9970e-003
tblVehicleEF	SBUS	7.74	3.09
tblVehicleEF	SBUS	0.58	0.50
tblVehicleEF	SBUS	4.67	0.68
tblVehicleEF	SBUS	1,179.47	372.25
tblVehicleEF	SBUS	1,093.03	1,093.97
tblVehicleEF	SBUS	55.12	5.68
tblVehicleEF	SBUS	9.10	3.45
tblVehicleEF	SBUS	3.73	4.17
tblVehicleEF	SBUS	7.1020e-003	2.9130e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	6.7950e-003	2.7870e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	9.1290e-003	2.7020e-003
tblVehicleEF	SBUS	0.04	0.01
tblVehicleEF	SBUS	0.92	0.37
tblVehicleEF	SBUS	4.4980e-003	1.3370e-003
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.30	0.03

tblVehicleEF	SBUS	0.01	3.5550e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.3300e-004	5.6000e-005
tblVehicleEF	SBUS	9.1290e-003	2.7020e-003
tblVehicleEF	SBUS	0.04	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	4.4980e-003	1.3370e-003
tblVehicleEF	SBUS	0.12	0.11
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.33	0.04
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.5210e-003	6.1310e-003
tblVehicleEF	SBUS	0.06	7.4110e-003
tblVehicleEF	SBUS	8.00	3.17
tblVehicleEF	SBUS	0.57	0.50
tblVehicleEF	SBUS	6.79	0.98
tblVehicleEF	SBUS	1,058.28	350.71
tblVehicleEF	SBUS	1,093.03	1,093.96
tblVehicleEF	SBUS	55.12	6.19
tblVehicleEF	SBUS	8.43	3.26
tblVehicleEF	SBUS	3.93	4.40
tblVehicleEF	SBUS	0.01	4.1830e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	9.8080e-003	4.0020e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003

tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	4.3640e-003	1.2920e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.93	0.37
tblVehicleEF	SBUS	2.3310e-003	6.9700e-004
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.07
tblVehicleEF	SBUS	0.37	0.04
tblVehicleEF	SBUS	0.01	3.3520e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.6900e-004	6.1000e-005
tblVehicleEF	SBUS	4.3640e-003	1.2920e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	2.3310e-003	6.9700e-004
tblVehicleEF	SBUS	0.12	0.10
tblVehicleEF	SBUS	0.02	0.07
tblVehicleEF	SBUS	0.40	0.05
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.08	0.02
tblVehicleEF	UBUS	7.52	26.09
tblVehicleEF	UBUS	13.83	1.44
tblVehicleEF	UBUS	1,788.21	1,610.65
tblVehicleEF	UBUS	153.17	17.72
tblVehicleEF	UBUS	3.79	0.32
tblVehicleEF	UBUS	0.49	0.09

tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	9.0420e-003	1.9590e-003
tblVehicleEF	UBUS	0.10	0.01
tblVehicleEF	UBUS	4.5390e-003	8.8500e-004
tblVehicleEF	UBUS	0.42	0.05
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.09	0.07
tblVehicleEF	UBUS	9.5090e-003	4.8150e-003
tblVehicleEF	UBUS	1.7820e-003	1.7500e-004
tblVehicleEF	UBUS	9.0420e-003	1.9590e-003
tblVehicleEF	UBUS	0.10	0.01
tblVehicleEF	UBUS	4.5390e-003	8.8500e-004
tblVehicleEF	UBUS	1.82	3.43
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.19	0.08
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.07	0.02
tblVehicleEF	UBUS	7.58	26.09
tblVehicleEF	UBUS	11.85	1.22
tblVehicleEF	UBUS	1,788.21	1,610.66
tblVehicleEF	UBUS	153.17	17.36

tblVehicleEF	UBUS	3.53	0.31
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	0.02	3.4780e-003
tblVehicleEF	UBUS	0.13	0.01
tblVehicleEF	UBUS	9.0520e-003	1.7490e-003
tblVehicleEF	UBUS	0.43	0.05
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	0.99	0.07
tblVehicleEF	UBUS	9.5110e-003	4.8150e-003
tblVehicleEF	UBUS	1.7480e-003	1.7200e-004
tblVehicleEF	UBUS	0.02	3.4780e-003
tblVehicleEF	UBUS	0.13	0.01
tblVehicleEF	UBUS	9.0520e-003	1.7490e-003
tblVehicleEF	UBUS	1.83	3.43
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.09	0.07
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.08	0.02
tblVehicleEF	UBUS	7.51	26.09
tblVehicleEF	UBUS	14.02	1.42

tblVehicleEF	UBUS	1,788.21	1,610.65
tblVehicleEF	UBUS	153.17	17.70
tblVehicleEF	UBUS	3.75	0.31
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	8.1990e-003	1.9860e-003
tblVehicleEF	UBUS	0.12	0.01
tblVehicleEF	UBUS	4.1400e-003	9.2700e-004
tblVehicleEF	UBUS	0.42	0.05
tblVehicleEF	UBUS	0.03	0.07
tblVehicleEF	UBUS	1.10	0.07
tblVehicleEF	UBUS	9.5090e-003	4.8150e-003
tblVehicleEF	UBUS	1.7850e-003	1.7500e-004
tblVehicleEF	UBUS	8.1990e-003	1.9860e-003
tblVehicleEF	UBUS	0.12	0.01
tblVehicleEF	UBUS	4.1400e-003	9.2700e-004
tblVehicleEF	UBUS	1.82	3.43
tblVehicleEF	UBUS	0.03	0.07
tblVehicleEF	UBUS	1.20	0.08
tblVehicleTrips	WD_TR	12.89	36.09

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.5029	2.0000e-005	2.3000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.9200e-003	4.9200e-003	1.0000e-005		5.2500e-003
Energy	5.8200e-003	0.0529	0.0445	3.2000e-004		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003		63.5294	63.5294	1.2200e-003	1.1600e-003	63.9069
Mobile	1.9076	8.9234	20.0544	0.0778	7.3851	0.0797	7.4648	1.9741	0.0752	2.0493		8,000.3780	8,000.3780	0.2552		8,006.7567
Total	**2.4162**	**8.9764**	**20.1011**	**0.0781**	**7.3851**	**0.0837**	**7.4688**	**1.9741**	**0.0793**	**2.0534**		**8,063.9123**	**8,063.9123**	**0.2564**	**1.1600e-003**	**8,070.6689**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.5029	2.0000e-005	2.3000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.9200e-003	4.9200e-003	1.0000e-005		5.2500e-003
Energy	5.8200e-003	0.0529	0.0445	3.2000e-004		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003		63.5294	63.5294	1.2200e-003	1.1600e-003	63.9069
Mobile	1.9076	8.9234	20.0544	0.0778	7.3851	0.0797	7.4648	1.9741	0.0752	2.0493		8,000.3780	8,000.3780	0.2552		8,006.7567
Total	**2.4162**	**8.9764**	**20.1011**	**0.0781**	**7.3851**	**0.0837**	**7.4688**	**1.9741**	**0.0793**	**2.0534**		**8,063.9123**	**8,063.9123**	**0.2564**	**1.1600e-003**	**8,070.6689**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/1/2022	7/31/2022	5	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Rubber Tired Dozers	0	1.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	0	6.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.9076	8.9234	20.0544	0.0778	7.3851	0.0797	7.4648	1.9741	0.0752	2.0493		8,000.378 0	8,000.378 0	0.2552		8,006.756 7
Unmitigated	1.9076	8.9234	20.0544	0.0778	7.3851	0.0797	7.4648	1.9741	0.0752	2.0493		8,000.378 0	8,000.378 0	0.2552		8,006.756 7

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
High School	811.98	98.33	40.28	2,561,554	2,561,554
Total	811.98	98.33	40.28	2,561,554	2,561,554

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
High School	16.60	8.40	6.90	77.80	17.20	5.00	75	19	6

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
High School	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	5.8200e-003	0.0529	0.0445	3.2000e-004		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003		63.5294	63.5294	1.2200e-003	1.1600e-003	63.9069
NaturalGas Unmitigated	5.8200e-003	0.0529	0.0445	3.2000e-004		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003		63.5294	63.5294	1.2200e-003	1.1600e-003	63.9069

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
High School	540	5.8200e-003	0.0529	0.0445	3.2000e-004		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003		63.5294	63.5294	1.2200e-003	1.1600e-003	63.9069
Total		**5.8200e-003**	**0.0529**	**0.0445**	**3.2000e-004**		**4.0200e-003**	**4.0200e-003**		**4.0200e-003**	**4.0200e-003**		**63.5294**	**63.5294**	**1.2200e-003**	**1.1600e-003**	**63.9069**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
High School	0.54	5.8200e-003	0.0529	0.0445	3.2000e-004		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003		63.5294	63.5294	1.2200e-003	1.1600e-003	63.9069
Total		**5.8200e-003**	**0.0529**	**0.0445**	**3.2000e-004**		**4.0200e-003**	**4.0200e-003**		**4.0200e-003**	**4.0200e-003**		**63.5294**	**63.5294**	**1.2200e-003**	**1.1600e-003**	**63.9069**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.5029	2.0000e-005	2.3000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.9200e-003	4.9200e-003	1.0000e-005		5.2500e-003
Unmitigated	0.5029	2.0000e-005	2.3000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.9200e-003	4.9200e-003	1.0000e-005		5.2500e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0571					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.4455					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.1000e-004	2.0000e-005	2.3000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.9200e-003	4.9200e-003	1.0000e-005		5.2500e-003
Total	**0.5029**	**2.0000e-005**	**2.3000e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**4.9200e-003**	**4.9200e-003**	**1.0000e-005**		**5.2500e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0571					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.4455					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.1000e-004	2.0000e-005	2.3000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.9200e-003	4.9200e-003	1.0000e-005		5.2500e-003
Total	**0.5029**	**2.0000e-005**	**2.3000e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**4.9200e-003**	**4.9200e-003**	**1.0000e-005**		**5.2500e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

This page intentionally left blank

APPENDIX 3.3:

EMFAC2017

EMFAC2017 Derived CalEEMod Annual Emission Rates: Year 2023[1,2]

Season	Pollutant	LDA	LDT1	LDT2	MDV	LHDT1	LHDT2	MHDT	HHDT	OBUS	UBUS	MCY	SBUS	MH
Annual	CH4_IDLEX	0	0	0	0	0.0046356	0.002999526	0.003230939	0.027740108	0.0085496	0	0	0.079007	0
Annual	CH4_RUNEX	0.0019163	0.0059943	0.0033783	0.0043277	0.0043563	0.003274591	0.001329339	0.017322056	0.0047718	3.3547912	0.3153406	0.0061384	0.0032094
Annual	CH4_STREX	0.0442403	0.0712522	0.0620225	0.0767662	0.0135632	0.007918788	0.008517892	1.52814E-07	0.0229437	0.0190019	0.2397483	0.0071545	0
Annual	CO_IDLEX	0	0	0	0	0.169996	0.131743978	0.355199556	8.39351502	0.500343	0	0	3.1233453	0
Annual	CO_RUNEX	0.573082	1.2751366	0.831585	0.9535035	0.5905513	0.444273692	0.173630239	0.207434337	0.5819416	26.090557	18.950169	0.4963029	0.3229537
Annual	CO_STREX	2.0073289	2.2499571	2.5518178	2.9483671	0.8983902	0.519207497	0.972628944	0.002640508	2.4507967	1.4372318	8.5871474	0.9356866	0
Annual	CO2_NBIO_IDLEX	0	0	0	0	9.3045762	14.65842635	69.20069752	1374.551275	68.169764	0	0	363.1996	0
Annual	CO2_NBIO_RUNEX	250.07731	299.04075	314.64518	394.24515	623.59389	622.6808149	939.4193442	1256.692232	1337.4325	1610.6544	208.08507	1093.9593	928.21789
Annual	CO2_NBIO_STREX	51.535684	62.773333	66.373318	82.785584	10.188153	7.021377375	8.496109106	0.020938228	20.296596	17.720545	60.087552	6.1154977	0
Annual	NOX_IDLEX	0	0	0	0	0.0796023	0.115540227	0.402748634	6.817629236	0.2461754	0	0	3.3683988	0
Annual	NOX_RUNEX	0.0311637	0.1074282	0.0680303	0.0893031	1.313437	1.454591969	0.901787171	1.919070399	0.8103709	0.3157011	1.121071	4.4344095	4.1574641
Annual	NOX_STREX[3]	0.1657632	0.2575263	0.2548267	0.3266326	0.2865557	0.176995993	1.739571737	2.397560349	0.7346161	0.1730414	0.2613976	0.8094688	0
Annual	PM10_IDLEX	0	0	0	0	0.0009883	0.001457487	0.000427902	0.002736546	8.16E-05	0	0	0.0034463	0
Annual	PM10_PMBW	0.03675	0.03675	0.03675	0.03675	0.07644	0.089180026	0.130340037	0.061022824	0.13034	0.0878825	0.01176	0.7448002	0.13034
Annual	PM10_PMTW	0.008	0.008	0.008	0.008	0.0100253	0.010859291	0.012000003	0.035578997	0.012	0.0219127	0.004	0.0105979	0.016
Annual	PM10_RUNEX	0.0013056	0.0019221	0.0013642	0.0014211	0.0098648	0.013062472	0.009385206	0.027079393	0.007971	0.0027897	0.0018422	0.0256866	0.1342111
Annual	PM10_STREX	0.0017588	0.002535	0.0018033	0.001858	0.0002138	0.000105774	9.63819E-05	2.74149E-07	0.0001982	0.0001728	0.0027899	4.417E-05	0
Annual	PM25_IDLEX	0	0	0	0	0.0009455	0.001394437	0.000409391	0.002618164	7.807E-05	0	0	0.0032972	0
Annual	PM25_PMBW	0.01575	0.01575	0.01575	0.01575	0.03276	0.038220011	0.055860016	0.026152639	0.05586	0.0376639	0.00504	0.3192001	0.05586
Annual	PM25_PMTW	0.002	0.002	0.002	0.002	0.0025063	0.002714823	0.003000001	0.008894749	0.003	0.0054782	0.001	0.0026495	0.004
Annual	PM25_RUNEX	0.0012026	0.0017688	0.0012557	0.0013106	0.009419	0.012487832	0.008975681	0.025907944	0.0076122	0.0026534	0.0017215	0.0245649	0.1284052
Annual	PM25_STREX	0.0016172	0.0023309	0.0016581	0.0017085	0.0001966	9.72552E-05	8.86196E-05	2.5207E-07	0.0001823	0.0001589	0.0026224	4.061E-05	0
Annual	ROG_DIURN	0.0607176	0.1888797	0.1019724	0.1248519	0.0028508	0.001530384	0.000655616	1.47603E-06	0.0026358	0.0019587	1.6709455	0.0015008	0
Annual	ROG_HTSK	0.090832	0.2306942	0.1262362	0.1579093	0.0729153	0.039128445	0.019583527	5.2503E-05	0.0240541	0.0123252	0.836107	0.0100133	0
Annual	ROG_IDLEX	0	0	0	0	0.0198325	0.015499791	0.016824003	0.568145316	0.0458879	0	0	0.3657628	0
Annual	ROG_RESTL	0.0471141	0.12998	0.0832176	0.1071978	0.0014285	0.000789991	0.000335114	8.94398E-07	0.0011393	0.000885	0.9042829	0.0007247	0
Annual	ROG_RUNEX	0.0070949	0.026006	0.0134428	0.0177878	0.05203	0.053696936	0.01158284	0.01941832	0.0264123	0.053524	2.1184535	0.0885598	0.0690969
Annual	ROG_RUNLS	0.1977724	0.7389034	0.4126899	0.4752907	0.4528549	0.219451316	0.096468492	0.000239216	0.2660202	0.058846	1.7664295	0.0614826	0
Annual	ROG_STREX	0.1898353	0.3530928	0.2802421	0.3702553	0.0670106	0.038629003	0.044819125	7.83291E-07	0.1184199	0.0733938	1.8103431	0.0412896	0
Annual	SO2_IDLEX	0	0	0	0	8.991E-05	0.000139935	0.000656457	0.012947424	0.0006506	0	0	0.0034697	0
Annual	SO2_RUNEX	0.0024739	0.0029592	0.0031129	0.0038976	0.0060648	0.005998989	0.008948287	0.011764181	0.0129975	0.004815	0.0020592	0.0104736	0.008775
Annual	SO2_STREX	0.00051	0.0006212	0.0006568	0.0008192	0.0001008	6.94822E-05	8.40759E-05	2.07201E-07	0.0002009	0.0001754	0.0005946	6.052E-05	0
Annual	TOG_DIURN	0.060754	0.188993	0.1020335	0.1249267	0.0028508	0.001530384	0.000655616	1.47603E-06	0.0026358	0.0019587	1.6709455	0.0015008	0
Annual	TOG_HTSK	0.0908865	0.2308326	0.1263119	0.158004	0.0729153	0.039128445	0.019583527	5.2503E-05	0.0240541	0.0123252	0.836107	0.0100133	0
Annual	TOG_IDLEX	0	0	0	0	0.0276606	0.020739906	0.022753958	0.648149519	0.0615467	0	0	0.5271864	0
Annual	TOG_RESTL	0.0471423	0.130058	0.0832675	0.1072621	0.0014285	0.000789991	0.000335114	8.94398E-07	0.0011393	0.000885	0.9042829	0.0007247	0
Annual	TOG_RUNEX	0.0103214	0.0379501	0.0195952	0.0258663	0.0629404	0.062460597	0.014718067	0.038641592	0.0368941	3.4300275	2.6208738	0.1049108	0.0786623
Annual	TOG_RUNLS	0.1978911	0.7393468	0.4129375	0.4755759	0.4528549	0.219451316	0.096468492	0.000239216	0.2660202	0.058846	1.7664295	0.0614826	0
Annual	TOG_STREX	0.2079907	0.3868622	0.3070443	0.4056641	0.0733682	0.042293896	0.049071301	8.57605E-07	0.1296548	0.0803569	1.9703107	0.045207	0
Summer	CH4_IDLEX	0	0	0	0	0.0046475	0.003006634	0.003074831	0.029363415	0.0086197	0	0	0.079108	0
Summer	CH4_RUNEX	0.0021833	0.0067742	0.0038413	0.0049301	0.004423	0.003297045	0.001349641	0.017322303	0.0048756	3.354825	0.3137043	0.0062087	0.0032094
Summer	CH4_STREX	0.0389828	0.0624716	0.054671	0.0675546	0.013088	0.00765304	0.008238898	1.46558E-07	0.021974	0.0172765	0.2151999	0.0059974	0
Summer	CO_IDLEX	0	0	0	0	0.169996	0.131743978	0.306579838	8.282439119	0.4967485	0	0	3.0866999	0
Summer	CO_RUNEX	0.7024683	1.5473739	1.0183223	1.1648442	0.5983437	0.446679647	0.175961775	0.207524367	0.593764	26.092224	19.608462	0.5038711	0.3229537
Summer	CO_STREX	1.7717936	1.9931601	2.2594973	2.5960636	0.8565413	0.49614692	0.927756769	0.002501395	2.2910242	1.2222475	8.0040891	0.6771272	0
Summer	CO2_NBIO_IDLEX	0	0	0	0	9.3045762	14.65842635	69.18470799	1357.066967	67.444523	0	0	372.24708	0
Summer	CO2_NBIO_RUNEX	271.86894	322.21592	336.74533	417.66701	623.60769	622.6850373	939.423431	1256.692381	1337.4533	1610.6574	209.06126	1093.9727	928.21789
Summer	CO2_NBIO_STREX	51.082798	62.215399	65.793285	82.07127	10.113279	6.980109092	8.419501087	0.02071762	20.025412	17.357095	58.517039	5.6830323	0
Summer	NOX_IDLEX	0	0	0	0	0.0796023	0.115540227	0.394928987	6.487908734	0.2339582	0	0	3.4471853	0
Summer	NOX_RUNEX	0.0290579	0.0999545	0.0637691	0.0835013	1.2368581	1.373269402	0.84862175	1.811544989	0.7529932	0.309149	0.974419	4.1706075	3.9232025
Summer	NOX_STREX[3]	0.1594063	0.2480281	0.2460425	0.3144758	0.2765935	0.171180552	1.736771382	2.397557018	0.7255323	0.1645515	0.2475146	0.8045931	0
Summer	PM10_IDLEX	0	0	0	0	0.0009883	0.001457487	0.00036373	0.00241709	7.251E-05	0	0	0.0029125	0
Summer	PM10_PMBW	0.03675	0.03675	0.03675	0.03675	0.07644	0.089180026	0.130340037	0.061022824	0.13034	0.0878825	0.01176	0.7448002	0.13034
Summer	PM10_PMTW	0.008	0.008	0.008	0.008	0.0100253	0.010859291	0.012000003	0.035578997	0.012	0.0219127	0.004	0.0105979	0.016
Summer	PM10_RUNEX	0.0013056	0.0019221	0.0013642	0.0014211	0.0098648	0.013062472	0.009385206	0.027079393	0.007971	0.0027897	0.0018422	0.0256866	0.1342111
Summer	PM10_STREX	0.0017588	0.002535	0.0018033	0.001858	0.0002138	0.000105774	9.63819E-05	2.74149E-07	0.0001982	0.0001728	0.0027899	4.417E-05	0
Summer	PM25_IDLEX	0	0	0	0	0.0009455	0.001394437	0.000347995	0.002312528	6.937E-05	0	0	0.0027865	0
Summer	PM25_PMBW	0.01575	0.01575	0.01575	0.01575	0.03276	0.038220011	0.055860016	0.026152639	0.05586	0.0376639	0.00504	0.3192001	0.05586
Summer	PM25_PMTW	0.002	0.002	0.002	0.002	0.0025063	0.002714823	0.003000001	0.008894749	0.003	0.0054782	0.001	0.0026495	0.004
Summer	PM25_RUNEX	0.0012026	0.0017688	0.0012557	0.0013106	0.009419	0.012487832	0.008975681	0.025907944	0.0076122	0.0026534	0.0017215	0.0245649	0.1284052
Summer	PM25_STREX	0.0016172	0.0023309	0.0016581	0.0017085	0.0001966	9.72552E-05	8.86196E-05	2.5207E-07	0.0001823	0.0001589	0.0026224	4.061E-05	0
Summer	ROG_DIURN	0.1174425	0.3666401	0.1975016	0.240509	0.0053198	0.002883007	0.001251678	2.79317E-06	0.0048008	0.0034783	3.3058148	0.0027018	0
Summer	ROG_HTSK	0.1055122	0.2823115	0.1483331	0.1813493	0.0851998	0.046256723	0.02338338	5.81948E-05	0.0264369	0.014296	1.2381959	0.0105352	0
Summer	ROG_IDLEX	0	0	0	0	0.0198325	0.015499791	0.016360574	0.601837524	0.0469008	0	0	0.3655239	0
Summer	ROG_RESTL	0.0881696	0.2471988	0.153373	0.1953594	0.0027137	0.001491789	0.000647791	1.84436E-06	0.0021636	0.0017486	2.050086	0.0013371	0
Summer	ROG_RUNEX	0.0080118	0.0293415	0.0152099	0.0201658	0.0523663	0.053791722	0.011673522	0.019419692	0.0269017	0.0536189	2.0991205	0.0889009	0.0690969
Summer	ROG_RUNLS	0.1973322	0.7415085	0.4138272	0.4763539	0.4575131	0.222614313	0.098503805	0.000242436	0.2673327	0.0571042	1.7641556	0.0567869	0
Summer	ROG_STREX	0.1658371	0.307812	0.2451078	0.3233644	0.0644662	0.037224137	0.043185849	7.53225E-07	0.1130774	0.0666357	1.6159125	0.0345479	0
Summer	SO2_IDLEX	0	0	0	0	8.991E-05	0.000139935	0.000656419	0.012782464	0.0006437	0	0	0.0035551	0
Summer	SO2_RUNEX	0.0026895	0.0031885	0.0033316	0.0041294	0.006065	0.005999031	0.008948328	0.011764182	0.0129977	0.004815	0.0020688	0.0104737	0.008775
Summer	SO2_STREX	0.0005055	0.0006157	0.0006511	0.0008122	0.0001001	6.90738E-05	8.33178E-05	2.05018E-07	0.0001982	0.0001718	0.0005791	5.624E-05	0
Summer	TOG_DIURN	0.1175128	0.36686	0.19762	0.2406532	0.0053198	0.002883007	0.001251678	2.79317E-06	0.0048008	0.0034783	3.3058148	0.0027018	0
Summer	TOG_HTSK	0.1055754	0.2824808	0.148422	0.1814581	0.0851998	0.046256723	0.02338338	5.81948E-05	0.0264369	0.014296	1.2381959	0.0105352	0
Summer	TOG_IDLEX	0	0	0	0	0.0276606	0.020739906	0.022010326	0.686564132	0.0626998	0	0	0.5269144	0
Summer	TOG_RESTL	0.0882224	0.2473471	0.1534649	0.1954766	0.0027137	0.001491789	0.000647791	1.84436E-06	0.0021636	0.0017486	2.050086	0.0013371	0
Summer	TOG_RUNEX	0.0116595	0.0428185	0.0221744	0.0293308	0.0634311	0.062598909	0.01485039	0.038643595	0.0376084	3.430166	2.5982787	0.1054085	0.0786623
Summer	TOG_RUNLS	0.1974506	0.7419534	0.4140755	0.4766397	0.4575131	0.222614313	0.098503805	0.000242436	0.2673327	0.0571042	1.7641556	0.0567869	0
Summer	TOG_STREX	0.1816974	0.3372507	0.2685497	0.3542888	0.0705823	0.040755744	0.047283069	8.24687E-07	0.1238055	0.0729577	1.7587457	0.0378256	0

Winter	CH4_IDLEX	0	0	0	0	0.0046349	0.00299807	0.003457003	0.024225508	0.0084813	0	0	0.0789961	0
Winter	CH4_RUNEX	0.0018496	0.0057653	0.0032422	0.0041546	0.0043477	0.003268732	0.001314344	0.000878011	0.0047409	3.3547943	0.3146514	0.0061306	0.0032094
Winter	CH4_STREX	0.0452537	0.0731587	0.0637228	0.0787233	0.0135875	0.007975946	0.008593962	1.53544E-07	0.0231128	0.0189067	0.2406081	0.0074108	0
Winter	CO_IDLEX	0	0	0	0	0.169996	0.131743978	0.423175775	8.522386502	0.5053067	0	0	3.1739507	0
Winter	CO_RUNEX	0.5375914	1.1927501	0.7751272	0.8903606	0.5895828	0.443637752	0.171965234	0.156662322	0.5788085	26.090703	18.501374	0.4957337	0.3229537
Winter	CO_STREX	2.0458535	2.3041136	2.6161192	3.0161196	0.9006736	0.523742986	0.986129236	0.002632673	2.4764456	1.4244412	8.5390969	0.9821296	0
Winter	CO2_NBIO_IDLEX	0	0	0	0	9.3045762	14.65842635	69.21798907	1394.572255	69.171287	0	0	350.70547	0
Winter	CO2_NBIO_RUNEX	244.10648	291.99823	307.92332	387.19227	623.59215	622.6796982	939.4164192	1245.199554	1337.4269	1610.6546	207.35577	1093.9582	928.21789
Winter	CO2_NBIO_STREX	51.612553	62.890499	66.501819	82.925352	10.192143	7.029574997	8.519173411	0.020925819	20.339942	17.698963	60.026782	6.1938765	0
Winter	NOX_IDLEX	0	0	0	0	0.0796023	0.115540227	0.413546522	7.248969607	0.2630469	0	0	3.2595984	0
Winter	NOX_RUNEX	0.0299927	0.1041585	0.065863	0.0863483	1.2982449	1.439969341	0.894347974	1.900263329	0.8056041	0.3141398	1.1152566	4.3998443	4.1151653
Winter	NOX_STREX[3]	0.1659923	0.2583178	0.2556154	0.3273398	0.2855643	0.177519177	1.740162077	2.3975611	0.7343715	0.1715373	0.2620959	0.8104009	0
Winter	PM10_IDLEX	0	0	0	0	0.0009883	0.001457487	0.000516521	0.003138257	9.416E-05	0	0	0.0041834	0
Winter	PM10_PMBW	0.03675	0.03675	0.03675	0.03675	0.07644	0.089180026	0.130340037	0.060799483	0.13034	0.0878825	0.01176	0.7448002	0.13034
Winter	PM10_PMTW	0.008	0.008	0.008	0.008	0.0100253	0.010859291	0.012000003	0.035448769	0.012	0.0219127	0.004	0.0105979	0.016
Winter	PM10_RUNEX	0.0013056	0.0019221	0.0013642	0.0014211	0.0098648	0.013062472	0.009385206	0.027061721	0.007971	0.0027897	0.0018422	0.0256866	0.1342111
Winter	PM10_STREX	0.0017588	0.002535	0.0018033	0.001858	0.0002138	0.000105774	9.63819E-05	2.74149E-07	0.0001982	0.0001728	0.0027899	4.417E-05	0
Winter	PM25_IDLEX	0	0	0	0	0.0009455	0.001394437	0.000494176	0.003002498	9.009E-05	0	0	0.0040025	0
Winter	PM25_PMBW	0.01575	0.01575	0.01575	0.01575	0.03276	0.038220011	0.055860016	0.026056921	0.05586	0.0376639	0.00504	0.3192001	0.05586
Winter	PM25_PMTW	0.002	0.002	0.002	0.002	0.0025063	0.002714823	0.003000001	0.008862192	0.003	0.0054782	0.001	0.0026495	0.004
Winter	PM25_RUNEX	0.0012026	0.0017688	0.0012557	0.0013106	0.009419	0.012487832	0.008975681	0.025891037	0.0076122	0.0026534	0.0017215	0.0245649	0.1284052
Winter	PM25_STREX	0.0016172	0.0023309	0.0016581	0.0017085	0.0001966	9.72552E-05	8.86196E-05	2.5207E-07	0.0001823	0.0001589	0.0026224	4.061E-05	0
Winter	ROG_DIURN	0.048961	0.157404	0.0794948	0.0965262	0.0025025	0.001184327	0.000491884	1.44728E-06	0.0023775	0.0019856	1.5917626	0.0012925	0
Winter	ROG_HTSK	0.0963696	0.252829	0.1341025	0.1661854	0.0820471	0.042112607	0.020315562	5.82088E-05	0.0253316	0.0137741	1.0263478	0.010199	0
Winter	ROG_IDLEX	0	0	0	0	0.0198325	0.015499791	0.017476806	0.52156854	0.0444891	0	0	0.3660926	0
Winter	ROG_RESTL	0.0399233	0.1090486	0.0699344	0.0915642	0.0012973	0.000658796	0.000266966	9.25804E-07	0.0010814	0.0009272	0.7304365	0.0006966	0
Winter	ROG_RUNEX	0.0068539	0.0250029	0.0129069	0.0170799	0.0519839	0.053671723	0.011516542	0.018681923	0.0262708	0.0535331	2.1135668	0.0885318	0.0690969
Winter	ROG_RUNLS	0.2224522	0.8544835	0.4732517	0.5418588	0.4853196	0.235559212	0.104061092	0.000254243	0.2825337	0.068696	2.0108874	0.0746199	0
Winter	ROG_STREX	0.1945927	0.3624938	0.2882424	0.3799866	0.0671209	0.038929468	0.045315261	7.86616E-07	0.1192214	0.073004	1.8149416	0.0427087	0
Winter	SO2_IDLEX	0	0	0	0	8.991E-05	0.000139935	0.000656463	0.013175227	0.00066	0	0	0.0033516	0
Winter	SO2_RUNEX	0.0024148	0.0028895	0.0030464	0.0038278	0.0060648	0.005998978	0.008948258	0.01176418	0.0129974	0.004815	0.002052	0.0104736	0.008775
Winter	SO2_STREX	0.0005107	0.0006224	0.0006581	0.0008206	0.0001009	6.95633E-05	8.43041E-05	2.07078E-07	0.0002013	0.0001751	0.000594	6.129E-05	0
Winter	TOG_DIURN	0.0489904	0.1574984	0.0795425	0.0965841	0.0025025	0.001184327	0.000491884	1.44728E-06	0.0023775	0.0019856	1.5917626	0.0012925	0
Winter	TOG_HTSK	0.0964274	0.2529807	0.1341829	0.1662851	0.0820471	0.042112607	0.020315562	5.82088E-05	0.0253316	0.0137741	1.0263478	0.010199	0
Winter	TOG_IDLEX	0	0	0	0	0.0276606	0.020739906	0.023799598	0.59376608	0.0599543	0	0	0.5275619	0
Winter	TOG_RESTL	0.0399473	0.109114	0.0699764	0.0916191	0.0012973	0.000658796	0.000266966	9.25804E-07	0.0010814	0.0009272	0.7304365	0.0006966	0
Winter	TOG_RUNEX	0.0099697	0.036486	0.0188129	0.0248357	0.0628731	0.062423807	0.014621325	0.021287868	0.0366877	3.4300408	2.6148401	0.1048699	0.0786623
Winter	TOG_RUNLS	0.2225857	0.8549962	0.4735356	0.5421839	0.4853196	0.235559212	0.104061092	0.000254243	0.2825337	0.068696	2.0108874	0.0746199	0
Winter	TOG_STREX	0.2132031	0.3971623	0.3158098	0.4163262	0.073489	0.042622868	0.049614507	8.61245E-07	0.1305324	0.0799302	1.9753367	0.0467606	0

1 Source: California Air Resources Board. EMFAC2017 Web Database. https://www.arb.ca.gov/emfac/2017/; California Air Pollution Control Officers Association (CAPCOA). 2017, November. California Emissions Estimator Model User's Guide, Version 2016.3.2, Appendix A.

2 Unless otherwise noted, per CalEEMod methodology, the calculated CalEEMod emission rates are derived from the emission rates obtained using the EMFAC2017 Web Database for the Riverside County region .

3 Because EMFAC2017 provides vehicle trips data for MHDT and HHDT diesel trucks, the formula provided in Appendix A of the CalEEMod User's Guide in calculating the NO_X STREX emission rates are utilized.

This page intentionally left blank

APPENDIX 3.4:

SCAQMD BRIEF

S219783

IN THE SUPREME COURT OF C ALIFORNIA

SIERRA CLUB, REVIVE THE SAN JOAQUIN, and
LEAGUE OF WOMEN VOTERS OF FRESNO,

Plaintiffs and Appellants,

v.

COUNTY OF FRESNO,

Defendant and Respondent,

and,

FRIANT RANCH, L.P.,

Real Party in Interest and Respondent.

After a Published Decision by the Court of Appeal, filed May 27, 2014
Fifth Appellate District Case No. F066798

Appeal from the Superior Court of California, County of Fresno
Case No. 11CECG00726
Honorable Rosendo A. Pena, Jr.

APPLICATION OF THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT FOR LEAVE TO FILE BRIEF OF *AMICUS CURIAE* IN SUPPORT OF NEITHER PARTY AND *[PROPOSED]* BRIEF OF *AMICUS CURIAE*

Kurt R. Wiese, General Counsel (SBN 127251)
*Barbara Baird, Chief Deputy Counsel (SBN 81507)
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 Copley Drive, Diamond Bar, CA 91765
Telephone: 909-396-2302; Facsimile: 909-396-2961
Email: bbaird@aqmd.gov
Counsel for [Proposed] Amicus Curiae,
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

TABLE OF CONTENTS

TABLE OF AUTHORITIES

State Cases

State Cases (cont'd)

California Statutes

California Statutes (cont'd)

California Regulations

Federal Statutes

Rules

Other

TO THE HONORABLE CHIEF JUSTICE AND JUSTICES OF THE SUPREME COURT:

APPLICATION FOR LEAVE TO FILE *AMICUS CURIAE* BRIEF

Pursuant to Rule 8.520(f) of the California Rules of Court, the South Coast Air Quality Management District (SCAQMD) respectfully requests leave to file the attached *amicus curiae* brief. Because SCAQMD's position differs from that of either party, we request leave to submit this amicus brief in support of neither party.

HOW THIS BRIEF WILL ASSIST THE COURT

SCAQMD's proposed amicus brief takes a position on two of the issues in this case. In both instances, its position differs from that of either party. The issues are:

1) Does the California Environmental Quality Act (CEQA) require an environmental impact report (EIR) to correlate a project's air pollution emissions with specific levels of health impacts?
2) What is the proper standard of review for determining whether an EIR provides sufficient information on the health impacts caused by a project's emission of air pollutants?

This brief will assist the Court by discussing the practical realities of correlating identified air quality impacts with specific health outcomes. In short, CEQA requires agencies to provide detailed information about a project's air quality impacts that is sufficient for the public and decisionmakers to adequately evaluate the project and meaningfully understand its impacts. However, the level of analysis is governed by a rule of reason; CEQA only requires agencies to conduct analysis if it is reasonably feasible to do so.

With regard to health-related air quality impacts, an analysis that correlates a project's air pollution emissions with specific levels of health impacts will be feasible in some cases but not others. Whether it is feasible depends on a variety of factors, including the nature of the project and the nature of the analysis under consideration. The feasibility of analysis may also change over time as air districts and others develop new tools for measuring projects' air quality related health impacts. Because SCAQMD has among the most sophisticated air quality modeling and health impact evaluation capability of any of the air districts in the State, it is uniquely situated to express an opinion on the extent to which the Court should hold that CEQA requires lead agencies to correlate air quality impacts with specific health outcomes.

SCAQMD can also offer a unique perspective on the question of the appropriate standard of review. SCAQMD submits that the proper standard of review for determining whether an EIR is sufficient as an informational document is more nuanced than argued by either party. In our view, this is a mixed question of fact and law. It includes determining whether additional analysis is feasible, which is primarily a factual question that should be reviewed under the substantial evidence standard. However, it also involves determining whether the omission of a particular analysis renders an EIR insufficient to serve CEQA's purpose as a meaningful, informational document. If a lead agency has not determined that a requested analysis is infeasible, it is the court's role to determine whether the EIR nevertheless meets CEQA's purposes, and courts should not defer to the lead agency's conclusions regarding the legal sufficiency of an EIR's analysis. The ultimate question of whether an EIR's analysis is "sufficient" to serve CEQA's informational purposes is predominately a question of law that courts should review de novo.

This brief will explain the rationale for these arguments and may assist the Court in reaching a conclusion that accords proper respect to a lead agency's factual conclusions while maintaining judicial authority over the ultimate question of what level of analysis CEQA requires.

STATEMENT OF INTEREST OF *AMICUS CURIAE*

The SCAQMD is the regional agency primarily responsible for air pollution control in the South Coast Air Basin, which consists of all of Orange County and the non-desert portions of the Los Angeles, Riverside, and San Bernardino Counties. (Health & Saf. Code § 40410; Cal. Code Regs., tit. 17, § 60104.) The SCAQMD participates in the CEQA process in several ways. Sometimes it acts as a lead agency that prepares CEQA documents for projects. Other times it acts as a responsible agency when it has permit authority over some part of a project that is undergoing CEQA review by a different lead agency. Finally, SCAQMD also acts as a commenting agency for CEQA documents that it receives because it is a public agency with jurisdiction by law over natural resources affected by the project.

In all of these capacities, SCAQMD will be affected by the decision in this case. SCAQMD sometimes submits comments requesting that a lead agency perform an additional type of air quality or health impacts analysis. On the other hand, SCAQMD sometimes determines that a particular type of health impact analysis is not feasible or would not produce reliable and informative results. Thus, SCAQMD will be affected by the Court's resolution of the extent to which CEQA requires EIRs to correlate emissions and health impacts, and its resolution of the proper standard of review.

CERTIFICATION REGARDING AUTHORSHIP AND FUNDING

No party or counsel in the pending case authored the proposed amicus curiae brief in whole or in part, or made any monetary contribution intended to fund the preparation or submission of the brief. No person or entity other than the proposed *Amicus Curiae* made any monetary contribution intended to fund the preparation or submission of the brief.

Respectfully submitted,

DATED: April 3, 2015

SOUTH COAST AIR QUALITY
MANAGEMENT DISTRICT
KURT R. WIESE, GENERAL COUNSEL
BARBARA BAIRD, CHIEF DEPUTY COUNSEL

By: Barbara Baird

Barbara Baird
Attorneys for [proposed] Amicus Curiae
SOUTH COAST AIR QUALITY
MANAGEMENT DISTICT

BRIEF OF AMICUS CURIAE

SUMMARY OF ARGUMENT

The South Coast Air Quality Management District (SCAQMD) submits that this Court should not try to establish a hard-and-fast rule concerning whether lead agencies are required to correlate emissions of air pollutants with specific health consequences in their environmental impact reports (EIR). The level of detail required in EIRs is governed by a few, core CEQA (California Environmental Quality Act) principles. As this Court has stated, "[a]n EIR must include detail sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project." (*Laurel Heights Improvement Assn. v. Regents of the Univ of Cal.* (1988) 47 Cal.3d 376, 405 ["*Laurel Heights I*"]) Accordingly, "an agency must use its best efforts to find out and disclose all that it reasonably can." (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 428 (quoting CEQA Guidelines § 15144)[1].). However, "[a]nalysis of environmental effects need not be exhaustive, but will be judged in light of what is reasonably feasible." (*Association of Irritated Residents v. County of Madera* (2003) 107 Cal.App.4th 1383, 1390; CEQA Guidelines §§ 15151, 15204(a).)

With regard to analysis of air quality related health impacts, EIRs must generally quantify a project's pollutant emissions, but in some cases it is not feasible to correlate these emissions to specific, quantifiable health impacts (e.g., premature mortality; hospital admissions). In such cases, a general description of the adverse health impacts resulting from the pollutants at issue may be sufficient. In other cases, due to the magnitude

---

[1] The CEQA Guidelines are found at Cal. Code Regs., tit. 14 §§ 15000, *et seq*.

or nature of the pollution emissions, as well as the specificity of the project involved, it may be feasible to quantify health impacts. Or there may be a less exacting, but still meaningful analysis of health impacts that can feasibly be performed. In these instances, agencies should disclose those impacts.

SCAQMD also submits that whether or not an EIR complies with CEQA's informational mandates by providing sufficient, feasible analysis is a mixed question of fact and law. Pertinent here, the question of whether an EIR's discussion of health impacts from air pollution is sufficient to allow the public to understand and consider meaningfully the issues involves two inquiries: (1) Is it feasible to provide the information or analysis that a commenter is requesting or a petitioner is arguing should be required?; and (2) Even if it is feasible, is the agency relying on other policy or legal considerations to justify not preparing the requested analysis? The first question of whether an analysis is feasible is primarily a question of fact that should be judged by the substantial evidence standard. The second inquiry involves evaluating CEQA's information disclosure purposes against the asserted reasons to not perform the requested analysis. For example, an agency might believe that its EIR meets CEQA's informational disclosure standards even without a particular analysis, and therefore choose not to conduct that analysis. SCAQMD submits that this is more of a legal question, which should be reviewed de novo as a question of law.

ARGUMENT

I. RELEVANT FACTUAL AND LEGAL FRAMEWORK.

A. Air Quality Regulatory Background

The South Coast Air Quality Management District (SCAQMD) is one of the local and regional air pollution control districts and air quality management districts in California. The SCAQMD is the regional air pollution agency for the South Coast Air Basin, which consists of all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. (Health & Saf. Code § 40410, 17 Cal. Code Reg. § 60104.) The SCAQMD also includes the Coachella Valley in Riverside County (Palm Springs area to the Salton Sea). (SCAQMD, *Final 2012 AQMP (Feb. 2013)*, http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan; then follow "chapter 7" hyperlink; pp 7-1, 7-3 (last visited Apr. 1, 2015).) The SCAQMD's jurisdiction includes over 16 million residents and has the worst or nearly the worst air pollution levels in the country for ozone and fine particulate matter. (SCAQMD, *Final 2012 AQMP (Feb. 2013)*, http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan; then follow "Executive Summary" hyperlink p. ES-1 (last visited Apr. 1, 2015).)

Under California law, the local and regional districts are primarily responsible for controlling air pollution from all sources except motor vehicles. (Health & Saf. Code § 40000.) The California Air Resources Board (CARB), part of the California Environmental Protection Agency, is primarily responsible for controlling pollution from motor vehicles. (*Id.*) The air districts must adopt rules to achieve and maintain the state and federal ambient air quality standards within their jurisdictions. (Health & Saf. Code § 40001.)

The federal Clean Air Act (CAA) requires the United States Environmental Protection Agency (EPA) to identify pollutants that are widely distributed and pose a threat to human health, developing a so-called "criteria" document. (42 U.S.C. § 7408; CAA § 108.) These pollutants are frequently called "criteria pollutants." EPA must then establish "national ambient air quality standards" at levels "requisite to protect public health", allowing "an adequate margin of safety." (42 U.S.C. § 7409; CAA § 109.) EPA has set standards for six identified pollutants: ozone, nitrogen dioxide, sulfur dioxide, carbon monoxide, particulate matter (PM), and lead. (U.S. EPA, National Ambient Air Quality Standards (NAAQS), http://www.epa.gov/air/criteria.html (last updated Oct. 21, 2014).)[2]

Under the Clean Air Act, EPA sets emission standards for motor vehicles and "nonroad engines" (mobile farm and construction equipment, marine vessels, locomotives, aircraft, etc.). (42 U.S.C. §§ 7521, 7547; CAA §§ 202, 213.) California is the only state allowed to establish emission standards for motor vehicles and most nonroad sources; however, it may only do so with EPA's approval. (42 U.S.C. §§ 7543(b), 7543(e); CAA §§ 209(b), 209(c).) Sources such as manufacturing facilities, power plants and refineries that are not mobile are often referred to as "stationary sources." The Clean Air Act charges state and local agencies with the primary responsibility to attain the national ambient air quality standards. (42 U.S.C. § 7401(a)(3); CAA § 101(a)(3).) Each state must adopt and implement a plan including enforceable measures to achieve and maintain the national ambient air quality standards. (42 U.S.C. § 7410; CAA § 110.) The SCAQMD and CARB jointly prepare portion of the plan for the South Coast Air Basin and submit it for approval by EPA. (Health & Saf. Code §§ 40460, et seq.)

The Clean Air Act also requires state and local agencies to adopt a permit program requiring, among other things, that new or modified "major" stationary sources use technology to achieve the "lowest achievable emission rate," and to control minor stationary sources as

---

[2] Particulate matter (PM) is further divided into two categories: fine particulate or $PM_{2.5}$ (particles with a diameter of less than or equal to 2.5 microns) and coarse particulate (PM_{10}) (particles with a diameter of 10 microns or less). (U.S. EPA, Particulate Matter (PM), http://www.epa.gov/airquality/particlepollution/ (last visited Apr. 1, 2015).)

needed to help attain the standards. (42 U.S.C. §§ 7502(c)(5), 7503(a)(2), 7410(a)(2)(C); CAA §§ 172(c)(5), 173(a)(2), 110(a)(2)(C).) The air districts implement these permit programs in California. (Health & Saf. Code §§ 42300, et seq.)

The Clean Air Act also sets out a regulatory structure for over 100 so-called "hazardous air pollutants" calling for EPA to establish "maximum achievable control technology" (MACT) for sources of these pollutants. (42 U.S.C. § 7412(d)(2); CAA § 112(d)(2).) California refers to these pollutants as "toxic air contaminants" (TACs) which are subject to two state-required programs. The first program requires "air toxics control measures" for specific categories of sources. (Health & Saf. Code § 39666.) The other program requires larger stationary sources and sources identified by air districts to prepare "health risk assessments" for impacts of toxic air contaminants. (Health & Saf. Code §§ 44320(b), 44322, 44360.) If the health risk exceeds levels identified by the district as "significant," the facility must implement a "risk reduction plan" to bring its risk levels below "significant" levels. Air districts may adopt additional more stringent requirements than those required by state law, including requirements for toxic air contaminants. (Health & Saf. Code § 41508; *Western Oil & Gas Assn. v. Monterey Bay Unified APCD* (1989) 49 Cal.3d 408, 414.) For example, SCAQMD has adopted a rule requiring new or modified sources to keep their risks below specified levels and use best available control technology (BACT) for toxics. (SCAQMD, *Rule 1401- New Source Review of Toxic Air Contaminants*, http://www.aqmd.gov/home/regulations/rules/scaqmd-rule-book/regulation-xiv; then follow "Rule 1401" hyperlink (last visited Apr. 1, 2015).)

B. The SCAQMD's Role Under CEQA

The California Environmental Quality Act (CEQA) requires public agencies to perform an environmental review and appropriate analysis for projects that they implement or approve. (Pub. Resources Code § 21080(a).) The agency with primary approval authority for a particular project is generally the "lead agency" that prepares the appropriate CEQA document. (CEQA Guidelines §§ 15050, 15051.) Other agencies having a subsequent approval authority over all or part of a project are called "responsible" agencies that must determine whether the CEQA document is adequate for their use. (CEQA Guidelines §§ 15096(c), 15381.) Lead agencies must also consult with and circulate their environmental impact reports to "trustee agencies" and agencies "with jurisdiction by law" including "authority over resources which may be affected by the project." (Pub. Resources Code §§ 21104(a), 21153; CEQA Guidelines §§ 15086(a)(3), 15073(c).) The SCAQMD has a role in all these aspects of CEQA.

Fulfilling its responsibilities to implement its air quality plan and adopt rules to attain the national ambient air quality standards, SCAQMD adopts a dozen or more rules each year to require pollution reductions from a wide variety of sources. The SCAQMD staff evaluates each rule for any adverse environmental impact and prepares the appropriate CEQA document. Although most rules reduce air emissions, they may have secondary environmental impacts such as use of water or energy or disposal of waste—e.g., spent catalyst from control equipment.[3]

---

[3] The SCAQMD's CEQA program for its rules is a "Certified Regulatory Program" under which it prepares a "functionally equivalent" document in lieu of a negative declaration or EIR. (Pub. Resources Code § 21080.5, CEQA Guidelines § 15251(l).)

The SCAQMD also approves a large number of permits every year to construct new, modified, or replacement facilities that emit regulated air pollutants. The majority of these air pollutant sources have already been included in an earlier CEQA evaluation for a larger project, are currently being evaluated by a local government as lead agency, or qualify for an exemption. However, the SCAQMD sometimes acts as lead agency for major projects where the local government does not have a discretionary approval. In such cases, SCAQMD prepares and certifies a negative declaration or environmental impact report (EIR) as appropriate.[4] SCAQMD evaluates perhaps a dozen such permit projects under CEQA each year. SCAQMD is often also a "responsible agency" for many projects since it must issue a permit for part of the projects (e.g., a boiler used to provide heat in a commercial building). For permit projects evaluated by another lead agency under CEQA, SCAQMD has the right to determine that the CEQA document is inadequate for its purposes as a responsible agency, but it may not do so because its permit program already requires all permitted sources to use the best available air pollution control technology. (SCAQMD, *Rule 1303(a)(1) – Requirements*, http://www.aqmd.gov/home/regulations/rules/scaqmd-rule-book/regulation-xiii; then follow "Rule 1303" hyperlink (last visited Apr. 1, 2015).)

Finally, SCAQMD receives as many as 60 or more CEQA documents each month (around 500 per year) in its role as commenting agency or an agency with "jurisdiction by law" over air quality—a natural resource affected by the project. (Pub. Resources Code §§ 21104(a), 21153; CEQA Guidelines § 15366(a)(3).) The SCAQMD staff provides comments on as many as 25 or 30 such documents each month.

[4] The SCAQMD's permit projects are not included in its Certified Regulatory Program, and are evaluated under the traditional local government CEQA analysis. (Pub. Resources Code §§ 21150-21154.)

(SCAQMD Governing Board Agenda, Apr. 3, 2015, Agenda Item 16, Attachment A, http://www.aqmd.gov/home/library/meeting-agendas-minutes/agenda?title=governing-board-meeting-agenda-april-3-2015; then follow "16. Lead Agency Projects and Environmental Documents Received by SCAQMD" hyperlink (last visited Apr. 1, 2015).) Of course, SCAQMD focuses its commenting efforts on the more significant projects.

Typically, SCAQMD comments on the adequacy of air quality analysis, appropriateness of assumptions and methodology, and completeness of the recommended air quality mitigation measures. Staff may comment on the need to prepare a health risk assessment detailing the projected cancer and noncancer risks from toxic air contaminants resulting from the project, particularly the impacts of diesel particulate matter, which CARB has identified as a toxic air contaminant based on its carcinogenic effects. (California Air Resources Board, Resolution 98-35, Aug. 27, 1998, http://www.arb.ca.gov/regact/diesltac/diesltac.htm; then follow Resolution 98-35 hyperlink (last visited Apr. 1, 2015).) Because SCAQMD already requires new or modified stationary sources of toxic air contaminants to use the best available control technology for toxics and to keep their risks below specified levels, (SCAQMD Rule 1401, supra, note 15), the greatest opportunity to further mitigate toxic impacts through the CEQA process is by reducing emissions—particularly diesel emissions—from vehicles.

II. THIS COURT SHOULD NOT SET A HARD-AND-FAST RULE CONCERNING THE EXTENT TO WHICH AN EIR MUST CORRELATE A PROJECT'S EMISSION OF POLLUTANTS WITH RESULTING HEALTH IMPACTS.

Numerous cases hold that courts do not review the correctness of an EIR's conclusions but rather its sufficiency as an informative document. (*Laurel Heights 1*, *supra*, 47 Cal.3d at p. 392; *Citizens of Goleta Valley v.*

Bd. of Supervisors (1990) 52 Cal.3d 553, 569; *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1197.)

As stated by the Court of Appeal in this case, where an EIR has addressed a topic, but the petitioner claims that the information provided about that topic is insufficient, courts must "draw[] a line that divides *sufficient* discussions from those that are *insufficient*." (*Sierra Club v. County of Fresno* (2014) 226 Cal.App.4th 704 (superseded by grant of review) 172 Cal.Rptr.3d 271, 290.) The Court of Appeal readily admitted that "[t]he terms themselves – sufficient and insufficient – provide little, if any, guidance as to where the line should be drawn. They are simply labels applied once the court has completed its analysis." (*Id.*)

The CEQA Guidelines, however, provide guidance regarding what constitutes a sufficient discussion of impacts. Section 15151 states that "the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible." Case law reflects this: "Analysis of environmental effects need not be exhaustive, but will be judged in light of what was reasonably feasible." (*Association of Irritated Residents v. County of Madera, supra,* 107 Cal.App.4th at p. 1390; see also CEQA Guidelines § 15204(a).)

Applying this test, this Court cannot realistically establish a hard-and-fast rule that an analysis correlating air pollution impacts of a project to quantified resulting health impacts is always required, or indeed that it is never required. Simply put, in some cases such an analysis will be "feasible"; in some cases it will not.

For example, air pollution control districts often require a proposed new source of toxic air contaminants to prepare a "health risk assessment" before issuing a permit to construct. District rules often limit the allowable cancer risk the new source may cause to the "maximally exposed individual" (worker and residence exposures). (*See, e.g.*, SCAQMD Rule 1401(c)(8); 1401(d)(1), *supra* note 15.) In order to perform this analysis, it is necessary to have data regarding the sources and types of air toxic contaminants, location of emission points, velocity of emissions, the meteorology and topography of the area, and the location of receptors (worker and residence). (SCAQMD, *Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act (AB2588), pp. 11-16*; (last visited Apr. 1, 2015) http://www.aqmd.gov/home/library/documents-support-material; "Guidelines" hyperlink; AB2588; then follow AB2588 Risk Assessment Guidelines hyperlink.)

Thus, it is feasible to determine the health risk posed by a new gas station locating at an intersection in a mixed use area, where receptor locations are known. On the other hand, it may not be feasible to perform a health risk assessment for airborne toxics that will be emitted by a generic industrial building that was built on "speculation" (i.e., without knowing the future tenant(s)). Even where a health risk assessment can be prepared, however, the resulting maximum health risk value is only a calculation of risk—it does not necessarily mean anyone will contract cancer as a result of the project.

In order to find the "cancer burden" or expected additional cases of cancer resulting from the project, it is also necessary to know the numbers and location of individuals living within the "zone of impact" of the project: i.e., those living in areas where the projected cancer risk from the project exceeds one in a million. (SCAQMD, Health Risk Assessment Summary form, http://www.aqmd.gov/home/forms ; filter by "AB2588" category; then "Health Risk Assessment" hyperlink (last visited Apr. 1, 2015).) The affected population is divided into bands of those exposed to at least 1 in a million risk, those exposed to at least 10 in a million risk, etc. up to those exposed at the highest levels. (*Id.*) This data allows agencies to calculate an approximate number of additional cancer cases expected from the project. However, it is not possible to predict which particular individuals will be affected.

For the so-called criteria pollutants[5], such as ozone, it may be more difficult to quantify health impacts. Ozone is formed in the atmosphere from the chemical reaction of the nitrogen oxides (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. (U.S. EPA, Ground Level Ozone, http://www.epa.gov/airquality/ozonepollution/ (last updated Mar. 25, 2015).) It takes time and the influence of meteorological conditions for these reactions to occur, so ozone may be formed at a distance downwind from the sources. (U.S. EPA, *Guideline on Ozone Monitoring Site Selection* (Aug. 1998) EPA-454/R-98-002 § 5.1.2, http://www.epa.gov/ttnamti1/archive/cpreldoc.html (last visited Apr. 1, 2015).) NO_x and VOC are known as "precursors" of ozone.

Scientifically, health effects from ozone are correlated with increases in the ambient level of ozone in the air a person breathes. (U.S. EPA, *Health Effects of Ozone in the General Population,* Figure 9, http://www.epa.gov/apti/ozonehealth/population.html#levels (last visited Apr. 1, 2015).) However, it takes a large amount of additional precursor emissions to cause a modeled increase in ambient ozone levels over an entire region. For example, the SCAQMD's 2012 AQMP showed that reducing NO_x by 432 tons per day (157,680 tons/year) and reducing VOC by 187 tons per day (68,255 tons/year) would reduce ozone levels at the SCAQMD's monitor site with the highest levels by only 9 parts per billion. (South Coast Air Quality Management District, *Final 2012 AQMP (February 2013)*, http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan; then follow "Appendix V: Modeling & Attainment Demonstrations" hyperlink,

[5] See discussion of types of pollutants, supra, Part I.A.

pp. v-4-2, v-7-4, v-7-24.) SCAQMD staff does not currently know of a way to accurately quantify ozone-related health impacts caused by NO_x or VOC emissions from relatively small projects.

On the other hand, this type of analysis may be feasible for projects on a regional scale with very high emissions of NO_x and VOCs, where impacts are regional. For example, in 2011 the SCAQMD performed a health impact analysis in its CEQA document for proposed Rule 1315, which authorized various newly-permitted sources to use offsets from the districts "internal bank" of emission reductions. This CEQA analysis accounted for essentially *all* the increases in emissions due to new or modified sources in the District between 2010 and 2030.[6] The SCAQMD was able to correlate this very large emissions increase (e.g., 6,620 pounds per day NO_x (1,208 tons per year), 89,180 pounds per day VOC (16,275 tons per year)) to expected health outcomes from ozone and particulate matter (e.g., 20 premature deaths per year and 89,947 school absences in the year 2030 due to ozone).[7] (SCAQMD Governing Board Agenda, February 4, 2011, Agenda Item 26, *Assessment for: Re-adoption of Proposed Rule 1315 – Federal New Source Review Tracking System* (see hyperlink in fn 6*)* at p. 4.1-35, Table 4.1-29.)

---

[6] (SCAQMD Governing Board Agenda, February 4, 2011, Agenda Item 26, Attachment G, *Assessment for: Re-adoption of Proposed Rule 1315 – Federal New Source Review Tracking System, Vol. 1, p.4.0-6,* http://www.aqmd.gov/home/library/meeting-agendas-minutes/agenda?title=governing-board-meeting-agenda-february-4-2011; the follow "26. Adopt Proposed Rule 1315 – Federal New Source Review Tracking System" (last visited April 1, 2015).)

[7] The SCAQMD was able to establish the location of future NO_x and VOC emissions by assuming that new projects would be built in the same locations and proportions as existing stationary sources. This CEQA document was upheld by the Los Angeles County Superior Court in *Natural Res. Def. Council v SCAQMD*, Los Angeles Superior Court No. BS110792).

However, a project emitting only 10 tons per year of NO_x or VOC is small enough that its regional impact on ambient ozone levels may not be detected in the regional air quality models that are currently used to determine ozone levels. Thus, in this case it would not be feasible to directly correlate project emissions of VOC or NO_x with specific health impacts from ozone. This is in part because ozone formation is not linearly related to emissions. Ozone impacts vary depending on the location of the emissions, the location of other precursor emissions, meteorology and seasonal impacts, and because ozone is formed some time later and downwind from the actual emission. (EPA Guideline on Ozone Monitoring Site Selection (Aug. 1998) EPA-454/R-98-002, § 5.1.2; https://www.epa.gov/ttnamti1/archive/cpreldoc.html; then search "Guideline on Ozone Monitoring Site Selection" click on pdf) (last viewed Apr. 1, 2015).)

SCAQMD has set its CEQA "significance" threshold for NO_x and VOC at 10 tons per year (expressed as 55 lb/day). (SCAQMD, *Air Quality Analysis Handbook*, http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook; then follow "SCAQMD Air Quality Significance Thresholds" hyperlink (last visited Apr. 1, 2015).) This is because the federal Clean Air Act defines a "major" stationary source for "extreme" ozone nonattainment areas such as SCAQMD as one emitting 10 tons/year. (42 U.S.C. §§ 7511a(e), 7511a(f); CAA §§ 182(e), 182(f).) Under the Clean Air Act, such sources are subject to enhanced control requirements (42 U.S.C. §§ 7502(c)(5), 7503; CAA §§ 172(c)(5), 173), so SCAQMD decided this was an appropriate threshold for making a CEQA "significance" finding and requiring feasible mitigation. Essentially, SCAQMD takes the position that a source that emits 10 tons/year of NO_x or VOC would contribute cumulatively to ozone formation. Therefore, lead agencies that use SCAQMD's thresholds of significance may determine that many projects have "significant" air quality impacts and must apply all feasible mitigation measures, yet will not be able to precisely correlate the project to quantifiable health impacts, unless the emissions are sufficiently high to use a regional modeling program.

In the case of particulate matter ($PM_{2.5}$)[8], another "criteria" pollutant, SCAQMD staff is aware of two possible methods of analysis. SCAQMD used regional modeling to predict expected health impacts from its proposed Rule 1315, as mentioned above. Also, the California Air Resources Board (CARB) has developed a methodology that can predict expected mortality (premature deaths) from large amounts of $PM_{2.5.}$ (California Air Resources Board, *Health Impacts Analysis: PM Premature Death Relationship*, http://www.arb.ca.gov/research/health/pm-mort/pm-mort_arch.htm (last reviewed Jan. 19, 2012).) SCAQMD used the CARB methodology to predict impacts from three very large power plants (e.g., 731-1837 lbs/day). (Final Environmental Assessment for Rule 1315, *supra*, pp 4.0-12, 4.1-13, 4.1-37 (e.g., 125 premature deaths in the entire SCAQMD in 2030), 4.1-39 (0.05 to 1.77 annual premature deaths from power plants.) Again, this project involved large amounts of additional $PM_{2.5}$ in the District, up to 2.82 tons/day (5,650 lbs/day of $PM_{2.5}$, or, or 1029 tons/year. (*Id.* at table 4.1-4, p. 4.1-10.)

However, the primary author of the CARB methodology has reported that this $PM_{2.5}$ health impact methodology is not suited for small projects and may yield unreliable results due to various uncertainties.[9] (SCAQMD, *Final Subsequent Mitigated Negative Declaration for: Warren*

[8] SCAQMD has not attained the latest annual or 24-hour national ambient air quality standards for "$PM_{2.5}$" or particulate matter less than 2.5 microns in diameter.

[9] Among these uncertainties are the representativeness of the population used in the methodology, and the specific source of PM and the corresponding health impacts. (*Id.* at p. 2-24.)

E&P, Inc. WTU Central Facility, New Equipment Project (certified July 19, 2011), http://www.aqmd.gov/home/library/documents-support-material/lead-agency-permit-projects/permit-project-documents---year-2011; then follow "Final Subsequent Mitigated Negative Declaration for Warren E&P Inc. WTU Central Facility, New Equipment Project" hyperlink, pp. 2-22, 2-23 (last visited Apr. 1, 2015).) Therefore, when SCAQMD prepared a CEQA document for the expansion of an existing oil production facility, with very small $PM_{2.5}$ increases (3.8 lb/day) and a very small affected population, staff elected not to use the CARB methodology for using estimated $PM_{2.5}$ emissions to derive a projected premature mortality number and explained why it would be inappropriate to do so. (*Id.* at pp 2-22 to 2-24.) SCAQMD staff concluded that use of this methodology for such a small source could result in unreliable findings and would not provide meaningful information. (*Id.* at pp. 2-23, 2-25.) This CEQA document was not challenged in court.

In the above case, while it may have been technically possible to plug the data into the methodology, the results would not have been reliable or meaningful. SCAQMD believes that an agency should not be required to perform analyses that do not produce reliable or meaningful results. This Court has already held that an agency may decline to use even the "normal" "existing conditions" CEQA baseline where to do so would be misleading or without informational value. (*Neighbors for Smart Rail v. Exposition Metro Line* (2013) 57 Cal.4th 439, 448, 457.) The same should be true for a decision that a particular study or analysis would not provide reliable or meaningful results.[10]

---

[10] Whether a particular study would result in "informational value" is a part of deciding whether it is "feasible." CEQA defines "feasible" as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and

Therefore, it is not possible to set a hard-and-fast rule on whether a correlation of air quality impacts with specific quantifiable health impacts is required in all cases. Instead, the result turns on whether such an analysis is reasonably feasible in the particular case.[11] Moreover, what is reasonably feasible may change over time as scientists and regulatory agencies continually seek to improve their ability to predict health impacts. For example, CARB staff has been directed by its Governing Board to reassess and improve the methodology for estimating premature deaths. (California Air Resources Board, *Health Impacts Analysis: PM Mortality Relationship*, http://www.arb.ca.gov/research/health/pm-mort/pm-mort.htm (last reviewed Dec. 29, 2010).) This factor also counsels against setting any hard-and-fast rule in this case.

III. THE QUESTION OF WHETHER AN EIR CONTAINS SUFFICIENT ANALYSIS TO MEET CEQA'S REQUIREMENTS IS A MIXED QUESTION OF FACT AND LAW GOVERNED BY TWO DIFFERENT STANDARDS OF REVIEW.

A. Standard of Review for Feasibility Determination and Sufficiency as an Informative Document

A second issue in this case is whether courts should review an EIR's informational sufficiency under the "substantial evidence" test as argued by Friant Ranch or the "independent judgment" test as argued by Sierra Club.

---

technological factors." (Pub. Resources Code § 21061.1.) A study cannot be "accomplished in a *successful* manner" if it produces unreliable or misleading results.

[11] In this case, the lead agency did not have an opportunity to determine whether the requested analysis was feasible because the comment was non-specific. Therefore, SCAQMD suggests that this Court, after resolving the legal issues in the case, direct the Court of Appeal to remand the case to the lead agency for a determination of whether the requested analysis is feasible. Because Fresno County, the lead agency, did not seek review in this Court, it seems likely that the County has concluded that at least some level of correlation of air pollution with health impacts is feasible.

As this Court has explained, "a reviewing court must adjust its scrutiny to the nature of the alleged defect, depending on whether the claim is predominantly one of improper procedure or a dispute over the facts." (*Vineyard Area Citizens v. City of Rancho Cordova, supra,* 40 Cal.4th at 435.) For questions regarding compliance with proper procedure or other legal questions, courts review an agency's action de novo under the "independent judgment" test. (*Id.*) On the other hand, courts review factual disputes only for substantial evidence, thereby "accord[ing] greater deference to the agency's substantive factual conclusions." (*Id.*)

Here, Friant Ranch and Sierra Club agree that the case involves the question of whether an EIR includes sufficient information regarding a project's impacts. However, they disagree on the proper standard of review for answering this question: Sierra Club contends that courts use the independent judgment standard to determine whether an EIR's analysis is sufficient to meet CEQA's informational purposes,[12] while Friant Ranch contends that the substantial evidence standard applies to this question.

///

///

///

///

///

///

///

///

///

---

[12] Sierra Club acknowledges that courts use the substantial evidence standard when reviewing predicate factual issues, but argues that courts ultimately decide as a matter of law what CEQA requires. (Answering Brief, pp. 14, 23.)

SCAQMD submits that the issue is more nuanced than either party contends. We submit that, whether a CEQA document includes sufficient analysis to satisfy CEQA's informational mandates is a mixed question of fact and law,[13] containing two levels of inquiry that should be judged by different standards.[14]

The state CEQA Guidelines set forth standards for the adequacy of environmental analysis. Guidelines Section 15151 states:

> An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection, but for adequacy, completeness, and a good-faith effort at full disclosure.

In this case, the basic question is whether the underlying analysis of air quality impacts made the EIR "sufficient" as an informative document. However, whether the EIR's analysis was sufficient is judged in light of what was reasonably feasible. This represents a mixed question of fact and law that is governed by two different standards of review.

---

[13] Friant Ranch actually states that the claim that an EIR lacks sufficient relevant information is, "most properly thought of as raising mixed questions of fact and law." (Opening Brief, p. 27.) However, the remainder of its argument claims that the court should apply the substantial evidence standard of review to all aspects of the issue.

[14] Mixed questions of fact and law issues may implicate predominantly factual subordinate questions that are reviewed under the substantial evidence test even though the ultimate question may be reviewed by the independent judgment test. *Crocker National Bank v. City and County of San Francisco* (1989) 49 Cal.3d 881, 888-889.

SCAQMD submits that an EIR's sufficiency as an informational document is ultimately a legal question that courts should determine using their independent judgment. This Court's language in *Laurel Heights I* supports this position. As this Court explained: "The court does not pass upon the correctness of the EIR's environmental conclusions, but only upon its *sufficiency as an informative document*." (*Laurel Heights I, supra,* 47 Cal.3d at 392-393) (emphasis added.) As described above, the Court in *Vineyard Area Citizens v. City of Rancho Cordova, supra,* 40 Cal.4th at 431, also used its independent judgment to determine what level of analysis CEQA requires for water supply impacts. The Court did not defer to the lead agency's opinion regarding the law's requirements; rather, it determined for itself what level of analysis was necessary to meet "[t]he law's informational demands." (*Id.* at p. 432.) Further, existing case law also holds that where an agency fails to comply with CEQA's information disclosure requirements, the agency has "failed to proceed in the manner required by law." (*Save Our Peninsula Comm. v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 118.)

However, whether an EIR satisfies CEQA's requirements depends in part on whether it was reasonably feasible for an agency to conduct additional or more thorough analysis. EIRs must contain "a detailed statement" of a project's impacts (Pub. Res. Code § 21061), and an agency must "use its best efforts to find out and disclose all that it reasonably can." (CEQA Guidelines § 15144.) Nevertheless, "the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible." (CEQA Guidelines § 15151.)

SCAQMD submits that the question of whether additional analysis or a particular study suggested by a commenter is "feasible" is generally a question of fact. Courts have already held that whether a particular alternative is "feasible" is reviewed by the substantial evidence test.

(*Uphold Our Heritage v. Town of Woodside* (2007) 147 Cal.App.4th 587, 598-99; *Center for Biological Diversity v. County of San Bernardino* (2010) 185 Cal.App.4th 866, 883.) Thus, if a lead agency determines that a particular study or analysis is infeasible, that decision should generally be judged by the substantial evidence standard. However, SCAQMD urges this Court to hold that lead agencies must explain the basis of any determination that a particular analysis is infeasible in the EIR itself. An EIR must discuss information, including issues related to the feasibility of particular analyses "in sufficient detail to enable meaningful participation and criticism by the public. '[W]hatever is required to be considered in an EIR must be in that formal report; what any official might have known from other writings or oral presentations cannot supply what is lacking in the report.'" (*Laurel Heights I*, *supra*, 47 Cal.3d at p. 405 (quoting *Santiago County Water District v. County of Orange* (1981) 118 Cal.App.3d 818, 831) (discussing analysis of alternatives).) The evidence on which the determination is based should also be summarized in the EIR itself, with appropriate citations to reference materials if necessary. Otherwise commenting agencies such as SCAQMD would be forced to guess where the lead agency's evidence might be located, thus thwarting effective public participation.

Moreover, if a lead agency determines that a particular study or analysis would not result in reliable or useful information and for that reason is not feasible, that determination should be judged by the substantial evidence test. (See *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority*, *supra*, 57 Cal.4th 439, 448, 457:

whether "existing conditions" baseline would be misleading or uninformative judged by substantial evidence standard.[15])

If the lead agency's determination that a particular analysis or study is not feasible is supported by substantial evidence, then the agency has not violated CEQA's information disclosure provisions, since it would be infeasible to provide additional information. This Court's decisions provide precedent for such a result. For example, this Court determined that the issue of whether the EIR should have included a more detailed discussion of future herbicide use was resolved because substantial evidence supported the agency's finding that "the precise parameters of future herbicide use could not be predicted." *Ebbetts Pass Forest Watch v. California Dept. of Forestry & Fire Protection* (2008) 43 Cal.4th 936, 955.

Of course, SCAQMD expects that courts will continue to hold lead agencies to their obligations to consult with, and not to ignore or misrepresent, the views of sister agencies having special expertise in the area of air quality. (*Berkeley Keep Jets Over the Bay v. Board of Port Commissioners* (2007) 91 Cal.App.4th 1344, 1364 n.11.) In some cases, information provided by such expert agencies may establish that the purported evidence relied on by the lead agency is not in fact "substantial". (*Id.* at pp. 1369-1371.)

In sum, courts retain ultimate responsibility to determine what CEQA requires. However, the law does not require exhaustive analysis, but only what is reasonably feasible. Agencies deserve deference for their factual determinations regarding what type of analysis is reasonably feasible. On the other hand, if a commenter requests more information, and the lead agency declines to provide it but does *not* determine that the

---

[15] The substantial evidence standard recognizes that the courts "have neither the resources nor the scientific expertise" to weigh conflicting evidence on technical issues. (*Laurel Heights I, supra,* 47 Cal.3d 376, 393.)

requested study or analysis would be infeasible, misleading or uninformative, the question becomes whether the omission of that analysis renders the EIR inadequate to satisfy CEQA's informational purposes. (*Id.* at pp. 1370-71.) Again, this is predominantly a question of law and should be judged by the de novo or independent judgment standard of review. Of course, this Court has recognized that a "project opponent or reviewing court can always imagine some additional study or analysis that might provide helpful information. It is not for them to design the EIR. That further study...might be helpful does not make it necessary." (*Laurel Heights I, supra,* 47 Cal.3d 376, 415 – see also CEQA Guidelines § 15204(a) [CEQA "does not require a lead agency to conduct every test. . . recommended or demanded by commenters."].) Courts, then, must adjudicate whether an omission of particular information renders an EIR inadequate to serve CEQA's informational purposes.[16]

[16] We recognize that there is case law stating that the substantial evidence standard applies to "challenges to the scope of an EIR's analysis of a topic" as well as the methodology used and the accuracy of the data relied on in the document "because these types of challenges involve factual questions." (*Bakersfield Citizens for Local Control v. City of Bakersfield, supra,* 124 Cal.App.4th 1184, 1198, and cases relied on therein.) However, we interpret this language to refer to situations where the question of the scope of the analysis really is factual—that is, where it involves whether further analysis is feasible, as discussed above. This interpretation is supported by the fact that the *Bakersfield* court expressly rejected an argument that a claimed "omission of information from the EIR should be treated as inquiries whether there is substantial evidence supporting the decision approving the project. " *Bakersfield, supra,* 124 Cal.App.4th at p. 1208. And the *Bakersfield* court ultimately decided that the lead agency must analyze the connection between the identified air pollution impacts and resulting health impacts, even though the EIR already included some discussion of air-pollution-related respiratory illnesses. *Bakersfield, supra,* 124 Cal.App.4th at p. 1220. Therefore, the court must not have interpreted this question as one of the "scope of the analysis" to be judged by the substantial evidence standard.

B. Friant Ranch's Rationale for Rejecting the Independent Judgment Standard of Review is Unsupported by Case Law.

In its brief, Friant Ranch makes a distinction between cases where a required CEQA topic is not discussed at all (to be reviewed by independent judgment as a failure to proceed in the manner required by law) and cases where a topic is discussed, but the commenter claims the information provided is insufficient (to be judged by the substantial evidence test). (Opening Brief, pp. 13-17.) The Court of Appeal recognized these two types of cases, but concluded that both raised questions of law. (*Sierra Club v. County of Fresno* (2014) 226 Cal.App.4th 704 (superseded by grant of review) 172 Cal.Rptr.3d 271, 290.) We believe the distinction drawn by Friant Ranch is unduly narrow, and inconsistent with cases which have concluded that CEQA documents are insufficient. In many instances, CEQA's requirements are stated broadly, and the courts must interpret the law to determine what level of analysis satisfies CEQA's mandate for providing meaningful information, even though the EIR discusses the issue to some extent.

For example, the CEQA Guidelines require discussion of the existing environmental baseline. In *County of Amador v. El Dorado County Water Agency* (1999) 76 Cal.App.4th 931, 954-955, the lead agency had discussed the environmental baseline by describing historic month-end water levels in the affected lakes. However, the court held that this was not an adequate baseline discussion because it failed to discuss the timing and amounts of past actual water releases, to allow comparison with the proposed project. The court evidently applied the independent judgment test to its decision, even though the agency discussed the issue to some extent.

Likewise, in *Vineyard Area Citizens* (2007) 40 Cal.4th 412, this Court addressed the question of whether an EIR's analysis of water supply impacts complied with CEQA. The parties agreed that the EIR was required to analyze the effects of providing water to the development project, "and that in order to do so the EIR had, in some manner, to identify the planned sources of that water." (*Vineyard Area Citizens, supra,* at p. 428.) However, the parties disagreed as to the level of detail required for this analysis and "what level of uncertainty regarding the availability of water supplies can be tolerated in an EIR . . . ." (*Id.*) In other words, the EIR had analyzed water supply impacts for the project, but the petitioner claimed that the analysis was insufficient.

This Court noted that neither CEQA's statutory language or the CEQA Guidelines specifically addressed the question of how precisely an EIR must discuss water supply impacts. (*Id.*) However, it explained that CEQA "states that '[w]hile foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can.'" (*Id.*, [Guidelines § 15144].) The Court used this general principle, along with prior precedent, to elucidate four "principles for analytical adequacy" that are necessary in order to satisfy "CEQA's informational purposes." (*Vineyard Area Citizens, supra,* at p. 430.) The Court did not defer to the agency's determination that the EIR's analysis of water supply impacts was sufficient. Rather, this Court used its independent judgment to determine for itself the level of analysis required to satisfy CEQA's fundamental purposes. (*Vineyard Area Citizens, supra*, at p. 441: an EIR does not serve its purposes where it neglects to explain likely sources of water and "… leaves long term water supply considerations to later stages of the project.")

Similarly, the CEQA Guidelines require an analysis of noise impacts of the project. (Appendix G, "Environmental Checklist Form."[17]) In *Gray v. County of Madera* (2008) 167 Cal.App.4th 1099, 1123, the court held that the lead agency's noise impact analysis was inadequate even though it had addressed the issue and concluded that the increase would not be noticeable. If the court had been using the substantial evidence standard, it likely would have upheld this discussion.

Therefore, we do not agree that the issue can be resolved on the basis suggested by Friant Ranch, which would apply the substantial evidence standard to *every* challenge to an analysis that addresses a required CEQA topic. This interpretation would subvert the courts' proper role in interpreting CEQA and determining what the law requires.

Nor do we agree that the Court of Appeal in this case violated CEQA's prohibition on courts interpreting its provisions "in a manner which imposes procedural or substantive requirements beyond those explicitly stated in this division or in the state guidelines." (Pub. Resources Code § 21083.1.) CEQA requires an EIR to describe *all* significant impacts of the project on the environment. (Pub. Resources Code § 21100(b)(2); *Vineyard Area Citizens, supra,* at p. 428.) Human beings are part of the environment, so CEQA requires EIRs to discuss a project's significant impacts on human health. However, except in certain particular circumstances,[18] neither the CEQA statute nor Guidelines specify the precise level of analysis that agencies must undertake to satisfy the law's requirements. (see, e.g., CEQA Guidelines § 15126.2(a) [EIRs must describe "health and safety problems caused by {a project's} physical changes"].) Accordingly, courts must interpret CEQA as a whole to

---

[17] Association of Environmental Professionals, 2015 CEQA Statute and Guidelines (2015) p.287.

[18] E.g., Pub. Resources Code § 21151.8(C)(3)(B)(iii) (requiring specific type of health risk analysis for siting schools).

determine whether a particular EIR is sufficient as an informational document. A court determining whether an EIR's discussion of human health impacts is legally sufficient does not constitute imposing a new substantive requirement.[19] Under Friant Ranch's theory, the above-referenced cases holding a CEQA analysis inadequate would have violated the law. This is not a reasonable interpretation.

IV. COURTS MUST SCRUPULOUSLY ENFORCE THE REQUIREMENTS THAT LEAD AGENCIES CONSULT WITH AND OBTAIN COMMENTS FROM AIR DISTRICTS

Courts must "scrupulously enforce" CEQA's legislatively mandated requirements. (*Vineyard Area Citizens, supra*, 40 Cal.4th 412, 435.) Case law has firmly established that lead agencies must consult with the relevant air pollution control district before conducting an initial study, and must provide the districts with notice of the intention to adopt a negative declaration (or EIR). (*Schenck v. County of Sonoma* (2011) 198 Cal.App.4th 949, 958.) As *Schenck* held, neither publishing the notice nor providing it to the State Clearinghouse was a sufficient substitute for sending notice directly to the air district. (*Id.*) Rather, courts "must be satisfied that [administrative] agencies have fully complied with the procedural requirements of CEQA, since only in this way can the important public purposes of CEQA be protected from subversion." *Schenck,* 198 Cal.App.4th at p. 959 (citations omitted).[20]

---

[19] We submit that Public Resources Code Section 21083.1 was intended to prevent courts from, for example, holding that an agency must analyze economic impacts of a project where there are no resulting environmental impacts (see CEQA Guidelines § 15131) , or imposing new procedural requirements, such as imposing additional public notice requirements not set forth in CEQA or the Guidelines.

[20] Lead agencies must consult air districts, as public agencies with jurisdiction by law over resources affected by the project, *before* releasing an EIR. (Pub. Resources Code §§ 21104(a); 21153.) Moreover, air

Lead agencies should be aware, therefore, that failure to properly seek and consider input from the relevant air district constitutes legal error which may jeopardize their project approvals. For example, the court in *Fall River Wild Trout Foundation v. County of Shasta,* (1999) 70 Cal.App.4th 482, 492 held that the failure to give notice to a trustee agency (Department of Fish and Game) was prejudicial error requiring reversal. The court explained that the lack of notice prevented the Department from providing any response to the CEQA document. (*Id.* at p. 492.) It therefore prevented relevant information from being presented to the lead agency, which was prejudicial error because it precluded informed decision-making. (*Id.*)[21]

---

districts should be considered "state agencies" for purposes of the requirement to consult with "trustee agencies" as set forth in Public Resources Code § 20180.3(a). This Court has long ago held that the districts are not mere "local agencies" whose regulations are superseded by those of a state agency regarding matters of statewide concern, but rather have concurrent jurisdiction over such issues. (*Orange County Air Pollution Control District v. Public Util. Com.* (1971) 4 Cal.3d 945, 951, 954.) Since air pollution is a matter of statewide concern, *Id* at 952, air districts should be entitled to trustee agency status in order to ensure that this vital concern is adequately protected during the CEQA process.

[21] In *Schenck,* the court concluded that failure to give notice to the air district was not prejudicial, but this was partly because the trial court had already corrected the error before the case arrived at the Court of Appeal. The trial court issued a writ of mandate requiring the lead agency to give notice to the air district. The air district responded by concurring with the lead agency that air impacts were not significant. (*Schenck,* 198 Cal.App.4th 949, 960.) We disagree with the *Schenck* court that the failure to give notice to the air district would not have been prejudicial (even in the absence of the trial court writ) merely because the lead agency purported to follow the air district's published CEQA guidelines for significance. (*Id.*, 198 Cal.App.4th at p. 960.) In the first place, absent notice to the air district, it is uncertain whether the lead agency properly followed those guidelines. Moreover, it is not realistic to expect that an air district's published guidelines would necessarily fully address all possible air-quality related issues that can arise with a CEQA project, or that those

Similarly, lead agencies must obtain additional information requested by expert agencies, including those with jurisdiction by law, if that information is necessary to determine a project's impacts. (*Sierra Club v. State Bd. Of Forestry* (1994) 7 Cal.4th 1215, 1236-37.) Approving a project without obtaining that information constitutes a failure to proceed in the manner prescribed by CEQA. (*Id.* at p. 1236.)

Moreover, a lead agency can save significant time and money by consulting with the air district early in the process. For example, the lead agency can learn what the air district recommends as an appropriate analysis on the facts of its case, including what kinds of health impacts analysis may be available, and what models are appropriate for use. This saves the lead agency from the need to do its analysis all over again and possibly needing to recirculate the document after errors are corrected, if new significant impacts are identified. (CEQA Guidelines § 15088.5(a).) At the same time, the air district's expert input can help the lead agency properly determine whether another commenter's request for additional analysis or studies is reasonable or feasible. Finally, the air district can provide input on what mitigation measures would be feasible and effective.

Therefore, we suggest that this Court provide guidance to lead agencies reminding them of the importance of consulting with the relevant air districts regarding these issues. Otherwise, their feasibility decisions may be vulnerable to air district evidence that establishes that there is no substantial evidence to support the lead agency decision not to provide specific analysis. (*See Berkeley Keep Jets Over the Bay*, *supra*, 91 Cal.App.4th 1344, 1369-1371.)

---

guidelines would necessarily be continually modified to reflect new developments. Therefore we believe that, had the trial court not already ordered the lead agency to obtain the air district's views, the failure to give notice would have been prejudicial, as in *Fall River, supra,* 70 Cal.App.4th 482, 492.

CONCLUSION

The SCAQMD respectfully requests this Court *not* to establish a hard-and-fast rule concerning whether CEQA requires a lead agency to correlate identified air quality impacts of a project with resulting health outcomes. Moreover, the question of whether an EIR is "sufficient as an informational document" is a mixed question of fact and law containing two levels of inquiry. Whether a particular proposed analysis is feasible is predominantly a question of fact to be judged by the substantial evidence standard of review. Where the requested analysis is feasible, but the lead agency relies on legal or policy reasons not to provide it, the question of whether the EIR is nevertheless sufficient as an informational document is predominantly a question of law to be judged by the independent judgment standard of review.

Respectfully submitted,

DATED: April 3, 2015

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
KURT R. WIESE, GENERAL COUNSEL
BARBARA BAIRD, CHIEF DEPUTY COUNSEL

By: Barbara Baird

Barbara Baird
Attorneys for Amicus Curiae
SOUTH COAST AIR QUALITY MANAGEMENT DISTICT

CERTIFICATE OF WORD COUNT

Pursuant to Rule 8.520(c)(1) of the California Rules of Court, I hereby certify that this brief contains 8,476 words, including footnotes, but excluding the Application, Table of Contents, Table of Authorities, Certificate of Service, this Certificate of Word Count, and signature blocks. I have relied on the word count of the Microsoft Word Vista program used to prepare this Certificate.

DATED: April 3, 2015 Respectfully submitted,

Barbara Baird

Barbara Baird

PROOF OF SERVICE

I am employed in the County of Los Angeles, California. I am over the age of 18 years and not a party to the within action. My business address is 21865 Copley Drive, Diamond Bar, California 91765.

On April 3, 2015 I served true copies of the following document(s) described as **APPLICATION OF THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT FOR LEAVE TO FILE BRIEF OF *AMICUS CURIAE* IN SUPPORT OF NEITHER PARTY AND *[PROPOSED]* BRIEF OF *AMICUS CURIAE*** by placing a true copy of the foregoing document(s) in a sealed envelope addressed as set forth on the attached service list as follows:

BY MAIL: I enclosed the document(s) in a sealed envelope or package addressed to the persons at the addresses listed in the Service List and placed the envelope for collection and mailing following our ordinary business practices. I am readily familiar with this District's practice for collection and processing of correspondence for mailing. Under that practice, the correspondence would be deposited with the United States Postal Service, with postage thereon fully prepaid at Diamond Bar, California, in the ordinary course of business. I am aware that on motion of the party served, service is presumed invalid if postal cancellation date or postage meter date is more than one day after date of deposit for mailing in affidavit.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on April 3, 2015 at Diamond Bar, California.

Patricia Anderson

SERVICE LIST

James G. Moose, Tiffany K. Wright, Laura M. Harris REMY MOOSE MANLEY, LLP 555 Capitol Mall, Suite 800 Sacramento, CA 95814	Attorneys for Real Party in Interest and Respondent *Friant Ranch, L.P.*
Bryan N. Wagner WAGNER & WAGNER 7110 N. Fresno St, Suite 340 Fresno, CA 93720	Attorney for Real Party in Interest and Respondent *Friant Ranch, L.P.*
Sara Hedgpeth-Harris LAW OFFICE OF SARA HEDGPETH-HARRIS 5445 E. Lane Avenue Fresno, CA 93727	Attorney for Plaintiffs and Appellants *Sierra Club, et al*
Daniel C. Cederborg Bruce B. Johnson, Jr. Zachary Stephen Redmond OFFICE OF THE FRESNO COUNTY COUNSEL 2220 Tulare Street, Suite 500 Fresno, CA 93721	Attorneys for Respondents *County of Fresno*
Clerk of the Court California Court of Appeal Fifth Appellate District 2424 Ventura Street Fresno, CA 93721 *(via U.S. Mail & Electronic Transmission)*	
Clerk of the Court Superior Court of California County of Fresno 1130 O Street Fresno, CA 93721	

This page intentionally left blank

Appendix B: Biological Resource Assessment for Murrieta Canyon Academy

Memorandum

Date: November 1, 2019

To: Lori Noorigian, Murrieta Valley Unified School District

From: Brianna Bernard, Carlson Strategic Land Solutions

Subject: Biological Resource Assessment for Murrieta Canyon Academy in the City of Murrieta

Murrieta Valley Unified School District (MVUSD) requested Carlson Strategic Land Solutions (CSLS) prepare a Technical Memo and graphics documenting the finding of a field review for potential sensitive plants and wildlife for the Murrieta Canyon Academy (Project) located in the City of Murrieta, California. In support of Project efforts, CSLS biologist, Brianna Bernard, conducted an analysis of the biological resources observed onsite and on October 2, 2019 and described in further detail below.

1.0 Project Location

The Project Site is located at 24150 Hayes Avenue, Murrieta, California (Figure 1). The Project site is located north of Hayes and west of Fullerton Road (Figure 2). The Project Site is located within the United States Geological Survey (USGS) 7.5-Minute Topographic Map *Murrieta* Quadrangle.

Areas surrounding the Project Site include residential to the east and south; Thompson Middle School soccer field and Thompson Middle School to the west; and Murrieta Valley High School to the north (Figure 2). The Project site is a portion of the Assessor's Parcel Numbers (APN) 904-050-047.

2.0 Project Description

MVUSD proposes to expand the existing Murrieta Canyon Academy (Project). The Murrieta Canyon Academy is an alternative high school which provides independent study and alternative high school and adult education. The Project expansion will allow MCA to increase current capacity from 200 students to 500 students.

The existing Murrieta Canyon Academy buildings are to be demolished and new buildings, parking, and landscape is to be constructed. The Project proposes buildings that are generally located within the existing softball fields located immediately north of the existing campus and south of the adjacent Thompson Middle School. Currently, the campus is a closed campus with a chain link fence surrounding the site. Access to all portions is via a locked gate along the south side of the campus.

The Project will generally include the design of a new campus with approximately 33,000 square-feet total footprint, associated parking lot, and other site improvements. More specifically, the new campus will include construction of a laboratory and classroom building, student pavilion, administration office, various academic and activity courts with additional parking and landscape at the existing campus. The proposed buildings will contain various classrooms, a library, restrooms, and storage rooms. The proposed buildings are expected to be single-story structures.

3.0 Methodology

3.1 Biological Survey

Prior to the field survey, available literature, historical aerials, and databases were reviewed regarding sensitive habitats, special status plants, and wildlife species within the vicinity. CSLS reviewed and consulted literature and databases focused on Riverside County, California, including the California Natural Diversity Database (CNDDB), California Native Plan Society (CNPS), and the U.S. Fish and Wildlife Service (USFWS) Critical Habitat database. The CNDDB is a California Department of Fish and Wildlife (CDFW) species account database that inventories status and locations of rare plants and wildlife in California (Figure 3). The CNDDB was used to identify any sensitive plant communities and special status plants and wildlife that have potential to occur within the Project site.

The CNPS inventory provides information and range for sensitive plant species within a specific or general area.

The USFWS's online service for information regarding Final Critical Habitat designation within California was reviewed to determine if the Study Area is within any species' designated Critical Habitat.

3.2 Jurisdictional Waters

The Project site was assessed for jurisdictional Waters of the United States (U.S.) and Waters of the State. To determine the presence of a wetland, three indicators are required: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. The methodology published in the *U.S. Army Corps of Engineers 1987 Wetland Delineation Manual* and the *Arid West Supplement* sets the standards for meeting each of the three indicators, which normally require that 50 percent or more dominant plant species typical of a wetland, soils exhibiting characteristics of saturation, and hydrological indicators be present.

Additionally, jurisdiction over non-wetland Waters of the U.S. is typically determined through the observation of an Ordinary High Water Mark (OHWM), which is defined as the "line on the shore established by the fluctuation of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas." Projects with impacts to Waters of the U.S. are regulated under Sections 401 and 404 of the Clean Water Act.

Waters of the State are regulated by the California Department of Fish and Wildlife (CDFW) through Section 1600 et seq. of the California Fish and Game Code. The limits of Waters of the State are defined as the "body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation." Therefore, the limits extend from the channel bed to the top of the bank, with the addition of the canopy of any riparian habitat associated with the watercourse.

3.3 MSHCP Assessment

The Property Boundary is located within the MSHCP, specifically within the Lake Elsinore Area Plan. The MSHCP is a comprehensive plan that includes portions of the County of Riverside and numerous cities. The MSHCP plans for conservation of 146 species and proposes a reserve system of approximately 500,000 acres. The MSHCP is intended to contribute to the economic viability of the County of Riverside by providing landowners, developers, and public infrastructure projects a streamlined regulatory process. While Murrieta Valley Unified School District is not a signatory to the MSHCP Agreement, the Project was analyzed to confirm no MSHCP features or overlays occurred on the Project.

4.0 Results

4.1 Biological Results

CSLS Biologist conducted a general biological survey within the Project site and surrounding 300-foot buffer on October 2, 2019. The survey was performed between 4:00 p.m. and 5:00 p.m. The temperature was 83° F during the field survey, with clear skies.

The Project site contains a manicured baseball field, buildings, hardscape, parking lot, and associated infrastructure.

Wildlife species observed onsite during the survey include: turkey vulture (*Cathartes aura*), American crow (*Corvus brachyrhynchos*), black phoebe (*Sayornis nigricans*), mourning dove (*Zenaida macroura*), and song sparrow (*Melospiza melodia*).

Representative photographs of the Project site were taken and included within Attachment A.

4.1.1 Vegetation Communities

Based on the field survey, the Project site is minimally vegetated, with ornamental species adjacent to the parking lot and turf within the baseball field. The Project site contains developed areas in the form of buildings, parking lot, and hardscape courtyard (Figure 4).

Table 1. Vegetation within the Project Site

Vegetation Community	Acreage
Ornamental	2.82
Developed	2.89
Total	**5.71**

Ornamental
This community includes maintained landscaped areas. The ornamental vegetation is non-native, and some of it is considered invasive. The ornamental habitat type includes shade trees, such as Peruvian pepper tree (*Schinus molle*), Brazilian pepper (*Schinus terebinthifolius*), and turf associated with the ball field, primarily Kentucky bluegrass (*Poa pratensis*).

Developed
This community consists of area developed with structures, asphalt, and concrete. These areas consist of built materials and are frequently maintained.

4.1.2 Special Status Plant and Wildlife Species

The Project does not contain any suitable habitat for special status plants or wildlife. Furthermore, no CNDDB occurrences fall within the Project Boundary (Figure 3). The vegetation communities observed onsite are not identified as special status habitats by CDFW or CNDDB; further, the communities observed onsite do not constitute as habitats for special status plants as identified in CNPS.

4.1.3 Critical Habitat

No critical habitat was mapped onsite (Figure 3).

4.1.4 Nesting Bird Species

Since the Project site contains suitable habitat for nesting and foraging bird species in the form of ornamental trees, if work is to be done during the typical avian breeding season (Feb. 15 - Aug. 15), a qualified biologist shall conduct a nesting bird survey to identify any potential nesting activity within 5 days before start of construction.

If active nests are observed, the location shall be clearly marked (with flagging) a distance of 100-feet surrounding the nest and designated as a "no-work buffer". No work shall occur within the buffer until the nest becomes inactive and the nestlings fledged (as confirmed by a qualified biologist). Encroachment of construction may be permitted at the discretion of a biological monitor.

4.2 Jurisdictional Waters

The Project site does not contain any waters that meet the definition of Waters of the United States or Waters of the State as stated above.

4.3 MSHCP Assessment

The Project site is not located within any MSHCP Criteria Areas, Cell Groups, or Subunits. The Project site is not located in special status survey areas for Amphibians, Mammals, Special Linkage, or special status overlay areas. Furthermore, the Project site is developed with buildings, hardscape, a parking lot, and a turf field. The MVUSD is not a permittee or a signatory participant of the MSHCP.

5.0 Summary

The Project site does not contain sensitive habitat or suitable habitat for sensitive species. No jurisdictional features are present onsite. Pursuant to the Migratory Bird Treaty Act, should vegetation be removed during active nesting season (February 15 to August 15) a qualified biologist should conduct a pre-construction nesting bird survey due to the ornamental tree species onsite.

Please contact me at bbernard@carlsonsls.com or 949.542.7042, should you have any questions or comments.

Brianna Bernard
Project Manager

Enclosures:

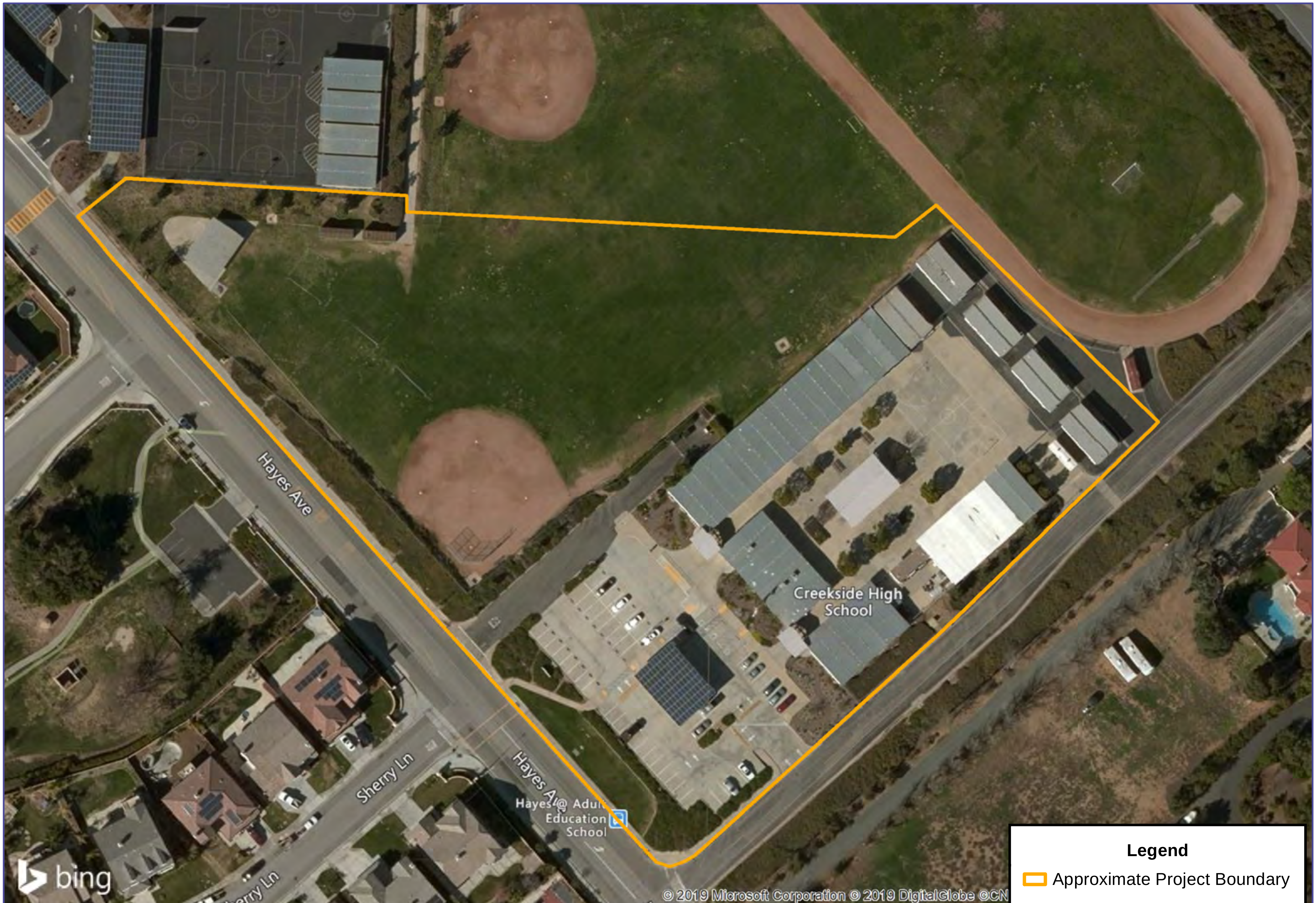
- Figures:
  - Figure 1: Regional Location
  - Figure 2: Project Site Location Map
  - Figure 3: CNDDB Occurrences and Critical Habitat Results
  - Figure 4: Vegetation Mapping
- Attachment A: Representative Photographs

c:\users\bbern\carlson sls dropbox\projects\mvusd\mca\technical studies\biology\2019-11-01 bio memo_mca.docx

Figures

GIS Prepared By: Carlson SLS Created: October 2, 2019	0 1,250 2,500 5,000 Feet 1 inch = 5,000 feet	Data Sources: Bing Maps	***Murrieta Unified School District: Murrieta Canyon Academy*** Regional Map

FIGURE 1



GIS Prepared By:
Carlson SLS

Created: October 1, 2019

0 12.5 25 50 75 100 125 150 Feet
1 inch = 100 feet

Data Source: Bing Maps

Murrieta Unified School District: Murrieta Canyon Academy

Project Site Location

FIGURE 2

GIS Prepared By:
Carlson SLS

Created: October 2, 2019

0 1,500 3,000 6,000 Feet

1 inch = 3,000 feet

Data Source: Bing Maps
CNDDB (09/2019)

Murrieta Unified School District: Murrieta Canyon Academy

CNDDB Occurrences and Critical Habitat Results

FIGURE 3

GIS Prepared By: Carlson SLS Created: October 1, 2019	0 12.5 25 50 75 100 125 150 Feet 1 inch = 100 feet	Data Source: Bing Maps Field Visit 10/02/19	***Murrieta Unified School District: Murrieta Canyon Academy*** Vegetation Mapping

FIGURE 4

APPENDIX A

Representative Photographs

The Project site is currently developed as Murrieta Canyon Academy (MCA).

Adjacent to the classroom buildings is a large maintained baseball field.

Large baseball field adjacent to MCA.

MCA is a closed campus with fencing along the perimeter.

A shade structure and large roll-off bins are found on the north east side of the Project site.

Ornamental landscape areas adjacent to parking.

Ornamental landscaped areas adjacent to the sidewalk.

Hardscaped inner courtyard with ornamental trees.

Appendix C: Cultural/Paleontological Resource Survey for Murrieta Canyon Academy

DUKE CRM

18 Technology Drive, Ste. 103
Irvine, California 92618
949-356-6660
www.dukecrm.com

October 18, 2019

Peter K. Carlson
Carlson Strategic Land Solutions
27134A Paseo Espada, Suite 323
San Juan Capistrano, CA 92675

Subject: Cultural/Paleontological Resource Survey for the Murrieta Canyon Academy Project, City of Murrieta, County of Riverside, California

Dear Mr. Carlson:

At the request of Carlson Strategic Land Solutions, Duke Cultural Resources Management, LLC (DUKE CRM) has conducted a cultural and paleontological assessment of the Murrieta Canyon Academy Project (Project), located in the City of Murrieta, Riverside County, California. Murrieta Valley Unified School District (MVUSD) proposes to expand the existing Murrieta Canyon Academy (MCA). The Project is approximately 5 acres. It is subject to the California Environmental Quality Act (CEQA) and the MVUSD is the lead agency for CEQA. Consistent with standard practices for California DUKE CRM conducted cultural and paleontological records searches, conducted a field survey of the Project boundaries, and prepared this report.

The Project will allow MCA to increase current capacity from 200 students to 500 students. The proposed expanded MCA buildings are generally located within the existing softball fields located immediately north of the existing campus and south of the adjacent Thompson Middle School. The existing MCA buildings are to be demolished and new parking/landscape to be constructed. The proposed Project will generally include the design of a new campus with approximately 33,000 square-feet footprint total and associated parking lot, and other site improvements. More specifically, the new campus will include construction of a single-story laboratory and classroom building, student pavilion, administration office, various academic and activity courts with additional parking and landscape at the existing campus. The proposed buildings will contain various classrooms, a library, restrooms, and storage rooms. The Project is located at the center of Section 18, Township 7 South, Range 3 West, and is depicted on the USGS *Murrieta* 7.5' quadrangle (Attachment 1 – Project Location). The Project is located on the existing MCA at 24150 Hayes Avenue, which is bound to south by Hayes Avenue, to the east by a housing development, to the north by Murrieta High School, and to the west by Thompson Middle School (Attachment 1 – Project Aerial).

BACKGROUND

The Project is situated in the northwestern portion of the northwest trending Peninsular Ranges geomorphic province. This province is distinguished by northwest-trending mountain ranges and valleys following faults branching from the San Andreas Fault. The Peninsular Ranges are bound to the east by the Colorado Desert and west into the submarine continental shelf, and they extend north to the San Bernardino – Riverside county line and south to the California state line (Norris and Webb 1976). The project is within the Elsinore Trough, a valley that is formed by vertical movement along faults associated with the San Andreas Fault system (Engle 1959; Springer, et al.

2009). Throughout the Elsinore Trough, valley sediment can exceed 2,000 feet in depth (Mann 1955). Locally, the sediments consist of fluvial deposits from the Pliocene (5.3 to 2.5 million years ago) and Pleistocene (2.5 million years ago to 11,700 years ago) Epochs that have been dissected and partially covered by subsequent fluvial deposits from the Holocene Epoch (11,700 years ago to today) (Pajak, et al. 1996). These deposits consist of Pleistocene- to Holocene-age fluvial deposits (*Qyv*) on valley floors, locally dominated by sand in the southeastern half of the Project and a sandstone member of Pauba Formation (*Qpfs*) which is composed of Pleistocene-age, cross-bedded sandstone with sparse cobble- to boulder-conglomerate beds in the northwestern half (Kennedy and Morton 2003, Attachment 1 - Project Geology).

The Project is located within the ethnographic territory of the Luiseño. The Luiseño are Takic speakers and are descended from Late Prehistoric populations of the region (Bean and Smith 1978, Shipley 1978). The Luiseño lived in sedentary and independent village groups, each with specific subsistence territories encompassing hunting, food gathering, and fishing areas. Villages were usually located in valley basins, along creeks and streams adjacent to mountain ranges where water was available. Most inland populations had access to fishing and food gathering sites on the coast though economic and subsistence practices centered upon the seasonal gathering of acorns and seeds; the hunting of deer and small mammals (Basgall 1987; Bean and Shipek 1978; Johnson and Earle 1987; Lovin 1963; White 1963)

A geoarchaeological sensitivity evaluation was undertaken for buried prehistoric and historic sites along the Murrieta Creek, within approximately 500 feet southwest of the current Project in 2006 (Onken et al. 2006). In it, the area of study directly southwest of the Project was high sensitivity, due to the potential of accumulated fluvial sediment (*Qyv*) and possible water ponding. However, the study also determined that landforms directly underlain by deposits of the Pauba Formation (*Qpfs*) had a much lower sensitivity, as the age of the sediments are older than the evidence of human occupation of California. In addition, the area was farmed for much of the 20th century. As a result of the geoarchaeological analysis from nearby areas, the Pauba Formation sandstone member (*Qpfs*) in the Project has a low potential to contain cultural material such as prehistoric archaeological sites due to its age. Similarly, the young alluvial valley deposits (*Qyv*) within the Project also have a low potential due to disturbance associated with farming and construction of the existing school.

RECORD SEARCH RESULTS

The cultural resource records search was conducted at the Eastern Information Center (EIC) of the California Historical Resources Information System (CHRIS) located at the University of California, Riverside on October 1, 2019, by Alexandria Bulato, B.A, Archaeologist. In addition, the California State Historic Property Data File (HPDF) was examined which includes the National Register of Historic Places (NRHP), California Register of Historic Resources (CRHR), the California Historic Landmarks (CHL), and the California Points of Historical Interest (CPHI).

The cultural resource records search identified sixteen cultural resources and sixty-two previous cultural resources studies within one mile of the Project. Four studies included or were directly adjacent to the Project (see Table 1). Of these, two were medium size study areas (10-50 acres) that surveyed a small portion of the site (McKenna et al. 2004; Keller 1987) and two were large study areas (>50 acres) that surveyed the entire Project area (Brown 1978; Salpas 1984). One Hundred percent of the Project area has been surveyed for cultural resources. Eight of the resources are prehistoric isolates, six are prehistoric archaeological sites, one is a historic archaeological site, and one is a multicomponent prehistoric/historic archaeological site (see Table 2). No cultural resources were mapped within the Project.

Table 1- Reports within the Project

Report No.	Year	Author	Title
RI-00340	1978	M.A. Brown	Joaquin Ranch: Archaeological Survey Addendum Report
RI-00346	1984	Jean A. Salpas	Mitigation of Archaeological Sites on Tract 14836 and Tract 14889 Arco Development/Joaquin Ranch
RI-02115	1987	Keller, Jean Salpas	An Archaeological Assessment of Parcel 22170, Riverside County, California
RI-05028	2004	McKenna et al.	Historic Property Survey Report: Architectural Evaluation of the Sykes Ranch Residential Complex in Murrieta, Riverside County, California

Table 2-Cultural Resources within 1-Mile of the Project

Primary / Trinomial	Resource Type	Resource Description	Direction, Distance (mi)
P-33-001299/ CA-RIV-1299	Prehistoric Isolate	One scraper of unidentified material	S, 0.8
P-33-001301/ CA-RIV-1301	Prehistoric Site	Habitation site with several artifacts	SW, 0.6
P-33-001305/ CA-RIV-1305	Prehistoric/Historic Site	Multicomponent site – prehistoric habitation site consisting of multiple artifacts, historic refuse scatter	S, 0.4
P-33-001312/ CA-RIV-1312	Prehistoric Site	Sparse lithic artifact scatter	W, 0.5
P-33-013504	Historic Site	Historic site consisting of two concrete structures and farm equipment	W, 0.2
P-33-013505	Prehistoric Isolate	One quartz flake	NE, 0.2
P-33-013506	Prehistoric Isolate	One chert flake	SW, 0.6
P-33-013507	Prehistoric Isolate	One basalt core	SW, 0.6
P-33-013508	Prehistoric Isolate	Two quartz flakes	SW, 0.8
P-33-013509	Prehistoric Isolate	One metamorphic scraper	SW, 1.0
P-33-013510	Prehistoric Isolate	One andesite flake	S, 0.6
P-33-013512	Prehistoric Isolate	Two flakes and one scraper	W, 0.7
P-33-013748	Prehistoric Isolate	One andesite bifacial mano	NW, 0.5
P-33-015206	Prehistoric Isolate	Three ground stone artifacts and one flaked stone artifact	SE, 0.6
P-33-015207	Prehistoric Isolate	One unifacial basalt mano	SE, 0.9
P-33-017048	Prehistoric Isolate	Three granitic metate fragments	W, 0.15

On October 1, 2019 the Western Science Center performed a paleontological records search to locate fossil localities within, and in the vicinity of, the Project (Attachment 2 – Paleontological Records Search Results). Mr. Benjamin Scherzer, M.S., Paleontologist, also performed a search of the online University of California Museum of Paleontology collections, San Diego Natural History Museum collections, Paleobiology Database, and FAUNMAP, and other published literature for nearby fossil localities in similar deposits (within 3 miles). These searches produced multiple fossil localities, all occurring in the Pauba Formation:

- The Principe Project produced material from Pacific Mastodon, horse, pronghorn, Giant ground sloth (*Megalonyx* sp.), and others in four separate localities between 0.25 and 1 mile north of the Project;
- The Village Walk Project produced material from Pacific Mastodon, horse, turtle, and others in four separate localities 1 miles northeast of the Project;
- Copper Creek #1 and #2 produced mammoth and camelid material at an unknown depth in the Pauba Formation 1.5 miles north of the Project (Dooley, et al. 2019);
- Copper Canyon (200320) produced mastodon material at an unknown depth 1.5 miles southwest of the Project;
- Meadowlane produced horse material at an unknown depth in the Pauba Formation 1.75 miles southeast of the Project;
- California Oaks produced material from mammoth, mastodon, horse, sloth, camelid, deer, pronghorn, peccary, canid, feline, bat, weasel, porcupine, rabbit, rodent, shrew, mole, bird, turtle, lizard, snake, fish, and mollusc at an unknown depth 2.5 miles northeast of the Project (Pajak, et al. 1996) and;
- USGS M1476 produced mastodon and rodent material at an unknown depth 3 miles southeast of the Project (Repenning 1987).

Due to the numerous nearby fossil localities in Pleistocene-age deposits, the Pauba Formation sandstone member (*Qpfs*) in the Project is assigned a high paleontological sensitivity. Holocene-age deposits are too young to have accumulated or preserved enough biologic material to contain fossil resources, and are assigned a low paleontological sensitivity as a result. However, Holocene-age deposits can transition at depth into older, Pleistocene-age deposits with a high paleontological sensitivity. As a result, the Holocene-age young alluvial valley deposits (*Qyv*) in the Project are assigned a high sensitivity with depth. These findings are consistent with the General Plan for the City of Murrieta (2011).

SURVEY METHODS AND RESULTS

A combination of systematic pedestrian and reconnaissance level field survey of the Project area was conducted October 15, 2019, by cross-trained Archaeologist/Paleontologist Nicholas F. Hearth M.A., RPA. Pedestrian transects were 15 meters apart. Reconnaissance level survey was undertaken in areas of asphalt, concrete, and dense landscaping vegetation. Regardless of ground cover, the Project area was heavily disturbed by modern development. The project area is located within school buildings, baseball fields, parking lots and hardscape (Attachment 3 – Project Photographs). No new archaeological or paleontological resources were discovered during the field survey. Due to extant modern development consisting of the extant landscaping, hardscaping, buildings and utilities, the Project has low sensitivity for cultural resources such as prehistoric and historic archaeological sites.

CONCLUSION AND RECOMMENDATIONS

Our research indicates that there is a low sensitivity for cultural resources in the Project. In contrast, this research indicates a high sensitivity for paleontological resources in the deposits that underlie the northwestern half of the Project. Therefore, significant and unique paleontological resources may be impacted by the project during earth disturbing activities in this area. These impacts would be considered potentially significant. In order to reduce the potential for impacts to paleontological resources to a level that is less than significant under CEQA, paleontological monitoring is recommended during ground disturbance associated with the northwestern half of the Project.

We recommend that a paleontological monitor be present to observe ground disturbing activities in the northwestern half of the Project. The paleontological monitor shall work under the direct supervision of a qualified paleontologist (B.S. /B.A. in geology, or related discipline with an emphasis in paleontology and demonstrated experience and competence in paleontological research, fieldwork, reporting, and curation).

1. The qualified paleontologist shall be on-site at the pre-construction meeting to discuss monitoring protocols.
2. Paleontological monitoring shall start at full-time. If no paleontological resources are discovered after half of the ground disturbance has occurred, monitoring can be reduced to part-time or spot-checking.
3. The paleontological monitor shall be empowered to temporarily halt or redirect grading efforts if paleontological resources are discovered.
4. In the event of a paleontological discovery the paleontological monitor shall flag the area and notify the construction crew immediately. No further disturbance in the flagged area shall occur until the qualified paleontologist has cleared the area.
5. In consultation with the qualified paleontologist the paleontological monitor shall quickly assess the nature and significance of the find. If the specimen is not significant it shall be quickly removed and the area cleared.
6. If the discovery is significant the qualified paleontologist shall notify the MVUSD immediately.
7. In consultation with MVUSD, the qualified paleontologist shall develop a plan of mitigation which will likely include salvage excavation and removal of the find, removal of sediment from around the specimen (in the laboratory), research to identify and categorize the find, curation of the find in a local qualified repository, and preparation of a report summarizing the find.

If archaeological resources are discovered during ground disturbance MVUSD shall retain a qualified archaeologist to assess the nature and significance of the find.

If human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC. The MLD may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials. In addition, according to the California Health and Safety Code, six or more human burials at one location constitute a cemetery (Section 8100), and unauthorized disturbance of Native American cemeteries is a felony (Section 7052).

If the proposed project changes, additional survey efforts may be necessary.

If you have any questions or comments, you can contact me at (949) 303-0420 or by e-mail at curt@dukecrm.com.

Sincerely,

DUKE CULTURAL RESOURCES MANAGEMENT, LLC

Curt Duke, M.A., RPA
President/Archaeologist

Attachments:
1 - Project Maps
2 - Paleontological Records Search Results
3 - Project Photographs

REFERENCES CITED

Basgall, Mark E.

1987 Resource Intensification Among Hunter-Gathers: Acorn Economies in Prehistoric Southern California. *Research in Economics Anthropology* 9:21-52.

Bean, Lowell J. and Florence C. Shipek

1978 Luiseño. In *California,* edited by Robert F. Heizer, pp.550-563. Handbook of North American Indians, Volume 8, William C Sturtevant, general editor, Smithsonian Institution, Washington, DC.

City of Murrieta

2011 Final EIR of the Murrieta General Plan 2035, section 5.9 on Cultural Resources. Electronic Document. www.murrietaca.gov/civicax/filebank/blobdload.aspx?BlobID=5212, accessed September 23, 2019.

Dooley, Alton C., Eric Scott, Jeremy Green, Kathleen B. Springer, Brett S. Booley, and Gregory James Smith.

2019 *Mammut pacificus* sp. nov., a newly recognized species of mastodon from the Pleistocene of western North America. *PeerJ* 7:e6614.

Engle, R.

1959 Geology and Mineral Deposits of the Lake Elsinore Quadrangle. *California Department of Natural Resources, Bulletin 146, Division of Mines, San Francisco*: 1-58.

Johnson, Allen W. and Timothy Earle

1987 *The Evolution of Human Societies: From Foraging Group to Agrarian State*. Stanford University Press, Stanford.

Kennedy, M.P. and D.M. Morton

2003 *Preliminary Geologic Map of the Murrieta 7.5' Quadrangle, Riverside County, California*. 1:24,000, U.S. Geological Survey Open-File Report 03-189.

Lovin, June

1963 A Summary Description of Luiseño Material Culture. In *Archaeological Survey Annual Report 1962-1963*,pp. 81-130. University of California, Los Angeles.

Mann, J.F., Jr.

1955 Geology of a Portion of the Elsinore Fault Zone, California (Special Report 43). *California Division of Mines; October, 1955,Open-file Report 92-10*: 1–22.

Norris, Robert M., and Robert W. Webb

1976 Geology of California, second edition: New York, John Wiley & Sons, p. 277-300.

Onken, Jill, Kerry D. Cato, and Anne Q. Stoll

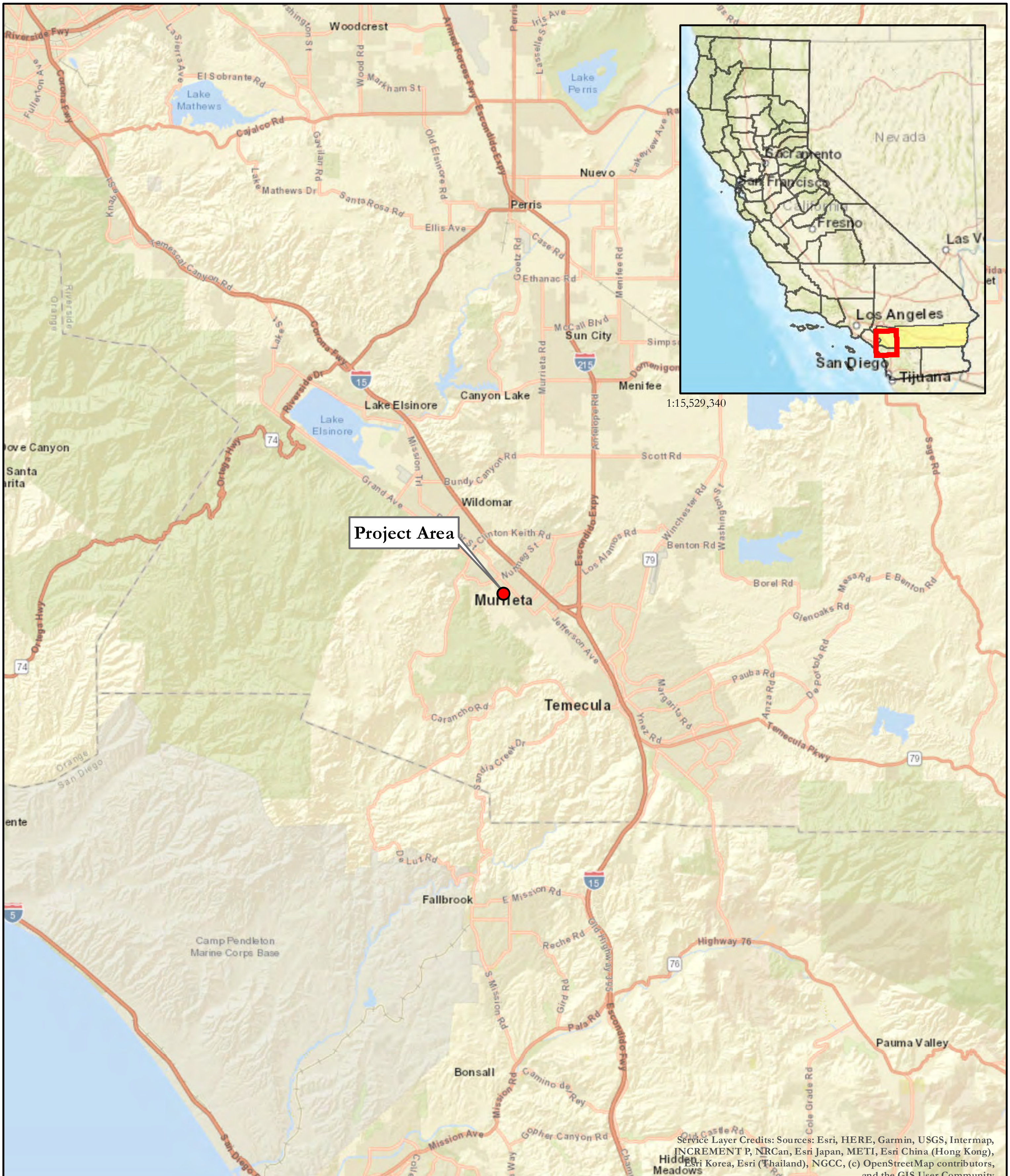
2006 *Geoarchaeological Evaluation for the Murrieta Creek Flood Control and Ecosystem Restoration Project, Riverside County, California*. Submitted to the U.S. Army Corps of Engineers, Los Angeles District, Contract No. DACW09-03-D-005, Task Order 8.

Pajak, Alois F., III, Eric Scott, and Christopher J. Bell
1996 A review of the biostratigraphy of Pliocene and Pleistocene sediments in the Elsinore Fault Zone, Riverside County, California. *PaleoBios* 17(2-4): 28-49.

Repenning, Charles .A.
1987 Biochronology of the microtine rodents of the United States. In *Cenozoic mammals of North America*, edited by Michael O. Woodburne, pp. 236 – 268. , University of California Press, Berkeley.

Springer, Kathleen B., Eric ScottJ. Christopher Sagebiel, and Lyndon K. Murray
2009 The Diamond Valley Lake local fauna: late Pleistocene vertebrates from inland southern California. In *Papers on Geology, Vertebrate Paleontology and Biostratigraphy in Honor of Michael O. Woodburne*, edited by Larry B. Albright III: 217–235. Museum of Northern Arizona Bulletin 65.

White, Raymond C.
1963 Luiseño Social Organization. *University of California Publications in American Archaeology and Ethnology* 48(2):91–194.



Map 1- Project Vicinity

Murrieta Canyon Academy Project, C-0309

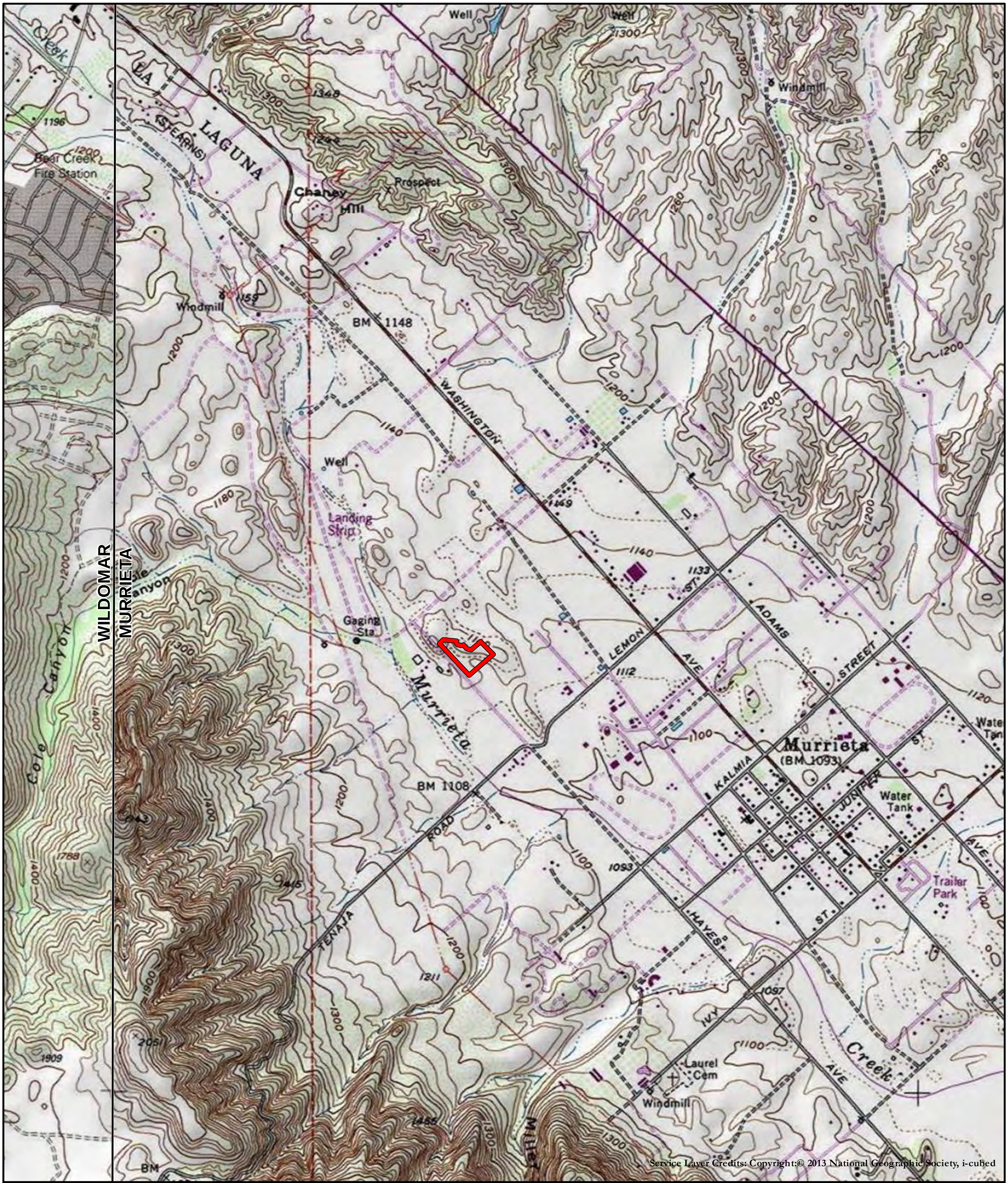
DUKE CRM

● Project Area

0 5 10 Miles

1 inch = 5 miles 1:316,800

N



Map 2- Project Location

Murrieta Canyon Academy Project, C-309

DUKE CRM

Project Area

USGS 7.5' Quads

0 0.25 0.5 Miles

0 0.25 0.5 Kilometers

N

1 inch = 2,000 feet 1:24,000

Map 3- Project Aerial

Murrieta Canyon Academy Project, C-309

DUKE CRM

Map 4- Project Geology

Murrieta Canyon Academy Project, C-309

DUKE CRM

Project Area

Geology from Kennedy and Morton 1993

Qyv: young alluvial-valley deposits

Qpfs: Pauba Formation, sandstone member

0 200 400 Feet

1 inch =400 feet 1:4,800

N

ATTACHMENT 2

PALEONTOLOGICAL RECORDS SEARCH RESULTS

Duke CRM
Benjamin Scherzer
118 Technology Drive, Suite 103
Irvine, CA 92618

October 1, 2019

Dear Mr. Scherzer,

This letter presents the results of a record search conducted for the Murrieta Canyon Academy Project in the city of Murrieta, Riverside County, California. The project site is located south of Washington Avenue, north of Hayes Avenue, east of Nighthawk Way, west of Fullerton Road, an unsectioned portion of Township 7 South, Range 3 West on the Murrieta USGS 7.5 minute quadrangle.

The geologic units underlying the project area are mapped primarily as alluvial valley deposits dating from the late Pleistocene to Holocene epoch with a strand of Pauba Formation sandstone dating from the Pleistocene in the southwestern portion of the project area (Kennedy & Morton, 1993). Pleistocene alluvial and sandstone units are considered to be of high paleontological value, with Pauba Formation deposits being well documented as containing vertebrate fauna from the late Irvingtonian and Rancholabrean ages. The Western Science Center does not have localities within the project area, but does have numerous localities within a 1 mile radius associated with the Village Walk Project and the Principe Collection. The Village Walk Project resulted in over one hundred Pleistocene fossils across multiple fossil localities, including those associated with mastodon (*Mammut pacificus*), ancient horse (*Equus sp.*), turtle (*Clemmys sp.*) , and many more. The Principe Collection is a salvage collection acquired after years of development in Murrieta and Temecula with localities only approximately known. Of the localities believed to be within the one mile radius of the project area, nearly 100 fossil specimens of mastodon (*Mammut pacificus*), ancient horse (*Equus sp.*), pronghorn (*Antilocapra sp.*), giant ground sloth (*Megalonyx sp.*) and many others, have been identified. Both collections are in similarly mapped sediment to the project area.

Any fossil specimen recovered from the Murrieta Canyon Academy Project would be scientifically significant. Excavation activity associated with the development of the project area would impact the paleontologically sensitive Pleistocene alluvial and sandstone units and it is the recommendation of the Western Science Center that a paleontological resource mitigation program be put in place to monitor, salvage, and curate any recovered fossils associated with the study area.

If you have any questions, or would like further information about the Village Walk Project or the Principe Collection, please feel free to contact me at dradford@westerncentermuseum.org

Sincerely,

Darla Radford
Collections Manager

ATTACHMENT 3

PROJECT PHOTOGRAPHS

Project overview southeast, athletic field.

Project overview west, athletic field.

Project overview west, parking lot and landscaping.

Project overview northeast, existing school campus.

Appendix D: Murrieta Canyon Academy Energy Analysis

Murrieta Canyon Academy

ENERGY ANALYSIS

CITY OF MURRIETA

PREPARED BY:

Haseeb Qureshi
hqureshi@urbanxroads.com
(949) 336-5987

Alyssa Tamase
atamase@urbanxroads.com
(949) 336-5988

MAY 5, 2020

TABLE OF CONTENTS

APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

%	Percent
(1)	Reference
AQIA	Air Quality Impact Analysis
BACM	Best Available Control Measures
BTU	British Thermal Units
CalEEMod	California Emissions Estimator Model
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCR	California Code of Regulations
CEC	California Energy Commission
CEQA	California Environmental Quality Act
City	City of Murrieta
CPEP	Clean Power and Electrification Pathway
CPUC	California Public Utilities Commission
DMV	Department of Motor Vehicles
DU	Dwelling Units
EIA	Energy Information Administration
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
EMFAC	EMissions FACtor
FERC	Federal Energy Regulatory Commission
GHG	Greenhouse Gas
GWh	Gigawatt Hour
HHDT	Heavy-Heavy Duty Trucks
hp-hr-gal	Horsepower Hours Per Gallon
I-215	Interstate 215
IEPR	Integrated Energy Policy Report
ISO	Independent Service Operator
ISTEA	Intermodal Surface Transportation Efficiency Act
ITE	Institute of Transportation Engineers
kBTU	Kilo-British Thermal Units
kWh	Kilowatt Hour
LDA	Light Duty Auto
LDT1/LDT2	Light-Duty Trucks
LHDT1/LHDT2	Light-Heavy Duty Trucks
MCA	Murrieta Canyon Academy

MCY	Motorcycles
MDV	Medium Duty Trucks
MH	Motor Homes
MHDT	Medium-Heavy Duty Trucks
mpg	Miles Per Gallon
MPO	Metropolitan Planning Organization
MVUSD	Murrieta Valley Unified School District
OBUS	Other Buses
PG&E	Pacific Gas and Electric
Project	Murrieta Canyon Academy
PV	Photovoltaic
SBUS	School Buses
SCAB	Southern California Air Basin
SCE	Southern California Edison
SDAB	San Diego Air Basin
SoCalGas	Southern California Gas
sf	Square Feet
TEA-21	Transportation Equity Act for the 21st Century
UBUS	Urban Buses
U.S.	United States
VMT	Vehicle Miles Traveled

This page intentionally left blank

EXECUTIVE SUMMARY

ES.1 SUMMARY OF FINDINGS

The results of this *Murrieta Canyon Academy Energy Analysis* is summarized below based on the significance criteria in Section 3 of this report consistent with Appendix G of the 2019 California Environmental Quality Act (CEQA) Statute and Guidelines (*CEQA Guidelines*) (1). Table ES-1 shows the findings of significance for potential energy impacts under CEQA.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Energy Impact #1: Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.	5.0	*Less Than Significant*	*n/a*
Energy Impact #2: Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.	5.0	*Less Than Significant*	*n/a*

This page intentionally left blank

1 INTRODUCTION

This report presents the results of the energy analysis prepared by Urban Crossroads, Inc., for the proposed Murrieta Canyon Academy (Project). The purpose of this report is to ensure that energy implication is considered by the City of Murrieta (City), as the lead agency, and to quantify anticipated energy usage associated with construction and operation of the proposed Project, determine if the usage amounts are efficient, typical, or wasteful for the land use type, and to emphasize avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy.

1.1 SITE LOCATION

The proposed Murrieta Canyon Academy Project is located on the northeast corner of Hayes Avenue and Fullerton Road in the City of Murrieta, as shown on Exhibit 1-A. The area surrounding the Project Site includes residential to the east and south; Thompson Middle School field and Thompson Middle School to the west; and Murrieta Valley High School to the north.

1.2 PROJECT DESCRIPTION

Murrieta Valley Unified School District (MVUSD) proposes to construct new buildings and associated infrastructure at the Murrieta Canyon Academy (MCA). MCA is an existing school campus consisting of portable structures that provides alternative high school programs including, independent study, alternative high school, and adult education. MVUSD proposes to construct a new campus with permanent single and two-story buildings and associated infrastructure and demolish the existing MCA buildings (Project). The site plan for the proposed Project is shown on Exhibit 1-B.

The proposed Project includes the construction of a new campus with approximately 41,500 square feet (sf) of classrooms and administrative offices, an associated parking lot, and other site improvements, to replace an existing campus of 22,500 sf of portable classrooms. More specifically, the new campus will include construction of single and two-story buildings with 22 classroom, student pavilion, library, restrooms, storage rooms, administration office, and various academic and activity courts with additional parking and landscaping. The proposed buildings are designed as single and two-story structures. All utilities exist to the Project site. The proposed Project will increase current enrollment capacity from 234 students to 594 students.

The Project is proposed to be constructed in the general location of the existing softball fields associated with Thompson Middle School, located immediately north-west of the existing MCA campus and south of the adjacent Thompson Middle School buildings. While the construction of the new buildings occurs, the existing buildings will remain in operation. Following the completion of the new buildings, anticipated to be during summer recess from school, the original buildings and parking lot will be demolished, and the new parking and associated landscape will be constructed.

EXHIBIT 1-A: LOCATION MAP

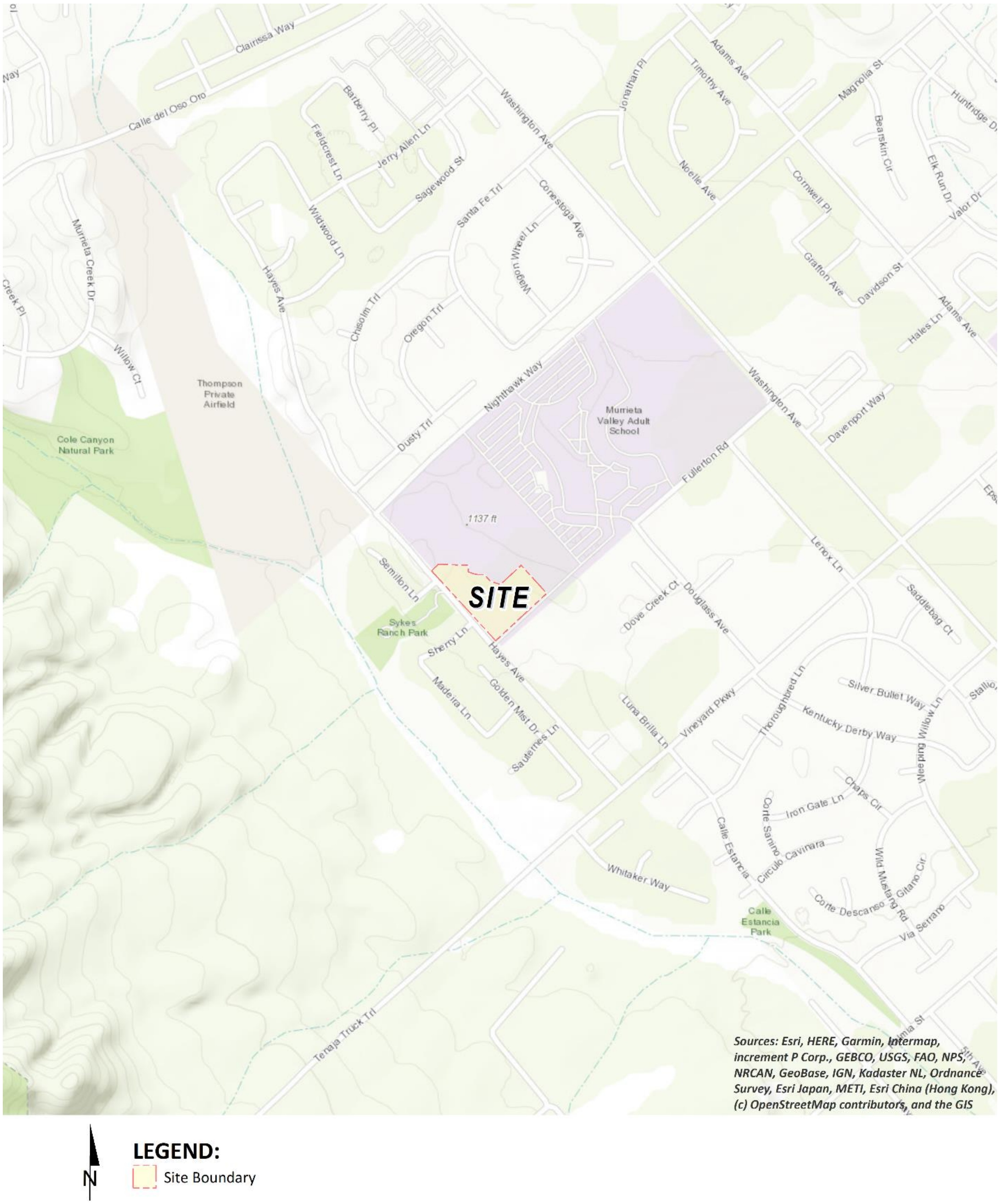
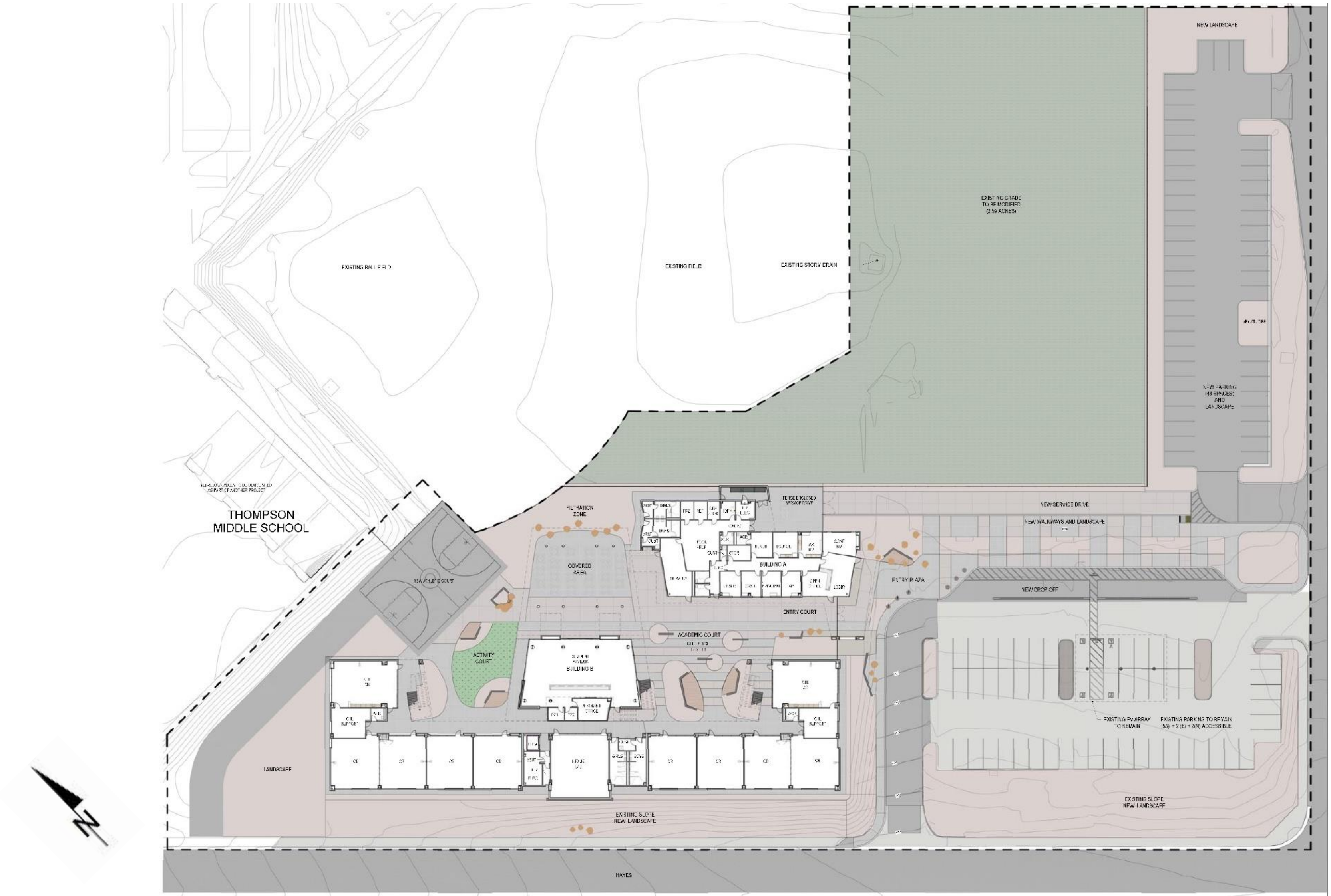


EXHIBIT 1-B: SITE PLAN



This page intentionally left blank

2 EXISTING CONDITIONS

This section provides an overview of the existing energy conditions in the Project region.

2.1 OVERVIEW

The most recent data for California's estimated total energy consumption is from 2017 and natural gas consumption is from 2018, released by the United States (U.S.) Energy Information Administration's (EIA) California State Profile and Energy Estimates in 2020 and included:

- Approximately 7,881 trillion British Thermal Unit (BTU) of energy was consumed;
- Approximately 683 million barrels of petroleum;
- Approximately 2,137 billion cubic feet of natural gas;
- Approximately 1 million short tons of coal (2)

The California Energy Commission's (CEC) Transportation Energy Demand Forecast 2018-2030 was released in order to support the 2017 Integrated Energy Policy Report. The Transportation energy Demand Forecast 2018-2030 lays out graphs and data supporting their projections of California's future transportation energy demand. The projected inputs consider expected variable changes in fuel prices, income, population, and other variables. Predictions regarding fuel demand included:

- Gasoline demand in the transportation sector is expected to decline from approximately 15.8 billion gallons in 2017 to between 12.3 billion and 12.7 billion gallons in 2030 (3)
- Diesel demand in the transportation sector is expected to rise, increasing from approximately 3.7 billion diesel gallons in 2015 to approximately 4.7 billion in 2030 (3)
    - Data from the Department of Energy states that approximately 3.9 billion gallons of diesel fuel were consumed in 2017 (4)

The most recent data provided by the EIA for energy use in California by demand sector is from 2017 and is reported as follows:

- Approximately 40.3% transportation;
- Approximately 23.1% industrial;
- Approximately 18.0% residential; and
- Approximately 18.7% commercial (5)

In 2018, total system electric generation for California was 285,488 gigawatt hours (GWh). California's massive electricity in-state generation system generated approximately 194,842 GWh which accounted for approximately 68% of the electricity it uses; the rest was imported from the Pacific Northwest (14%) and the U.S. Southwest (18%) (6). Natural gas is the main source for electricity generation at 47% of the total in-state electric generation system power as shown in Table 2-1.

TABLE 2-1: TOTAL ELECTRICITY SYSTEM POWER (CALIFORNIA 2018)

Fuel Type	California In-State Generation	Percent of California In-State	Northwest Imports (GWh)	Southwest Imports (GWh)	California Power Mix (GWh)	Percent California Power Mix
Coal	294	0.15%	399	8,740	9,433	3.30%
Large Hydro	22,096	11.34%	7,418	985	30,499	10.68%
Natural Gas	90,691	46.54%	49	8,904	99,644	34.91%
Nuclear	18,268	9.38%	0	7,573	25,841	9.05%
Oil	35	0.02%	0	0	35	0.01%
Other	430	0.22%	0	9	439	0.15%
Renewables	63,028	32.35%	14,074	12,400	89,502	31.36%
Biomass	5,909	3.03%	772	26	6,707	2.35%
Geothermal	11,528	5.92%	171	1,269	12,968	4.54%
Small Hydro	4,248	2.18%	334	1	4,583	1.61%
Solar	27,265	13.99%	174	5,094	32,533	11.40%
Wind	14,078	7.23%	12,623	6,010	32,711	11.46%
Unspecified Sources of Power	N/A	N/A	17,576	12,519	30,095	10.54%
Total	**194,842**	**100%**	**39,517**	**51,130**	**285,488**	**100%**

Source: https://www.energy.ca.gov/almanac/electricity_data/total_system_power.html

An updated summary of, and context for energy consumption and energy demands within the State is presented in "U.S. Energy Information Administration, California State Profile and Energy Estimates, Quick Facts" excerpted below:

- California was the seventh-largest producer of crude oil among the 50 states in 2018, and, as of January 2019, it ranked third in oil refining capacity.
- California is the largest consumer of jet fuel among the 50 states and accounted for one-fifth of the nation's jet fuel consumption in 2018. (7)
- California's total energy consumption is second highest in the nation, but, in 2018, the state's per capita energy consumption was the fourth-lowest, due in part to its mild climate and its energy efficiency programs. (8)
- In 2018, California ranked first in the nation as a producer of electricity from solar, geothermal, and biomass resources and fourth in the nation in conventional hydroelectric power generation.
- In 2018, large- and small-scale solar photovoltaic (PV) and solar thermal installations provided 19% of California's net electricity generation (9).

As indicated above, California is one of the nation's leading energy-producing states, and California per capita energy use is among the nation's most efficient. Given the nature of the Project, the remainder of this discussion will focus on the three sources of energy that are most relevant to the project—namely, electricity and transportation fuel for vehicle trips associated with the uses planned for the Project.

2.2 ELECTRICITY

The usage associated with electricity use were calculated using the California Emissions Estimator Model (CalEEMod) Version 2016.3.2. The Southern California region's electricity reliability has been of concern for the past several years due to the planned retirement of aging facilities that depend upon once-through cooling technologies, as well as the June 2013 retirement of the San Onofre Nuclear Generating Station (San Onofre). While the once-through cooling phase-out has been ongoing since the May 2010 adoption of the State Water Resources Control Board's once-through cooling policy, the retirement of San Onofre complicated the situation. California ISO studies had revealed the extent to which the South California Air Basin (SCAB) and the San Diego Air Basin (SDAB) region were vulnerable to low-voltage and post-transient voltage instability concerns. A preliminary plan to address these issues was detailed in the 2013 Integrative Energy Policy Report (IEPR) after a collaborative process with other energy agencies, utilities, and air districts (10). If the resource development outlined in the preliminary plan continues as detailed, reliability in Southern California would likely be assured; however, tight resource margins have led energy agencies and the California Air Resources Board (CARB) to develop a contingency plan. This contingency plan was discussed at a public workshop in Los Angeles on August 20, 2014 and is detailed within this Section (11).

Electricity is provided to the Project by Southern California Edison (SCE). SCE provides electric power to more than 15 million persons in 15 counties and in 180 incorporated cities, within a service area encompassing approximately 50,000 square miles. Based on SCE's 2018 Power Content Label Mix, SCE derives electricity from varied energy resources including: fossil fuels, hydroelectric generators, nuclear power plants, geothermal power plants, solar power generation, and wind farms. SCE also purchases from independent power producers and utilities, including out-of-state suppliers (12).

California's electricity industry is an organization of traditional utilities, private generating companies, and state agencies, each with a variety of roles and responsibilities to ensure that electrical power is provided to consumers. The California Independent Service Operator (ISO) is a nonprofit public benefit corporation and is the impartial operator of the State's wholesale power grid and is charged with maintaining grid reliability, and to direct uninterrupted electrical energy supplies to California's homes and communities. While utilities [such as SCE] still own transmission assets, the ISO routes electrical power along these assets, maximizing the use of the transmission system and its power generation resources. The ISO matches buyers and sellers of electricity to ensure that enough power is available to meet demand. To these ends, every five minutes the ISO forecasts electrical demands, accounts for operating reserves, and assigns the lowest cost power plant unit to meet demands while ensuring adequate system transmission capacities and capabilities (13).

Part of the ISO's charge is to plan and coordinate grid enhancements to ensure that electrical power is provided to California consumers. To this end, transmission owners (investor-owned utilities such as SCE) file annual transmission expansion/modification plans to accommodate the State's growing electrical needs. The ISO reviews and either approves or denies the proposed additions. In addition, and perhaps most importantly, the ISO works with other areas in the western United States electrical grid to ensure that adequate power supplies are available to the State. In this manner, continuing reliable and affordable electrical power is assured to existing and new consumers throughout the State.

Table 2-2 identifies SCE's specific proportional shares of electricity sources in 2018. As indicated in Table 2-2, the 2018 SCE Power Mix has renewable energy at 36% of the overall energy resources. Geothermal resources are at 8%, wind power is at 13%, large hydroelectric sources are at 1%, solar energy is at 13%, and coal is at 0%. Biomass and waste sources have increased by 1% since 2017. Natural gas remains at 17% since 2017 (14).

TABLE 2-2: SCE 2018 POWER CONTENT MIX

Energy Resources	2018 SCE Power Mix
Eligible Renewable	**36%**
Biomass & waste	1%
Geothermal	8%
Small Hydroelectric	1%
Solar	13%
Wind	13%
Coal	**0%**
Large Hydroelectric	**4%**
Natural Gas	**17%**
Nuclear	**6%**
Other	**0%**
Unspecified Sources of power*	37%
Total	**100%**

* "Unspecified sources of power" means electricity from transactions that are not traceable to specific generation sources

2.3 NATURAL GAS

The usage associated with natural gas use were calculated using the CalEEMod Version 2016.3.2. The following summary of natural gas resources and service providers, delivery systems, and associated regulation is excerpted from information provided by the California Public Utilities Commission (CPUC).

"The CPUC regulates natural gas utility service for approximately 10.8 million customers that receive natural gas from Pacific Gas and Electric (PG&E), Southern California Gas (SoCalGas), San Diego Gas & Electric (SDG&E), Southwest Gas, and several smaller natural gas utilities. The CPUC also regulates independent storage operators: Lodi Gas Storage, Wild Goose Storage, Central Valley Storage and Gill Ranch Storage.

The vast majority of California's natural gas customers are residential and small commercial customers, referred to as "core" customers, who accounted for approximately 32% of the natural gas delivered by California utilities in 2012. Large consumers, like electric generators and industrial customers, referred to as "noncore" customers, accounted for approximately 68% of the natural gas delivered by California utilities in 2012.

The PUC regulates the California utilities' natural gas rates and natural gas services, including in-state transportation over the utilities' transmission and distribution pipeline systems, storage, procurement, metering and billing. Most of the natural gas used in California comes from out-of-state natural gas basins. In 2012, California customers received 35% of their natural gas supply from basins located in the Southwest, 16% from Canada, 40% from the Rocky Mountains, and 9% from basins located within California. California gas utilities may soon also begin receiving biogas into their pipeline systems.

Natural gas from out-of-state production basins is delivered into California via the interstate natural gas pipeline system. The major interstate pipelines that deliver out-of-state natural gas to California consumers are the Gas Transmission Northwest Pipeline, Kern River Pipeline, Transwestern Pipeline, El Paso Pipeline, Ruby Pipeline, Questar Southern Trails and Mojave Pipeline. Another pipeline, the North Baja – Baja Norte Pipeline, takes gas off the El Paso Pipeline at the California/Arizona border, and delivers that gas through California into Mexico. While the Federal Energy Regulatory Commission (FERC) regulates the transportation of natural gas on the interstate pipelines, the PUC often participates in FERC regulatory proceedings to represent the interests of California natural gas consumers.

Most of the natural gas transported via the interstate pipelines, as well as some of the California-produced natural gas, is delivered into the PG&E and SoCalGas intrastate natural gas transmission pipeline systems (commonly referred to as California's "backbone" natural gas pipeline system). Natural gas on the utilities' backbone pipeline systems is then delivered into the local transmission and distribution pipeline systems, or to natural gas storage fields. Some large noncore customers take natural gas directly off the high-pressure backbone pipeline systems, while core customers and other noncore customers take natural gas off the utilities' distribution pipeline systems. The PUC has regulatory jurisdiction over 150,000 miles of utility-owned natural gas pipelines, which transported 82% of the total amount of natural gas delivered to California's gas consumers in 2012.

SDG&E and Southwest Gas' southern division are wholesale customers of SoCalGas, and currently receive all of their natural gas from the SoCalGas system (Southwest Gas also *provides natural gas distribution service in the Lake Tahoe area). Some other municipal wholesale customers are the cities of Palo Alto, Long Beach, and Vernon, which are not regulated by the CPUC.*

Some of the natural gas delivered to California customers may be delivered directly to them without being transported over the regulated utility systems. For example, the Kern River/Mojave pipeline system can deliver natural gas directly to some large customers, "bypassing" the utilities' systems. Much of California-produced natural gas is also delivered directly to large consumers.

PG&E and SoCalGas own and operate several natural gas storage fields that are located in northern and southern California. These storage fields, and four independently owned storage utilities – Lodi Gas Storage, Wild Goose Storage, Central Valley Storage, and Gill Ranch Storage – help meet peak seasonal natural gas demand and allow California natural gas customers to secure natural gas supplies more efficiently. (A portion of the Gill Ranch facility is owned by PG&E).

California's regulated utilities do not own any natural gas production facilities. All of the natural gas sold by these utilities must be purchased from suppliers and/or marketers. The price of natural gas sold by suppliers and marketers was deregulated by the FERC in the mid-1980's and is determined by "market forces." However, the PUC decides whether California ' s utilities have taken reasonable steps in order to minimize the cost of natural gas purchased on behalf of their core customers." (15)

As indicated in the preceding discussions, natural gas is available from a variety of in-state and out-of-state sources and is provided throughout the state in response to market supply and demand. Complementing available natural gas resources, biogas may soon be available via existing delivery systems, thereby increasing the availability and reliability of resources in total. The PUC oversees utility purchases and transmission of natural gas to ensure reliable and affordable natural gas deliveries to existing and new consumers throughout the State.

2.4 TRANSPORTATION ENERGY RESOURCES

The Project would generate additional vehicle trips with resulting consumption of energy resources, predominantly gasoline and diesel fuel. In March 2018, the Department of Motor Vehicles (DMV) identified 35 million registered vehicles in California (16), and those vehicles (as noted previously) consume an estimated 19 billion gallons of fuel each year[1]. Gasoline (and other vehicle fuels) are commercially provided commodities and would be available to the Project patrons and employees via commercial outlets.

California's on-road transportation system includes 170,000 miles of highways and major roadways, more than 27 million passenger vehicles and light trucks, and almost 8 million medium- and heavy-duty vehicles (16). While gasoline consumption has been declining since 2008 it is still by far the dominant fuel. Petroleum comprises about 92% of all transportation energy use, excluding fuel consumed for aviation and most marine vessels (17). Nearly 19 billion

[1] Fuel consumptions estimated utilizing information from EMFAC2017.

gallons of on-highway fuel are burned each year, including 15.1 billion gallons of gasoline (including ethanol) and 3.9 billion gallons of diesel fuel (including biodiesel and renewable diesel). In 2016, Californians also used 194 million therms of natural gas as a transportation fuel (18), or the equivalent of 155 million gallons of gasoline.

This page intentionally left blank

3 REGULATORY BACKGROUND

Federal and state agencies regulate energy use and consumption through various means and programs. On the federal level, the United States Department of Transportation, the United States Department of Energy, and the United States Environmental Protection Agency (EPA) are three federal agencies with substantial influence over energy policies and programs. On the state level, the CPUC and the CEC are two agencies with authority over different aspects of energy. Relevant federal and state energy-related laws and plans are summarized below. Project consistency with applicable federal and state regulations is also presented in *italicized* text.

3.1 FEDERAL REGULATIONS

3.1.1 INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT OF 1991 (ISTEA)

The ISTEA promoted the development of inter-modal transportation systems to maximize mobility as well as address national and local interests in air quality and energy. ISTEA contained factors that Metropolitan Planning Organizations (MPOs) were to address in developing transportation plans and programs, including some energy-related factors. To meet the new ISTEA requirements, MPOs adopted explicit policies defining the social, economic, energy, and environmental values guiding transportation decisions. *Transportation and access to the Project site is provided primarily by the local and regional roadway systems. The Project would not interfere with, nor otherwise obstruct intermodal transportation plans or projects that may be realized pursuant to the ISTEA because SCAG is not planning for intermodal facilities on or through the Project site.*

3.1.2 THE TRANSPORTATION EQUITY ACT FOR THE 21ST CENTURY (TEA-21)

The TEA-21 was signed into law in 1998 and builds upon the initiatives established in the ISTEA legislation, discussed above. TEA-21 authorizes highway, highway safety, transit, and other efficient surface transportation programs. TEA-21 continues the program structure established for highways and transit under ISTEA, such as flexibility in the use of funds, emphasis on measures to improve the environment, and focus on a strong planning process as the foundation of good transportation decisions. TEA-21 also provides for investment in research and its application to maximize the performance of the transportation system through, for example, deployment of Intelligent Transportation Systems, to help improve operations and management of transportation systems and vehicle safety. *The Project site is located along major transportation corridors with proximate access to the Interstate freeway system. The site selected for the Project facilitates access, acts to reduce vehicle miles traveled, takes advantage of existing infrastructure systems, and promotes land use compatibilities through collocation of similar uses. The Project supports the strong planning processes emphasized under TEA-21. The Project is therefore consistent with, and would not otherwise interfere with, nor obstruct implementation of TEA-21.*

3.2 CALIFORNIA REGULATIONS

3.2.1 INTEGRATED ENERGY POLICY REPORT (IEPR)

Senate Bill 1389 (Bowen, Chapter 568, Statutes of 2002) requires the CEC to prepare a biennial integrated energy policy report that assesses major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety (Public Resources Code § 25301a]). The Energy Commission prepares these assessments and associated policy recommendations every two years, with updates in alternate years, as part of the Integrated Energy Policy Report.

The 2019 IEPR was adopted January 31, 2020, and continues to work towards improving electricity, natural gas, and transportation fuel energy use in California. The 2019 IEPR focuses on a variety of topics such as including the environmental performance of the electricity generation system, landscape-scale planning, the response to the gas leak at the Aliso Canyon natural gas storage facility, transportation fuel supply reliability issues, updates on Southern California electricity reliability, methane leakage, climate adaptation activities for the energy sector, climate and sea level rise scenarios, and the California Energy Demand Forecast (19). The 2020 IEPR Update is currently in progress but is not anticipated to be adopted until February 2021. *Electricity would be provided to the Project by SCE and natural gas is provided by SoCalGas. SCE's Clean Power and Electrification Pathway (CPEP) white paper and SoCalGas 2018 Corporate Sustainability Report builds on existing state programs and policies. As such, the Project is consistent with, and would not otherwise interfere with, nor obstruct implementation the goals presented in the 2019 IEPR.*

3.2.2 STATE OF CALIFORNIA ENERGY PLAN

The CEC is responsible for preparing the State Energy Plan, which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. The Plan calls for the state to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies several strategies, including assistance to public agencies and fleet operators and encouragement of urban designs that reduce VMT and accommodate pedestrian and bicycle access. *The Project site is located along major transportation corridors with proximate access to the Interstate freeway system. The site selected for the Project facilitates access, acts to reduce VMT by developing educational uses on a civic/institutional-designated site. The Project therefore is consistent with, and would not otherwise interfere with, nor obstruct implementation of the State of California Energy Plan.*

3.2.3 CALIFORNIA CODE TITLE 24, PART 6, ENERGY EFFICIENCY STANDARDS

California Code of Regulations (CCR) Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases greenhouse gas (GHG) emissions. The 2019 version of Title 24 was adopted by the CEC and will become effective on January 1, 2020. The 2019 Title 24 standards go into effect on January 1, 2020 and are applicable to building permit applications submitted on or after that date. The 2019 Title 24 standards require solar photovoltaic systems for new homes, establish requirements for newly constructed healthcare facilities, encourage demand responsive technologies for residential buildings, update indoor and outdoor lighting for nonresidential buildings. The CEC anticipates that single-family homes built with the 2019 standards will use approximately 7% less energy compared to the residential homes built under the 2016 standards. Additionally, after implementation of solar photovoltaic systems, homes built under the 2019 standards will about 53% less energy than homes built under the 2016 standards. Nonresidential buildings will use approximately 30% less energy due to lighting upgrades (20). *The 2019 version of Title 24 was adopted by the California Energy Commission (CEC) and will become effective on January 1, 2020. It should be noted that the analysis herein assumes compliance with the 2019 Title 24 Standards.*

3.2.4 AB 1493 PAVLEY REGULATIONS AND FUEL EFFICIENCY STANDARDS.

California AB 1493, enacted on July 22, 2002, required ARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light duty trucks. Under this legislation, CARB adopted regulations to reduce GHG emissions from non-commercial passenger vehicles (cars and light-duty trucks). Although aimed at reducing GHG emissions, specifically, a co-benefit of the Pavley standards is an improvement in fuel efficiency and consequently a reduction in fuel consumption. *AB 1493 is not applicable to the Project as it is a statewide measure establishing vehicle emissions standards. No feature of the Project would interfere with implementation of the requirements under AB 1493.*

3.2.5 CALIFORNIA'S RENEWABLE PORTFOLIO STANDARD (RPS).

First established in 2002 under Senate Bill (SB) 1078, California's Renewable Portfolio Standards (RPS) requires retail sellers of electric services to increase procurement from eligible renewable resources to 33 percent of total retail sales by 2020 (21). *California's Renewable Portfolio Standard is not applicable to the Project as it is a statewide measure that establishes a renewable energy mix. No feature of the Project would interfere with implementation of the requirements under RPS.*

3.2.6 SB 350— CLEAN ENERGY AND POLLUTION REDUCTION ACT OF 2015.

In October 2015, the legislature approved, and the Governor signed SB 350, which reaffirms California's commitment to reducing its GHG emissions and addressing climate change. Key provisions include an increase in the renewables portfolio standard (RPS), higher energy efficiency requirements for buildings, initial strategies towards a regional electricity grid, and improved infrastructure for electric vehicle charging stations. Provisions for a 50 percent reduction in the use of petroleum statewide were removed from the Bill because of opposition and concern that it would prevent the Bill's passage. Specifically, SB 350 requires the following to reduce statewide GHG emissions:

- Increase the amount of electricity procured from renewable energy sources from 33 percent to 50 percent by 2030, with interim targets of 40 percent by 2024, and 25 percent by 2027.
- Double the energy efficiency in existing buildings by 2030. This target will be achieved through the California Public Utility Commission (CPUC), the California Energy Commission (CEC), and local publicly owned utilities.
- Reorganize the Independent System Operator (ISO) to develop more regional electrify transmission markets and to improve accessibility in these markets, which will facilitate the growth of renewable energy markets in the western United States (California Leginfo 2015).

This measure is not directly applicable to development projects, but the proposed Project would use energy from Southern California Edison, which has committed to diversify its portfolio of energy sources by increasing energy from wind and solar sources.

This page intentionally left blank

4 PROJECT ENERGY DEMANDS AND ENERGY EFFICIENCY MEASURES

4.1 EVALUATION CRITERIA

In compliance with Appendix G of the *State CEQA Guidelines* (1)*,* this report analyzes the project's anticipated energy use to determine if the Project would:

- Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation; or
- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency

In addition, Appendix F of the *State CEQA Guidelines* (22)*,* states that the means of achieving the goal of energy conservation includes the following:

- Decreasing overall per capita energy consumption;
- Decreasing reliance on fossil fuels such as coal, natural gas and oil; and
- Increasing reliance on renewable energy sources.

4.2 METHODOLOGY

Information from the California Emissions Estimator Model (CalEEMod) outputs for the *Murrieta Canyon Academy Air Quality Impact Analysis* (Urban Crossroads, Inc.) (AQIA) (23) was utilized in this analysis, detailing Project related construction equipment, transportation energy demands, and facility energy demands.

4.2.1 CALIFORNIA EMISSIONS ESTIMATOR MODEL (CALEEMOD)

On October 17, 2017, the SCAQMD, in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts, released the latest version of the CalEEMod Version 2016.3.2. The purpose of this model is to calculate construction-source and operational-source criteria pollutants and GHG emissions from direct and indirect sources as well as energy usage. (24). Accordingly, the latest version of CalEEMod has been used to determine the proposed Project's anticipated transportation and facility energy demands. Output from the annual construction and operational model runs are provided in Appendix 4.1.

4.2.2 EMISSION FACTORS MODEL

On August 19, 2019, the EPA approved the 2017 version of the EMissions FACtor model (EMFAC) web database for use in State Implementation Plan and transportation conformity analyses. EMFAC2017 is a mathematical model that was developed to calculate emission rates, fuel consumption, VMT from motor vehicles that operate on highways, freeways, and local roads in California and is commonly used by the CARB to project changes in future emissions from on-road mobile sources (25). This energy study utilizes the different fuel types for each vehicle class from the annual EMFAC2017 emission inventory in order to derive the average vehicle fuel economy which is then used to determine the estimated annual fuel consumption associated with vehicle usage during Project construction and operational activities. For purposes of analysis, the 2022 through 2023 analysis years were utilized to determine the average vehicle fuel economy used throughout the duration of the Project.

4.2.3 CONSTRUCTION DURATION

The construction schedule utilized in the analysis, shown in Table 4-1, represents a "worst-case" analysis scenario should construction occur any time after the respective dates since emission factors for construction decrease as time passes and the analysis year increases due to emission regulations becoming more stringent.[2] The duration of construction activity and associated equipment represents a reasonable approximation of the expected construction fleet as required per *CEQA Guidelines*. The duration of construction activity was based on information provided by the Project Applicant and the opening year.

TABLE 4-1: CONSTRUCTION DURATION

Phase Name	Start Date	End Date	Days
Site Preparation	08/01/2022	09/30/2022	45
Grading	08/01/2022	09/30/2022	45
Building Construction	10/01/2022	06/23/2023	190
Paving	05/28/2023	06/23/2023	20
Architectural Coating	05/28/2023	06/23/2023	20
Demolition	06/24/2023	08/04/2023	30

3.4.6 CONSTRUCTION EQUIPMENT

Site specific construction fleet may vary due to specific project needs at the time of construction. The associated construction equipment was generally based on CalEEMod defaults. A detailed summary of construction equipment assumptions by phase is provided at Table 4-2. Please refer to specific detailed modeling inputs/outputs contained in Appendix 4.1 of this energy study.

TABLE 4-2: CONSTRUCTION EQUIPMENT ASSUMPTIONS (1 OF 2)

Phase Name	Equipment Type	Quantity	Hours Per Day
Site Preparation	Crawler Tractors	4	8
	Rubber Tired Dozers	3	8
Grading	Crawler Tractors	3	8
	Excavators	1	8
	Graders	1	8
	Rubber Tired Dozers	1	8

[2] As shown in the CalEEMod User's Guide Version 2016.3.2, Section 4.3 "OFFROAD Equipment" as the analysis year increases, emission factors for the same equipment pieces decrease due to the natural turnover of older equipment being replaced by newer less polluting equipment and new regulatory requirements.

TABLE 4-2: CONSTRUCTION EQUIPMENT ASSUMPTIONS (2 OF 2)

Phase Name	Equipment Type	Quantity	Hours Per Day
Building Construction	Cranes	1	8
	Crawler Tractors	3	8
	Forklifts	3	8
	Generator Sets	1	8
	Welders	1	8
Paving	Cement and Mortar Mixers	2	8
	Crawler Tractors	1	8
	Pavers	1	8
	Paving Equipment	2	8
	Rollers	2	8
Architectural Coating	Air Compressors	1	8
Demolition	Concrete/Industrial Saws	1	8
	Excavators	3	8
	Rubber Tired Dozers	2	8

4.3 CONSTRUCTION ENERGY DEMANDS

4.3.1 CONSTRUCTION EQUIPMENT ELECTRICITY USAGE ESTIMATES

The focus within this section is the energy implications of the construction process, specifically the power cost from on-site electricity consumption during construction of the proposed Project. Based on the *2017 National Construction Estimator*, Richard Pray (2017) (26), the typical power cost per 1,000 square feet of building construction per month is estimated to be $2.32. For the proposed Project development, the Project plans to develop 41,500 square feet (sf) of classrooms and administrative offices, an associated parking lot, and other site improvements. Based on information provided in the AQIA, construction activities are anticipated to occur over the course of 12 months (23). Based on Table 4-3, the total power cost of the on-site electricity usage during the construction of the Project is estimated to be approximately $1,155.36.

The SCE's general service rate schedule were used to determine the Project's electrical usage. As of January 1, 2020, SCE's general service rate is $0.08 per kilowatt hours (kWh) of electricity (27). As shown on Table 4-4, the total electricity usage from on-site Project construction related activities is estimated to be approximately 14,461 kWh.

TABLE 4-3: CONSTRUCTION POWER COST

Land Use	**Power Cost** (per 1,000 SF of building construction per month)	**Size** (1,000 SF)	**Construction Duration** (months)	Project Construction Power Cost
Murrieta Canyon Academy	$2.32	41.500	12	$1,155.36
			CONSTRUCTION POWER COST	***$1,155.36***

TABLE 4-4: CONSTRUCTION ELECTRICITY USAGE

Land Use	Cost per kWh	Project Construction Electricity Usage (kWh)
Murrieta Canyon Academy	$0.08	14,461
	CONSTURCTION ELECTRICTY USAGE (kWh)	***14,461***

4.3.2 CONSTRUCTION EQUIPMENT FUEL ESTIMATES

Fuel consumed by construction equipment would be the primary energy resource expended over the course of Project construction. Project construction activity timeline estimates, construction equipment schedules, equipment power ratings, load factors, and associated fuel consumption estimates are presented in Table 4-5. Eight-hour daily use of all equipment is assumed. The aggregate fuel consumption rate for all equipment is estimated at 18.5 horsepower hour per gallon (hp-hr-gal.), obtained from CARB 2018 Emissions Factors Tables and cited fuel consumption rate factors presented in Table D-24 of the Moyer guidelines (28). For the purposes of this analysis, the calculations are based on all construction equipment being diesel-powered which is standard practice consistent with industry standards. Diesel fuel would be supplied by existing commercial fuel providers serving the City and region.

As presented in Table 4-5, Project construction activities would consume an estimated 70,624 gallons of diesel fuel. Project construction would represent a “single-event” diesel fuel demand and would not require on-going or permanent commitment of diesel fuel resources for this purpose.

TABLE 4-5: CONSTRUCTION EQUIPMENT FUEL CONSUMPTION ESTIMATES

Activity/Duration	Equipment	HP Rating	Quantity	Usage Hours	Load Factor	HP-hrs/day	Total Fuel Consumption (gal. diesel fuel)
Site Preparation (45 days)	Crawler Tractors	212	4	8	0.43	2,917	7,096
	Rubber Tired Dozers	247	3	8	0.40	2,371	5,768
Grading (45 days)	Crawler Tractors	212	3	8	0.43	2,188	5,322
	Excavators	158	1	8	0.38	480	1,168
	Graders	187	1	8	0.41	613	1,492
	Rubber Tired Dozers	247	1	8	0.40	790	1,923
Building Construction (190 days)	Cranes	231	1	8	0.29	536	5,504
	Crawler Tractors	212	3	8	0.43	2,188	22,470
	Forklifts	89	3	8	0.20	427	4,387
	Generator Sets	84	1	8	0.74	497	5,107
	Welders	46	1	8	0.45	166	1,701
Paving (20 days)	Cement and Mortar Mixers	9	2	8	0.56	81	87
	Crawler Tractors	212	1	8	0.43	729	788
	Pavers	130	1	8	0.42	437	472
	Paving Equipment	132	2	8	0.36	760	822
	Rollers	80	2	8	0.38	486	526
Architectural Coating (20 days)	Air Compressors	78	1	8	0.48	300	324
Demolition (30 days)	Concrete/Industrial Saws	81	1	8	0.73	473	767
	Excavators	158	3	8	0.38	1,441	2,337
	Rubber Tired Dozers	247	2	8	0.40	1,581	2,563
TOTAL CONSTRUCTION PROCESS FUEL DEMAND (GALLONS DIESEL FUEL)							***70,624***

4.3.3 CONSTRUCTION WORKER FUEL ESTIMATES

It is assumed that all construction worker trips are from light duty autos (LDA) along area roadways. With respect to estimated VMT for the Project, the construction worker trips would generate an estimated 271,142 VMT (23). Data regarding Project related construction worker trips were based on CalEEMod defaults utilized within the AQIA.

Vehicle fuel efficiencies for LDA were estimated using information generated within the 2017 version of the EMFAC developed by CARB. EMFAC2017 is a mathematical model that was developed to calculate emission rates, fuel consumption, and VMT from motor vehicles that operate on highways, freeways, and local roads in California and is commonly used by the CARB to project changes in future emissions from on-road mobile sources (25). EMFAC2017 was run for the LDA vehicle class within the California sub-area for the 2022 and 2023 calendar year. Data from EMFAC2017 is shown in Appendix 4.2.

As generated by EMFAC2017, an aggregated fuel economy of LDAs ranging from model years 2022 and 2023 are estimated to have fuel efficiencies of 32.53 miles per gallon (mpg) and 33.56 mpg, respectively. Table 4-6 provides an estimated annual fuel consumption resulting from LDAs related to the Project construction worker trips. Based on Table 4-6, it is estimated that 8,174 gallons of fuel will be consumed related to construction worker trips during full construction of the Project. It should be noted that construction worker trips would represent a "single-event" gasoline fuel demand and would not require on-going or permanent commitment of fuel resources for this purpose.

TABLE 4-6: CONSTRUCTION WORKER FUEL CONSUMPTION ESTIMATES

Construction Activity	Worker Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
2022					
Site Preparation (45 days)	18	14.7	11,907	32.53	366
Grading (45 days)	15	14.7	9,923	32.53	305
Building Construction (65 days)	83	14.7	79,307	32.53	2,438
2023					
Building Construction (125 days)	83	14.7	152,513	33.56	4,544
Paving (20 days)	20	14.7	5,880	33.56	175
Architectural Coating (20 days)	17	14.7	4,998	33.56	149
Demolition (30 days)	15	14.7	6,615	33.56	197
PROJECT CONSTRUCTION WORKER FUEL CONSUMPTION					***8,174***

4.3.4 CONSTRUCTION VENDOR FUEL ESTIMATES

With respect to estimated VMT, the construction vendor trips would generate an estimated 776,952 VMT along area roadways for the Project (23). It is assumed that 50% of all vendor trips are from medium-heavy duty trucks (MHDT), 50% are from heavy-heavy duty trucks (HHDT), and 100% of all hauling trips are from HHDTs. These assumptions are consistent with the CalEEMod defaults utilized within the within the AQIA (23). Vehicle fuel efficiencies for MHDTs and HHDTs were estimated using information generated within EMFAC2017. EMFAC2017 was run for the LDA vehicle class within the California sub-area for the 2022 and 2023 calendar year. Data from EMFAC2017 is shown in Appendix 4.2.

As generated by EMFAC2017, an aggregated fuel economy of MHDTs ranging from model years 2022 and 2023 are estimated to have fuel efficiencies of 10.01 mpg and 10.35 mpg, respectively. Table 4-7 provides an estimated annual fuel consumption resulting from MHDTs related to the Project construction vendor trips. Based on Table 4-7, it is estimated that 2,050 gallons of fuel will be consumed related to MHDTs from construction vendor trips.

TABLE 4-7: CONSTRUCTION VENDOR FUEL CONSUMPTION ESTIMATES – MHDT

Construction Activity	Worker Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
2022					
Building Construction (65 days)	16	6.9	7,176	10.01	717
2023					
Building Construction (125 days)	16	6.9	13,800	10.35	1,333
				PROJECT MHDT TOTAL	***2,050***

As generated by EMFAC2017, an aggregated fuel economy of HHDTs ranging from model years 2022 and 2023 are estimated to have fuel efficiencies of 7.10 mpg and 7.42 mpg, respectively. Table 4-8 provides an estimated annual fuel consumption resulting from HHDTs related to the Project construction vendor/hauling trips. Based on Table 4-8, it is estimated that 106,036 gallons of fuel will be consumed related to HHDTs from construction vendor/hauling trips.

TABLE 4-8: CONSTRUCTION VENDOR/HAULING FUEL CONSUMPTION ESTIMATES – HHDT (1 OF 2)

Construction Activity	Worker Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Vendor					
2022					
Building Construction (65 days)	16	6.9	7,176	7.10	1,011

TABLE 4-8: CONSTRUCTION VENDOR/HAULING FUEL CONSUMPTION ESTIMATES – HHDT (2 OF 2)

Construction Activity	Worker Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Vendor					
2023					
Building Construction (125 days)	16	6.9	13,800	7.42	1,860
Hauling					
2022					
Grading (45 days)	750	20	675,000	7.10	95,077
2023					
Demolition (30 days)	100	20	60,000	7.42	8,088
				PROJECT HHDT TOTAL	***106,036***

It should be noted that Project construction vendor trips would represent a "single-event" diesel fuel demand and would not require on-going or permanent commitment of diesel fuel resources for this purpose.

4.3.5 CONSTRUCTION ENERGY EFFICIENCY/CONSERVATION MEASURES

The equipment used for Project construction would conform to CARB regulations and California emissions standards. There are no unusual Project characteristics or construction processes that would require the use of equipment that would be more energy intensive than is used for comparable activities; or equipment that would not conform to current emissions standards (and related fuel efficiencies). Equipment employed in construction of the Project would therefore not result in inefficient wasteful, or unnecessary consumption of fuel.

The Project would utilize construction contractors which practice compliance with applicable CARB regulation regarding retrofitting, repowering, or replacement of diesel off-road construction equipment. Additionally, CARB has adopted the Airborne Toxic Control Measure to limit heavy-duty diesel motor vehicle idling in order to reduce public exposure to diesel particulate matter and other Toxic Air Contaminants. Compliance with anti-idling and emissions regulations would result in a more efficient use of construction-related energy and the minimization or elimination of wasteful or unnecessary consumption of energy. Idling restrictions and the use of newer engines and equipment would result in less fuel combustion and energy consumption.

Additionally, certain incidental construction-source energy efficiencies would likely accrue through implementation of California regulations and best available control measures (BACM). More specifically, CCR Title 13, Motor Vehicles, section 2449(d)(3) Idling, limits idling times of construction vehicles to no more than five minutes, thereby precluding unnecessary and wasteful consumption of fuel due to unproductive idling of construction equipment. To this end, "grading plans shall reference the requirement that a sign shall be posted on-site stating that construction workers need to shut off engines at or before five minutes of idling." In this manner, construction equipment operators are informed that engines are to be turned off at or prior to five minutes of idling. Enforcement of idling limitations is realized through periodic site inspections conducted by City building officials, and/or in response to citizen complaints.

Indirectly, construction energy efficiencies and energy conservation would be achieved for the proposed development through energy efficiencies realized from bulk purchase, transport and use of construction materials.

A full analysis related to the energy needed to form construction materials is not included in this analysis due to a lack of detailed Project-specific information on construction materials. At this time, an analysis of the energy needed to create Project-related construction materials would be extremely speculative and thus has not been prepared.

In general, the construction processes promote conservation and efficient use of energy by reducing raw materials demands, with related reduction in energy demands associated with raw materials extraction, transportation, processing and refinement. Use of materials in bulk reduces energy demands associated with preparation and transport of construction materials as well as the transport and disposal of construction waste and solid waste in general, with corollary reduced demands on area landfill capacities and energy consumed by waste transport and landfill operations.

4.4 OPERATIONAL ENERGY DEMANDS

4.4.1 TRANSPORTATION ENERGY DEMANDS

Energy that would be consumed by Proposed Project-generated traffic is a function of total VMT and estimated vehicle fuel economies of vehicles accessing the Project site. The following vehicle subcategories included in this analysis are consistent with CalEEMod and EMFAC.

LIGHT-DUTY AUTOS

With respect to estimated VMT, and based on the trip frequency and trip length methodologies cited in the Project's AQIA, the Project would generate an estimated 2,175,813 annual VMT along area roadways for all LDAs with full build-out of the Project (23). Table 4-9 provides an estimated range of annual fuel consumption resulting from Project generated LDAs. Based on Table 4-9, it is estimated that 64,829 gallons of fuel will be consumed from Project generated LDA trips.

TABLE 4-9: PROJECT-GENERATED LDA VEHICLE TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
2,175,813	33.56	64,829

LIGHT-DUTY TRUCKS

With respect to estimated VMT, and based on the trip frequency and trip length methodologies cited in the Project's AQIA, the Project would generate an estimated 143,772 annual VMT along area roadways for all Light-Duty Trucks (LDT1)[3] vehicles with full build-out of the Project (23). Table 4-10 provides an estimated range of annual fuel consumption resulting from Project generated LDT1s. Based on Table 4-10, it is estimated that 5,132 gallons of fuel will be consumed from Project generated LDT1 trips.

TABLE 4-10: PROJECT-GENERATED LDT1 VEHICLE TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
143,772	28.01	5,132

Additionally, the Project would generate an estimated 741,260 annual VMT along area roadways for all LDT2[4] vehicles with full build-out of the Project (23). Table 4-11 provides an estimated range of annual fuel consumption resulting from Project generated LDT2s. Based on Table 4-11, it is estimated that 27,817 gallons of fuel will be consumed from Project generated LDT2 trips.

TABLE 4-11: PROJECT-GENERATED LDT2 VEHICLE TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
741,260	26.65	27,817

MEDIUM-DUTY TRUCKS

With respect to estimated VMT, and based on the trip frequency and trip length methodologies cited in the Project's AQIA, the Project would generate an estimated 446,363 annual VMT along area roadways for all Medium-Duty Trucks (MDV) vehicles with full build-out of the Project (23). Table 4-12 provides an estimated range of annual fuel consumption resulting from Project generated MDVs. Based on Table 4-12, it is estimated that 20,956 gallons of fuel will be consumed from Project generated MDV trips.

TABLE 4-12: PROJECT-GENERATED MDV VEHICLE TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
446,363	21.30	20,956

LIGHT-HEAVY DUTY TRUCKS

With respect to estimated VMT, and based on the trip frequency and trip length methodologies cited in the Project's AQIA, the Project would generate an estimated 56,652 annual VMT along

[3] Vehicles under the LDT1 category have a gross vehicle weight rating (GVWR) of less than 6,000 lbs. and equivalent test weight (ETW) of less than or equal to 3,750 lbs.
[4] Vehicles under the LDT2 category have a GVWR of less than 6,000 lbs. and ETW between 3,751 lbs. and 5,750 lbs.

area roadways for all Light-Heavy-Duty Trucks (LHDT1)[5] vehicles with full build-out of the Project (23). Table 4-13 provides an estimated range of annual fuel consumption resulting from Project generated LHDT1s. Based on Table 4-13, it is estimated that 3,915 gallons of fuel will be consumed from Project generated LHDT1 trips.

TABLE 4-13: PROJECT-GENERATED LHDT1 TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
56,652	14.47	3,915

Additionally, the Project would generate an estimated 19,061 annual VMT along area roadways for all LHDT2[6] vehicles with full build-out of the Project (23). Table 4-14 provides an estimated range of annual fuel consumption resulting from Project generated LHDT2s. Based on Table 4-14, it is estimated that 1,271gallons of fuel will be consumed from Project generated LHDT2 trips.

TABLE 4-14: PROJECT-GENERATED LHDT2 TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
19,061	14.99	1,271

MEDIUM-HEAVY DUTY TRUCKS

With respect to estimated VMT, and based on the trip frequency and trip length methodologies cited in the Project's AQIA, the Project would generate an estimated 69,820 annual VMT along area roadways for all MHDTs with full build-out of the Project (23). Table 4-15 provides an estimated range of annual fuel consumption resulting from Project generated MHDTs. Based on Table 4-15, it is estimated that 6,744 gallons of fuel will be consumed from Project generated MHDT trips.

TABLE 4-15: PROJECT-GENERATED MHDT TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
69,820	10.35	6,744

HEAVY-HEAVY DUTY TRUCKS

With respect to estimated VMT, and based on the trip frequency and trip length methodologies cited in the Project's AQIA, the Project would generate an estimated 278,160 annual VMT along area roadways for all HHDTs with full build-out of the Project (23). Table 4-16 provides an estimated range of annual fuel consumption resulting from Project generated HHDTs. Based on Table 4-16, it is estimated that 37,496 gallons of fuel will be consumed from Project generated HHDT trips.

[5] Vehicles under the LHDT1 category have a GVWR of 8,501 to 10,000 lbs.
[6] Vehicles under the LHDT2 category have a GVWR of 10,001 to 14,000 lbs.

TABLE 4-16: PROJECT-GENERATED HHDT TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
278,160	7.42	37,496

OTHER BUSES

With respect to estimated VMT, and based on the trip frequency and trip length methodologies cited in the Project's AQIA, the Project would generate an estimated 5,588 annual VMT along area roadways for all Other Buses (OBUS) with full build-out of the Project (23). Table 4-17 provides an estimated range of annual fuel consumption resulting from Project generated OBUS vehicles. Based on Table 4-17, it is estimated that 831 gallons of fuel will be consumed from Project generated OBUS trips.

TABLE 4-17: PROJECT-GENERATED OBUS TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
5,588	6.73	831

URBAN BUSES

With respect to estimated VMT, and based on the trip frequency and trip length methodologies cited in the Project's AQIA, the Project would generate an estimated 4,549 annual VMT along area roadways for all Urban Buses (UBUS) with full build-out of the Project (23). Table 4-18 provides an estimated range of annual fuel consumption resulting from Project generated UBUS vehicles. Based on Table 4-18, it is estimated that 909 gallons of fuel will be consumed from Project generated UBUS trips.

TABLE 4-18: PROJECT-GENERATED UBUS TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
4,549	5.00	909

MOTORCYCLES

With respect to estimated VMT, and based on the trip frequency and trip length methodologies cited in the Project's AQIA, the Project would generate an estimated 17,879 annual VMT along area roadways for all Motorcycles (MCY) with full build-out of the Project (23). Table 4-19 provides an estimated range of annual fuel consumption resulting from Project generated MCY vehicles. Based on Table 4-19, it is estimated that 467 gallons of fuel will be consumed from Project generated MCY trips.

TABLE 4-19: PROJECT-GENERATED MCY TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
17,879	38.26	467

SCHOOL BUSES

With respect to estimated VMT, and based on the trip frequency and trip length methodologies cited in the Project's AQIA, the Project would generate an estimated 3,641 annual VMT along area roadways for all School Buses (SBUS) with full build-out of the Project (23). Table 4-20 provides an estimated range of annual fuel consumption resulting from Project generated SBUS vehicles. Based on Table 4-20, it is estimated that 449 gallons of fuel will be consumed from Project generated SBUS trips.

TABLE 4-20: PROJECT-GENERATED SBUS TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
3,641	8.10	449

MOTOR HOMES

With respect to estimated VMT, and based on the trip frequency and trip length methodologies cited in the Project's AQIA, the Project would generate an estimated 3,562 annual VMT along area roadways for all Motor Homes (MH) with full build-out of the Project (23). Table 4-21 provides an estimated range of annual fuel consumption resulting from Project generated MH vehicles. Based on Table 4-21, it is estimated that 574 gallons of fuel will be consumed from Project generated MH trips.

TABLE 4-21: PROJECT-GENERATED MH TRAFFIC ANNUAL FUEL CONSUMPTION

Annual VMT	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
3,562	6.21	574

As summarized on Table 4-22 the Project will result in 3,966,119 annual VMT and an estimated annual fuel consumption of 171,391 gallons of fuel.

TABLE 4-22: TOTAL PROJECT-GENERATED TRAFFIC ANNUAL FUEL CONSUMPTION (ALL VEHICLES)

Vehicle Type	Annual VMT	Estimated Annual Fuel Consumption (gallons)
LDA	2,175,813	64,829
LDT1	143,772	5,132
LDT2	741,260	27,817
MDV	446,363	20,956
LHDT1	56,652	3,915
LHDT2	19,061	1,271
MHDT	69,820	6,744
HHD T	278,160	37,496
OBUS	5,588	831
UBUS	4,549	909
MCY	17,879	467
SBUS	3,641	449
MH	3,562	574
TOTAL (ALL VEHICLES)	***3,966,119***	***171,391***

4.4.2 FACILITY ENERGY DEMANDS

Energy use in buildings is divided into energy consumed by the built environment and energy consumed by uses that are independent of the construction of the building such as in plug-in appliances. In California, the California Building Standards Code Title 24 governs energy consumed by the built environment, mechanical systems, and some types of fixed lighting (29). Non-building energy use, or “plug-in” energy use can be further subdivided by specific end-use (refrigeration, cooking, appliances, etc.).

Project building operations and Project site maintenance activities would result in the consumption of natural gas and electricity. Natural gas would be supplied to the Project by SoCalGas; electricity would be supplied to the Project by SCE. Annual natural gas and electricity demands of the Project are summarized in Table 4-23.

Energy use in buildings is divided into energy consumed by the built environment and energy consumed by uses that are independent of the construction of the building such as in plug-in appliances. In California, the California Building Standards Code Title 24 governs energy consumed by the built environment, mechanical systems, and some types of fixed lighting (29). Non-building energy use, or “plug-in” energy use can be further subdivided by specific end-use (refrigeration, cooking, appliances, etc.).

TABLE 4-23: PROJECT ANNUAL OPERATIONAL ENERGY DEMAND SUMMARY

Natural Gas Demand	kBTU/year
High School	276,805
Other Asphalt Surfaces	0
Other Non-Asphalt Surfaces	0
Parking Lot	0
TOTAL PROJECT NATURAL GAS DEMAND	***276,805***
Electricity Demand	**kWh/year**
High School	230,740
Other Asphalt Surfaces	0
Other Non-Asphalt Surfaces	0
Parking Lot	6,720
TOTAL PROJECT ELECTRICITY DEMAND	***237,460***

kBTU – kilo-British Thermal Units

4.4.3 OPERATIONAL ENERGY EFFICIENCY/CONSERVATION MEASURES

Energy efficiency/energy conservation attributes of the Project would be complemented by increasingly stringent state and federal regulatory actions addressing vehicle fuel economies and vehicle emissions standards; and enhanced building/utilities energy efficiencies mandated under California building codes (e.g., Title24, California Green Building Standards Code).

It should also be noted that the Project would not result in a substantial increase in demand or transmission service, resulting in the need for new or expanded sources of energy supply or new or expanded energy delivery systems or infrastructure because it would be served by the existing electric utility lines in the Project vicinity.

ENHANCED VEHICLE FUEL EFFICIENCIES

Project annual fuel consumption estimates presented previously in Tables 4-22 represent likely potential maximums that would occur for the Project. Under subsequent future conditions, average fuel economies of vehicles accessing the Project site can be expected to improve as older, less fuel-efficient vehicles are removed from circulation, and in response to fuel economy and emissions standards imposed on newer vehicles entering the circulation system.

4.5 SUMMARY

4.5.1 CONSTRUCTION ENERGY DEMANDS

The estimated power cost of on-site electricity usage during the construction of the Project is assumed to be around $1,155.36. Additionally, based on the assumed power cost, it is estimated that the total electricity usage during construction, after full Project build-, is calculated to be around 14,461 kWh.

Construction equipment used by the Project would result in single event consumption of approximately 70,624 gallons of diesel fuel. Construction equipment use of fuel would not be atypical for the type of construction proposed because there are no aspects of the Project's proposed construction process that are unusual or energy-intensive, and Project construction equipment would conform to the applicable CARB emissions standards, acting to promote equipment fuel efficiencies.

CCR Title 13, Title 13, Motor Vehicles, section 2449(d)(3) Idling, limits idling times of construction vehicles to no more than 5 minutes, thereby precluding unnecessary and wasteful consumption of fuel due to unproductive idling of construction equipment. BACMs inform construction equipment operators of this requirement. Enforcement of idling limitations is realized through periodic site inspections conducted by City building officials, and/or in response to citizen complaints.

Construction worker trips for full construction of the Project would result in the estimated fuel consumption of 8,174 gallons of fuel. Additionally, fuel consumption from construction vendor trips (MHDTs and HHDTs) will total approximately 108,036 gallons. Diesel fuel would be supplied by City and regional commercial vendors. Indirectly, construction energy efficiencies and energy conservation would be achieved using bulk purchases, transport and use of construction materials. The 2019 IEPR released by the CEC has shown that fuel efficiencies are getting better within on and off-road vehicle engines due to more stringent government requirements (19). As supported by the preceding discussions, Project construction energy consumption would not be considered inefficient, wasteful, or otherwise unnecessary.

4.5.2 OPERATIONAL ENERGY DEMANDS

TRANSPORTATION ENERGY DEMANDS

Annual vehicular trips and related VMT generated by the operational of the Project would result in an estimated 64,829 gallons of fuel consumption per year for LDAs, 5,132 gallons of fuel of LDT1s, 27,817 gallons of fuel for LDT2s, 20,956 gallons for fuel for MDVs, 3,915 gallons of fuel for LHDT1s, 1,271 gallons of fuel for LHDT2s, 6,744 gallons of fuel for MHDTs, 37,496 gallons for fuel for HHDTs, 831 gallons of fuel of OBUS, 909 gallons of fuel for UBUS, 467 gallons for fuel for MCYs, 449 gallons of fuel for SBUS, and 574 gallons of fuel for MHs. The total estimated annual fuel consumption from Project generated VMT would result in a fuel demand 171,391 gallons of fuel.

Fuel would be provided by current and future commercial vendors. Trip generation and VMT generated by the Project are consistent with other residential and commercial uses of similar scale and configuration, as reflected respectively in the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Ed., 2017); and CalEEMod. That is, the Project does not propose uses or operations that would inherently result in excessive and wasteful vehicle trips and VMT, nor associated excess and wasteful vehicle energy consumption.

Enhanced fuel economies realized pursuant to federal and state regulatory actions, and related transition of vehicles to alternative energy sources (e.g., electricity, natural gas, biofuels, hydrogen cells) would likely decrease future gasoline fuel demands per VMT. Location of the Project proximate to regional and local roadway systems tends to reduce VMT within the region, acting to reduce regional vehicle energy demands. The Project would implement sidewalks, facilitating and encouraging pedestrian access. Facilitating pedestrian and bicycle access would reduce VMT and associated energy consumption. In compliance with the California Green Building Standards Code, the Project would promote the use of bicycles as an alternative mean of transportation by providing short-term and/or long-term bicycle parking accommodations. As supported by the preceding discussions, Project transportation energy consumption would not be considered inefficient, wasteful, or otherwise unnecessary.

FACILITY ENERGY DEMANDS

Project facility operational energy demands are estimated at: 276,805 kBTU/year of natural gas; and 237,460 kWh/year of electricity. Natural gas would be supplied to the Project by SoCalGas; electricity would be supplied by SCE. The Project proposes conventional residential and commercial uses reflecting contemporary energy efficient/energy conserving designs and operational programs. Uses proposed by the Project are not inherently energy intensive, and the Project energy demands in total would be comparable to, or less than, other projects of similar scale and configuration.

Additionally, the Project is will be required to comply with the applicable Title 24 standards which will further ensure that the Project energy demands would not be inefficient, wasteful, or otherwise unnecessary.

This page intentionally left blank

5 CONCLUSIONS

***Energy Impact-1:* *Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation*.**

As supported by the preceding analyses, Project construction and operations would not result in the inefficient, wasteful or unnecessary consumption of energy. Further, the energy demands of the Project can be accommodated within the context of available resources and energy delivery systems. The Project would therefore not cause or result in the need for additional energy producing or transmission facilities. The Project would not engage in wasteful or inefficient uses of energy and aims to achieve energy conservations goals within the State of California.

***Energy Impact-2:* *Conflict with or obstruct a state or local plan for renewable energy or energy efficiency*.**

The proposed Project is subject to California Building Code requirements. New buildings must achieve compliance with 2019 Building and Energy Efficiency Standards and the 2019 California Green Building Standards requirements.

The Project would provide for, and promote, energy efficiencies equal to or beyond those required under other applicable federal and State of California standards and regulations, and in so doing would meet or exceed all California Building Standards Code Title 24 standards. Moreover, energy consumed by the Project’s operation is calculated to be comparable to, or less than, energy consumed by other residential and commercial uses of similar scale and intensity that are constructed and operating in California. On this basis, the Project would not result in the inefficient, wasteful, or unnecessary consumption of energy. Further, the Project would not cause or result in the need for additional energy producing facilities or energy delivery systems.

This page intentionally left blank

6 REFERENCES

1. **Association of Environmental Professionals.** *2018 CEQA California Environmental Quality Act.* 2018.
2. **Administration, U.S. Energy Information.** California State Profile and Energy Estimates. [Online] https://www.eia.gov/state/data.php?sid=CA#ConsumptionExpenditures.
3. **California Energy Commission.** *Transportation Energy Demand Forecast 2018-2030.* 2018.
4. **Alternate Fuels Data Center. *U.S. Department of Energy.* [Online] https://afdc.energy.gov/states/ca.**
5. **U.S. Energy Information Administration. California Energy Consumption by End-Use Sector. *California State Profile and Energy Estimates.* [Online] https://www.eia.gov/state/?sid=CA#tabs-2.**
6. **California Energy Commission. Total System Electric Generation. *CA.gov.* [Online] https://www.energy.ca.gov/almanac/electricity_data/total_system_power.html.**
7. **Jet fuel consumption, price, and expenditure estimates, 2017. *U.S. Energy Information Administration.* [Online] https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_fuel/html/fuel_jf.html.**
8. **State Profile Data: California. *U.S. Energy and Information Administration.* [Online] https://www.eia.gov/state/data.php?sid=CA.**
9. **U.S. Energy Information Administration. State Profile and Energy Estimates. *Independent Statistics and Analysis.* [Online] http://www.eia.gov/state/?sid=CA#tabs2..**
10. **California Energy Commission. 2013 Integrated Energy Policy Report. [Online] 2013. http://www.energy.ca.gov/2013publications/CEC-100-2013-001/CEC-100-2013-001-CMF.pdf.**
11. **—. *2014 IEPR Update.* 2014.**
12. **—. California Energy Almanac. *Utility Energy Supply Plans from 2013.* [Online] https://www.energy.ca.gov/almanac/electricity_data/s-2_supply_forms_2013/.**
13. **California ISO. Understanding the ISO. [Online] http://www.caiso.com/about/Pages/OurBusiness/UnderstandingtheISO/default.aspx.**
14. **Southern California Edison. 2018 Power Content Label. *Southern California Edison.* [Online] 2018. https://www.sce.com/sites/default/files/inline-files/2018SCEPCL.pdf.**
15. **California Public Utilities Commission. Natural Gas and California. [Online] http://www.cpuc.ca.gov/general.aspx?id=4802.**
16. **Department of Motor Vehicles. *State of California Department of Motor Vehicles Statistics For Publication January Through December 2017.* 2018.**
17. **U.S. Energy Information Administration. Use of Energy in the United States Explained Energy Use for Transportation. [Online] https://www.eia.gov/energyexplained/?page=us_energy_transportation.**
18. **—. Natural Gas Consumption by End Use. [Online] https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm.**
19. **California Energy Commission Staff. 2019 Integrated Energy Policy Report Update. [Online] 2019. [Cited: March 26, 2020.] https://ww2.energy.ca.gov/2019_energypolicy/.**

20. The California Energy Commission. 2019 Building Energy Efficiency Standards . *California Energy Commission.* [Online] 2018. https://www.energy.ca.gov/title24/2019standards/documents/2018_Title_24_2019_Building_Standards_FAQ.pdf.

21. California Energy Commission. Renewables Portfolio Standard (RPS). [Online] 2002. http://www.energy.ca.gov/portfolio/.

22. State of California. *California Environmental Quality Act Guideline, California Public Resources Code, Title 14, Division 6, Chapter 3,.*

23. Urban Crossroads, Inc. *Murrieta Canyon Academy Air Quality Impact Report.* 2020.

24. California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod). [Online] September 2016. www.caleemod.com.

25. California Department of Transportation. EMFAC Software. [Online] http://www.dot.ca.gov/hq/env/air/pages/emfac.htm.

26. Pray, Richard. *2017 National Construction Estimator.* Carlsbad : Craftsman Book Company, 2017.

27. Southern California Edison. Schedule GS-1 General Service. *Regulatory Information - Rates Pricing.* [Online] https://library.sce.com/content/dam/sce-doclib/public/regulatory/tariff/electric/schedules/general-service-&-industrial-rates/ELECTRIC_SCHEDULES_GS-1.pdf.

28. California Air Resources Board. *Methods to Find the Cost-Effectiveness of Funding Air Quality Projects For Evaluating Motor Vehicle Registration Fee Projects And Congestion Mitigation and Air Quality Improvement (CMAQ) Projects, Emission Factor Tables.* 2018.

29. State of California. Title 24, Part 6, of the California Code of Regulations. *California's Energy Efficiency Standards for Residential and Nonresidential Buildings.* [Online] http://www.energy.ca.gov/title24/.

This page intentionally left blank

7 CERTIFICATIONS

The contents of this energy analysis report represent an accurate depiction of the environmental impacts associated with the proposed Murrieta Canyon Academy. The information contained in this energy analysis report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5987.

Haseeb Qureshi
Associate Principal
URBAN CROSSROADS, INC.
260 E. Baker St., Suite 200
Costa Mesa, CA 92626
(949) 336-5987
hqureshi@urbanxroads.com

EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Planned Communities and Urban Infill – Urban Land Institute • June 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August 2007
AB2588 Regulatory Standards – Trinity Consultants • November 2006
Air Dispersion Modeling – Lakes Environmental • June 2006

This page intentionally left blank

APPENDIX 4.1:

CALEEMOD ANNUAL CONSTRUCTION EMISSIONS MODEL OUTPUTS

Murrieta Canyon Academy (Unmitigated)

Riverside-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
High School	41.50	1000sqft	0.95	41,500.00	0
Other Asphalt Surfaces	0.53	Acre	0.53	23,086.80	0
Other Non-Asphalt Surfaces	2.59	Acre	2.59	112,820.40	0
Parking Lot	48.00	Space	0.44	19,200.00	0

1.2 Other Project Characteristics

Urbanization Urban

Wind Speed (m/s) 2.4

Precipitation Freq (Days) 28

Climate Zone 10

Operational Year 2023

Utility Company Southern California Edison

CO2 Intensity (lb/MWhr) 702.44

CH4 Intensity (lb/MWhr) 0.029

N2O Intensity (lb/MWhr) 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Total Project Area analyzed is 4.51 acres. The existing parking area (approximately 0.49 acres) in the southern portion of the site will remain and has been excluded from this anlaysis.

Construction Phase - Constructure schedule based on 2023 Opening Year and information provided by the Project Applicant.

Off-road Equipment - Hours are based on an 8-hour workday.

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Off-road Equipment -

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Trips and VMT - Per information provided by the Project Applicant, demolition activities will result in 100 truck trips.

Demolition -

Grading - It is assumed that 5 acres can be graded per day

Architectural Coating - Rule 1113

Vehicle Trips - Based on information provided in the Murrieta Canyon Academy Expansion Traffic Impact Study by RK Engineering Grounp, Inc.

Vehicle Emission Factors - EMFAC2017

Vehicle Emission Factors - EMFAC2017

Vehicle Emission Factors - EMFAC2017

Energy Use - The Project will design building shells and building components to meet 2019 Title 24 Standards which expects 30% less energy for nonresidential uses

Construction Off-road Equipment Mitigation - Rule 403

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	100.00	50.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	50.00
tblConstructionPhase	NumDays	18.00	20.00
tblConstructionPhase	NumDays	230.00	190.00
tblConstructionPhase	NumDays	20.00	30.00

tblConstructionPhase	NumDays	8.00	45.00
tblConstructionPhase	NumDays	18.00	20.00
tblConstructionPhase	NumDays	5.00	45.00
tblEnergyUse	LightingElect	3.03	2.12
tblEnergyUse	T24E	2.78	1.95
tblEnergyUse	T24NG	6.97	4.88
tblGrading	AcresOfGrading	90.00	225.00
tblGrading	AcresOfGrading	90.00	225.00
tblGrading	MaterialExported	0.00	6,000.00
tblLandUse	LotAcreage	0.43	0.44
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblTripsAndVMT	HaulingTripNumber	102.00	100.00
tblVehicleEF	HHD	0.96	0.03
tblVehicleEF	HHD	0.03	0.02
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	2.07	8.39
tblVehicleEF	HHD	0.41	0.21
tblVehicleEF	HHD	1.44	2.6410e-003

tblVehicleEF	HHD	6,147.84	1,374.55
tblVehicleEF	HHD	1,399.88	1,256.69
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	17.43	6.82
tblVehicleEF	HHD	0.97	1.92
tblVehicleEF	HHD	5.1890e-003	2.7370e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	4.9650e-003	2.6180e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.8620e-003	8.8950e-003
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	7.3000e-005	1.0000e-006
tblVehicleEF	HHD	2.3430e-003	5.3000e-005
tblVehicleEF	HHD	0.55	0.57
tblVehicleEF	HHD	4.3000e-005	1.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.5400e-004	2.3900e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.06	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.1000e-005	0.00
tblVehicleEF	HHD	7.3000e-005	1.0000e-006
tblVehicleEF	HHD	2.3430e-003	5.3000e-005

tblVehicleEF	HHD	0.63	0.65
tblVehicleEF	HHD	4.3000e-005	1.0000e-006
tblVehicleEF	HHD	0.08	0.04
tblVehicleEF	HHD	1.5400e-004	2.3900e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.91	0.03
tblVehicleEF	HHD	0.03	0.02
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	1.50	8.28
tblVehicleEF	HHD	0.41	0.21
tblVehicleEF	HHD	1.38	2.5010e-003
tblVehicleEF	HHD	6,513.09	1,357.07
tblVehicleEF	HHD	1,399.88	1,256.69
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	17.99	6.49
tblVehicleEF	HHD	0.91	1.81
tblVehicleEF	HHD	4.3760e-003	2.4170e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	4.1860e-003	2.3130e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.8620e-003	8.8950e-003
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	1.4000e-004	3.0000e-006

tblVehicleEF	HHD	2.6540e-003	5.8000e-005
tblVehicleEF	HHD	0.51	0.60
tblVehicleEF	HHD	8.2000e-005	2.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.5700e-004	2.4200e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.06	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.0000e-005	0.00
tblVehicleEF	HHD	1.4000e-004	3.0000e-006
tblVehicleEF	HHD	2.6540e-003	5.8000e-005
tblVehicleEF	HHD	0.59	0.69
tblVehicleEF	HHD	8.2000e-005	2.0000e-006
tblVehicleEF	HHD	0.08	0.04
tblVehicleEF	HHD	1.5700e-004	2.4200e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	1.04	0.02
tblVehicleEF	HHD	0.03	8.7800e-004
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	2.85	8.52
tblVehicleEF	HHD	0.41	0.16
tblVehicleEF	HHD	1.46	2.6330e-003
tblVehicleEF	HHD	5,643.45	1,394.57
tblVehicleEF	HHD	1,399.88	1,245.20
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	16.66	7.25
tblVehicleEF	HHD	0.96	1.90

tblVehicleEF	HHD	6.3140e-003	3.1380e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	6.0400e-003	3.0020e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	5.5000e-005	1.0000e-006
tblVehicleEF	HHD	2.4340e-003	5.8000e-005
tblVehicleEF	HHD	0.59	0.52
tblVehicleEF	HHD	3.6000e-005	1.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.6500e-004	2.5400e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.05	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.1000e-005	0.00
tblVehicleEF	HHD	5.5000e-005	1.0000e-006
tblVehicleEF	HHD	2.4340e-003	5.8000e-005
tblVehicleEF	HHD	0.68	0.59
tblVehicleEF	HHD	3.6000e-005	1.0000e-006
tblVehicleEF	HHD	0.08	0.02
tblVehicleEF	HHD	1.6500e-004	2.5400e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	LDA	3.3240e-003	1.9160e-003

tblVehicleEF	LDA	4.1920e-003	0.04
tblVehicleEF	LDA	0.51	0.57
tblVehicleEF	LDA	0.96	2.01
tblVehicleEF	LDA	235.32	250.08
tblVehicleEF	LDA	54.50	51.54
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.04	0.06
tblVehicleEF	LDA	0.09	0.09
tblVehicleEF	LDA	0.03	0.05
tblVehicleEF	LDA	8.3520e-003	7.0950e-003
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.06	0.19
tblVehicleEF	LDA	2.3560e-003	2.4740e-003
tblVehicleEF	LDA	5.6100e-004	5.1000e-004
tblVehicleEF	LDA	0.04	0.06
tblVehicleEF	LDA	0.09	0.09
tblVehicleEF	LDA	0.03	0.05
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.06	0.21
tblVehicleEF	LDA	3.7650e-003	2.1830e-003
tblVehicleEF	LDA	3.6350e-003	0.04
tblVehicleEF	LDA	0.62	0.70

tblVehicleEF	LDA	0.85	1.77
tblVehicleEF	LDA	256.22	271.87
tblVehicleEF	LDA	54.50	51.08
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.09	0.12
tblVehicleEF	LDA	0.10	0.11
tblVehicleEF	LDA	0.06	0.09
tblVehicleEF	LDA	9.4470e-003	8.0120e-003
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.05	0.17
tblVehicleEF	LDA	2.5670e-003	2.6900e-003
tblVehicleEF	LDA	5.5900e-004	5.0600e-004
tblVehicleEF	LDA	0.09	0.12
tblVehicleEF	LDA	0.10	0.11
tblVehicleEF	LDA	0.06	0.09
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.05	0.18
tblVehicleEF	LDA	3.2080e-003	1.8500e-003
tblVehicleEF	LDA	4.3060e-003	0.05
tblVehicleEF	LDA	0.48	0.54
tblVehicleEF	LDA	0.98	2.05
tblVehicleEF	LDA	229.53	244.11

tblVehicleEF	LDA	54.50	51.61
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.10	0.10
tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	8.0650e-003	6.8540e-003
tblVehicleEF	LDA	0.04	0.22
tblVehicleEF	LDA	0.06	0.19
tblVehicleEF	LDA	2.2980e-003	2.4150e-003
tblVehicleEF	LDA	5.6100e-004	5.1100e-004
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.10	0.10
tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	0.01	9.9700e-003
tblVehicleEF	LDA	0.04	0.22
tblVehicleEF	LDA	0.06	0.21
tblVehicleEF	LDT1	9.2940e-003	5.9940e-003
tblVehicleEF	LDT1	0.01	0.07
tblVehicleEF	LDT1	1.18	1.28
tblVehicleEF	LDT1	2.73	2.25
tblVehicleEF	LDT1	295.40	299.04
tblVehicleEF	LDT1	68.37	62.77
tblVehicleEF	LDT1	0.11	0.11

tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.18	0.19
tblVehicleEF	LDT1	0.30	0.23
tblVehicleEF	LDT1	0.12	0.13
tblVehicleEF	LDT1	0.02	0.03
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.19	0.35
tblVehicleEF	LDT1	2.9680e-003	2.9590e-003
tblVehicleEF	LDT1	7.3100e-004	6.2100e-004
tblVehicleEF	LDT1	0.18	0.19
tblVehicleEF	LDT1	0.30	0.23
tblVehicleEF	LDT1	0.12	0.13
tblVehicleEF	LDT1	0.03	0.04
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.21	0.39
tblVehicleEF	LDT1	0.01	6.7740e-003
tblVehicleEF	LDT1	0.01	0.06
tblVehicleEF	LDT1	1.43	1.55
tblVehicleEF	LDT1	2.40	1.99
tblVehicleEF	LDT1	320.93	322.22
tblVehicleEF	LDT1	68.37	62.22
tblVehicleEF	LDT1	0.11	0.10
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003

tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.36	0.37
tblVehicleEF	LDT1	0.37	0.28
tblVehicleEF	LDT1	0.24	0.25
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.16	0.31
tblVehicleEF	LDT1	3.2270e-003	3.1890e-003
tblVehicleEF	LDT1	7.2500e-004	6.1600e-004
tblVehicleEF	LDT1	0.36	0.37
tblVehicleEF	LDT1	0.37	0.28
tblVehicleEF	LDT1	0.24	0.25
tblVehicleEF	LDT1	0.04	0.04
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.18	0.34
tblVehicleEF	LDT1	8.9360e-003	5.7650e-003
tblVehicleEF	LDT1	0.01	0.07
tblVehicleEF	LDT1	1.11	1.19
tblVehicleEF	LDT1	2.78	2.30
tblVehicleEF	LDT1	287.77	292.00
tblVehicleEF	LDT1	68.37	62.89
tblVehicleEF	LDT1	0.11	0.10
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003

tblVehicleEF	LDT1	0.16	0.16
tblVehicleEF	LDT1	0.33	0.25
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.02	0.03
tblVehicleEF	LDT1	0.21	0.85
tblVehicleEF	LDT1	0.19	0.36
tblVehicleEF	LDT1	2.8910e-003	2.8900e-003
tblVehicleEF	LDT1	7.3200e-004	6.2200e-004
tblVehicleEF	LDT1	0.16	0.16
tblVehicleEF	LDT1	0.33	0.25
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.03	0.04
tblVehicleEF	LDT1	0.21	0.85
tblVehicleEF	LDT1	0.21	0.40
tblVehicleEF	LDT2	4.7540e-003	3.3780e-003
tblVehicleEF	LDT2	5.7630e-003	0.06
tblVehicleEF	LDT2	0.68	0.83
tblVehicleEF	LDT2	1.27	2.55
tblVehicleEF	LDT2	330.23	314.65
tblVehicleEF	LDT2	76.02	66.37
tblVehicleEF	LDT2	0.06	0.07
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.06	0.10
tblVehicleEF	LDT2	0.10	0.13

tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.08	0.28
tblVehicleEF	LDT2	3.3070e-003	3.1130e-003
tblVehicleEF	LDT2	7.8100e-004	6.5700e-004
tblVehicleEF	LDT2	0.06	0.10
tblVehicleEF	LDT2	0.10	0.13
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.09	0.31
tblVehicleEF	LDT2	5.3890e-003	3.8410e-003
tblVehicleEF	LDT2	5.0030e-003	0.05
tblVehicleEF	LDT2	0.83	1.02
tblVehicleEF	LDT2	1.13	2.26
tblVehicleEF	LDT2	359.32	336.75
tblVehicleEF	LDT2	76.02	65.79
tblVehicleEF	LDT2	0.06	0.06
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.12	0.20
tblVehicleEF	LDT2	0.12	0.15
tblVehicleEF	LDT2	0.10	0.15
tblVehicleEF	LDT2	0.01	0.02

tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.07	0.25
tblVehicleEF	LDT2	3.6000e-003	3.3320e-003
tblVehicleEF	LDT2	7.7900e-004	6.5100e-004
tblVehicleEF	LDT2	0.12	0.20
tblVehicleEF	LDT2	0.12	0.15
tblVehicleEF	LDT2	0.10	0.15
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.07	0.27
tblVehicleEF	LDT2	4.5710e-003	3.2420e-003
tblVehicleEF	LDT2	5.9350e-003	0.06
tblVehicleEF	LDT2	0.63	0.78
tblVehicleEF	LDT2	1.30	2.62
tblVehicleEF	LDT2	321.50	307.92
tblVehicleEF	LDT2	76.02	66.50
tblVehicleEF	LDT2	0.06	0.07
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.11	0.13
tblVehicleEF	LDT2	0.04	0.07
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.07	0.47
tblVehicleEF	LDT2	0.08	0.29

tblVehicleEF	LDT2	3.2190e-003	3.0460e-003
tblVehicleEF	LDT2	7.8200e-004	6.5800e-004
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.11	0.13
tblVehicleEF	LDT2	0.04	0.07
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.07	0.47
tblVehicleEF	LDT2	0.09	0.32
tblVehicleEF	LHD1	4.9950e-003	4.6360e-003
tblVehicleEF	LHD1	8.5970e-003	4.3560e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.81	0.59
tblVehicleEF	LHD1	2.14	0.90
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.59
tblVehicleEF	LHD1	29.33	10.19
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.91	1.31
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004

tblVehicleEF	LHD1	3.6750e-003	2.8510e-003
tblVehicleEF	LHD1	0.10	0.07
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.8430e-003	1.4280e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.31	0.45
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3400e-004	1.0100e-004
tblVehicleEF	LHD1	3.6750e-003	2.8510e-003
tblVehicleEF	LHD1	0.10	0.07
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.8430e-003	1.4280e-003
tblVehicleEF	LHD1	0.08	0.06
tblVehicleEF	LHD1	0.31	0.45
tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD1	4.9950e-003	4.6470e-003
tblVehicleEF	LHD1	8.7610e-003	4.4230e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.82	0.60
tblVehicleEF	LHD1	2.04	0.86
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.61
tblVehicleEF	LHD1	29.33	10.11
tblVehicleEF	LHD1	0.09	0.08

tblVehicleEF	LHD1	1.80	1.24
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	6.8550e-003	5.3200e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	3.4810e-003	2.7140e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.32	0.46
tblVehicleEF	LHD1	0.22	0.06
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3200e-004	1.0000e-004
tblVehicleEF	LHD1	6.8550e-003	5.3200e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	3.4810e-003	2.7140e-003
tblVehicleEF	LHD1	0.09	0.06
tblVehicleEF	LHD1	0.32	0.46
tblVehicleEF	LHD1	0.24	0.07
tblVehicleEF	LHD1	4.9950e-003	4.6350e-003

tblVehicleEF	LHD1	8.5850e-003	4.3480e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.81	0.59
tblVehicleEF	LHD1	2.14	0.90
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.59
tblVehicleEF	LHD1	29.33	10.19
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.89	1.30
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	3.2380e-003	2.5030e-003
tblVehicleEF	LHD1	0.11	0.08
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.6810e-003	1.2970e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.33	0.49
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003

tblVehicleEF	LHD1	3.3400e-004	1.0100e-004
tblVehicleEF	LHD1	3.2380e-003	2.5030e-003
tblVehicleEF	LHD1	0.11	0.08
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.6810e-003	1.2970e-003
tblVehicleEF	LHD1	0.08	0.06
tblVehicleEF	LHD1	0.33	0.49
tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD2	3.3070e-003	3.0000e-003
tblVehicleEF	LHD2	3.5370e-003	3.2750e-003
tblVehicleEF	LHD2	6.6670e-003	7.9190e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.44
tblVehicleEF	LHD2	1.03	0.52
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.68
tblVehicleEF	LHD2	22.93	7.02
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.29	1.45
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005

tblVehicleEF	LHD2	1.3090e-003	1.5300e-003
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	7.0300e-004	7.9000e-004
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4800e-004	6.9000e-005
tblVehicleEF	LHD2	1.3090e-003	1.5300e-003
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	7.0300e-004	7.9000e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	LHD2	3.3070e-003	3.0070e-003
tblVehicleEF	LHD2	3.5730e-003	3.2970e-003
tblVehicleEF	LHD2	6.4430e-003	7.6530e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.45
tblVehicleEF	LHD2	0.98	0.50
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.69
tblVehicleEF	LHD2	22.93	6.98
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.22	1.37

tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005
tblVehicleEF	LHD2	2.4680e-003	2.8830e-003
tblVehicleEF	LHD2	0.04	0.05
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	1.3130e-003	1.4920e-003
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4700e-004	6.9000e-005
tblVehicleEF	LHD2	2.4680e-003	2.8830e-003
tblVehicleEF	LHD2	0.04	0.05
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	1.3130e-003	1.4920e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	LHD2	3.3070e-003	2.9980e-003
tblVehicleEF	LHD2	3.5300e-003	3.2690e-003
tblVehicleEF	LHD2	6.7050e-003	7.9760e-003

tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.44
tblVehicleEF	LHD2	1.03	0.52
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.68
tblVehicleEF	LHD2	22.93	7.03
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.28	1.44
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005
tblVehicleEF	LHD2	1.0230e-003	1.1840e-003
tblVehicleEF	LHD2	0.04	0.04
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	5.9800e-004	6.5900e-004
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.08	0.24
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4800e-004	7.0000e-005
tblVehicleEF	LHD2	1.0230e-003	1.1840e-003
tblVehicleEF	LHD2	0.04	0.04

tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	5.9800e-004	6.5900e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.08	0.24
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	MCY	0.43	0.32
tblVehicleEF	MCY	0.15	0.24
tblVehicleEF	MCY	18.81	18.95
tblVehicleEF	MCY	9.70	8.59
tblVehicleEF	MCY	166.71	208.09
tblVehicleEF	MCY	45.36	60.09
tblVehicleEF	MCY	1.12	1.12
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	1.69	1.67
tblVehicleEF	MCY	0.83	0.84
tblVehicleEF	MCY	0.92	0.90
tblVehicleEF	MCY	2.11	2.12
tblVehicleEF	MCY	0.55	1.77
tblVehicleEF	MCY	2.05	1.81
tblVehicleEF	MCY	2.0360e-003	2.0590e-003
tblVehicleEF	MCY	6.7200e-004	5.9500e-004
tblVehicleEF	MCY	1.69	1.67
tblVehicleEF	MCY	0.83	0.84
tblVehicleEF	MCY	0.92	0.90

tblVehicleEF	MCY	2.61	2.62
tblVehicleEF	MCY	0.55	1.77
tblVehicleEF	MCY	2.23	1.97
tblVehicleEF	MCY	0.42	0.31
tblVehicleEF	MCY	0.13	0.22
tblVehicleEF	MCY	19.51	19.61
tblVehicleEF	MCY	9.10	8.00
tblVehicleEF	MCY	166.71	209.06
tblVehicleEF	MCY	45.36	58.52
tblVehicleEF	MCY	0.97	0.97
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	3.35	3.31
tblVehicleEF	MCY	1.23	1.24
tblVehicleEF	MCY	2.09	2.05
tblVehicleEF	MCY	2.09	2.10
tblVehicleEF	MCY	0.55	1.76
tblVehicleEF	MCY	1.84	1.62
tblVehicleEF	MCY	2.0460e-003	2.0690e-003
tblVehicleEF	MCY	6.5600e-004	5.7900e-004
tblVehicleEF	MCY	3.35	3.31
tblVehicleEF	MCY	1.23	1.24
tblVehicleEF	MCY	2.09	2.05
tblVehicleEF	MCY	2.59	2.60
tblVehicleEF	MCY	0.55	1.76

tblVehicleEF	MCY	2.00	1.76
tblVehicleEF	MCY	0.42	0.31
tblVehicleEF	MCY	0.15	0.24
tblVehicleEF	MCY	18.37	18.50
tblVehicleEF	MCY	9.67	8.54
tblVehicleEF	MCY	166.71	207.36
tblVehicleEF	MCY	45.36	60.03
tblVehicleEF	MCY	1.12	1.12
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	1.59	1.59
tblVehicleEF	MCY	1.02	1.03
tblVehicleEF	MCY	0.73	0.73
tblVehicleEF	MCY	2.11	2.11
tblVehicleEF	MCY	0.63	2.01
tblVehicleEF	MCY	2.06	1.81
tblVehicleEF	MCY	2.0290e-003	2.0520e-003
tblVehicleEF	MCY	6.7200e-004	5.9400e-004
tblVehicleEF	MCY	1.59	1.59
tblVehicleEF	MCY	1.02	1.03
tblVehicleEF	MCY	0.73	0.73
tblVehicleEF	MCY	2.61	2.61
tblVehicleEF	MCY	0.63	2.01
tblVehicleEF	MCY	2.24	1.98
tblVehicleEF	MDV	9.8990e-003	4.3280e-003

tblVehicleEF	MDV	0.01	0.08
tblVehicleEF	MDV	1.15	0.95
tblVehicleEF	MDV	2.62	2.95
tblVehicleEF	MDV	458.82	394.25
tblVehicleEF	MDV	104.21	82.79
tblVehicleEF	MDV	0.13	0.09
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.11	0.12
tblVehicleEF	MDV	0.19	0.16
tblVehicleEF	MDV	0.09	0.11
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.20	0.37
tblVehicleEF	MDV	4.5960e-003	3.8980e-003
tblVehicleEF	MDV	1.0880e-003	8.1900e-004
tblVehicleEF	MDV	0.11	0.12
tblVehicleEF	MDV	0.19	0.16
tblVehicleEF	MDV	0.09	0.11
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.22	0.41
tblVehicleEF	MDV	0.01	4.9300e-003
tblVehicleEF	MDV	0.01	0.07
tblVehicleEF	MDV	1.41	1.16

tblVehicleEF	MDV	2.31	2.60
tblVehicleEF	MDV	498.05	417.67
tblVehicleEF	MDV	104.21	82.07
tblVehicleEF	MDV	0.13	0.08
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.21	0.24
tblVehicleEF	MDV	0.22	0.18
tblVehicleEF	MDV	0.16	0.20
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.17	0.32
tblVehicleEF	MDV	4.9910e-003	4.1290e-003
tblVehicleEF	MDV	1.0820e-003	8.1200e-004
tblVehicleEF	MDV	0.21	0.24
tblVehicleEF	MDV	0.22	0.18
tblVehicleEF	MDV	0.16	0.20
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.19	0.35
tblVehicleEF	MDV	9.5100e-003	4.1550e-003
tblVehicleEF	MDV	0.02	0.08
tblVehicleEF	MDV	1.08	0.89
tblVehicleEF	MDV	2.68	3.02
tblVehicleEF	MDV	447.05	387.19

tblVehicleEF	MDV	104.21	82.93
tblVehicleEF	MDV	0.13	0.09
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.08	0.10
tblVehicleEF	MDV	0.20	0.17
tblVehicleEF	MDV	0.08	0.09
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.13	0.54
tblVehicleEF	MDV	0.20	0.38
tblVehicleEF	MDV	4.4770e-003	3.8280e-003
tblVehicleEF	MDV	1.0890e-003	8.2100e-004
tblVehicleEF	MDV	0.08	0.10
tblVehicleEF	MDV	0.20	0.17
tblVehicleEF	MDV	0.08	0.09
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.13	0.54
tblVehicleEF	MDV	0.22	0.42
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	2.00	0.32
tblVehicleEF	MH	5.24	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.48	4.16

tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.08	0.00
tblVehicleEF	MH	0.49	0.00
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.31	0.00
tblVehicleEF	MH	9.8680e-003	8.7750e-003
tblVehicleEF	MH	6.6300e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.08	0.00
tblVehicleEF	MH	0.49	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.34	0.00
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	2.05	0.32
tblVehicleEF	MH	4.88	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.37	3.92

tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	2.52	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.94	0.00
tblVehicleEF	MH	0.08	0.07
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.30	0.00
tblVehicleEF	MH	9.8690e-003	8.7750e-003
tblVehicleEF	MH	6.5700e-004	0.00
tblVehicleEF	MH	2.52	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.94	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.32	0.00
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	1.99	0.32
tblVehicleEF	MH	5.28	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.46	4.12

tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.47	0.00
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.03	0.00
tblVehicleEF	MH	0.31	0.00
tblVehicleEF	MH	9.8680e-003	8.7750e-003
tblVehicleEF	MH	6.6300e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.47	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.03	0.00
tblVehicleEF	MH	0.34	0.00
tblVehicleEF	MHD	0.02	3.2310e-003
tblVehicleEF	MHD	2.5650e-003	1.3290e-003
tblVehicleEF	MHD	0.05	8.5180e-003
tblVehicleEF	MHD	0.32	0.36
tblVehicleEF	MHD	0.21	0.17
tblVehicleEF	MHD	5.07	0.97
tblVehicleEF	MHD	148.43	69.20

tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.50
tblVehicleEF	MHD	0.41	0.40
tblVehicleEF	MHD	0.47	0.90
tblVehicleEF	MHD	1.3500e-004	4.2800e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.2900e-004	4.0900e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	1.5020e-003	6.5600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	7.6500e-004	3.3500e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.31	0.04
tblVehicleEF	MHD	1.4270e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3400e-004	8.4000e-005
tblVehicleEF	MHD	1.5020e-003	6.5600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	7.6500e-004	3.3500e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.34	0.05

tblVehicleEF	MHD	0.02	3.0750e-003
tblVehicleEF	MHD	2.5980e-003	1.3500e-003
tblVehicleEF	MHD	0.05	8.2390e-003
tblVehicleEF	MHD	0.23	0.31
tblVehicleEF	MHD	0.21	0.18
tblVehicleEF	MHD	4.84	0.93
tblVehicleEF	MHD	157.22	69.18
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.42
tblVehicleEF	MHD	0.42	0.39
tblVehicleEF	MHD	0.44	0.85
tblVehicleEF	MHD	1.1400e-004	3.6400e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.0900e-004	3.4800e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	2.8970e-003	1.2520e-003
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	1.4710e-003	6.4800e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.30	0.04
tblVehicleEF	MHD	1.5100e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3000e-004	8.3000e-005

tblVehicleEF	MHD	2.8970e-003	1.2520e-003
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	1.4710e-003	6.4800e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.33	0.05
tblVehicleEF	MHD	0.02	3.4570e-003
tblVehicleEF	MHD	2.5410e-003	1.3140e-003
tblVehicleEF	MHD	0.05	8.5940e-003
tblVehicleEF	MHD	0.44	0.42
tblVehicleEF	MHD	0.21	0.17
tblVehicleEF	MHD	5.15	0.99
tblVehicleEF	MHD	136.28	69.22
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.52
tblVehicleEF	MHD	0.39	0.41
tblVehicleEF	MHD	0.46	0.89
tblVehicleEF	MHD	1.6400e-004	5.1700e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.5700e-004	4.9400e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	1.0970e-003	4.9200e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02

tblVehicleEF	MHD	5.9600e-004	2.6700e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.31	0.05
tblVehicleEF	MHD	1.3130e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3600e-004	8.4000e-005
tblVehicleEF	MHD	1.0970e-003	4.9200e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	5.9600e-004	2.6700e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.34	0.05
tblVehicleEF	OBUS	0.01	8.5500e-003
tblVehicleEF	OBUS	5.6790e-003	4.7720e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.25	0.50
tblVehicleEF	OBUS	0.39	0.58
tblVehicleEF	OBUS	5.52	2.45
tblVehicleEF	OBUS	68.59	68.17
tblVehicleEF	OBUS	1,085.33	1,337.43
tblVehicleEF	OBUS	69.49	20.30
tblVehicleEF	OBUS	0.13	0.25
tblVehicleEF	OBUS	0.35	0.81
tblVehicleEF	OBUS	1.2000e-005	8.2000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003

tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.1000e-005	7.8000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	2.0910e-003	2.6360e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	9.0600e-004	1.1390e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.34	0.12
tblVehicleEF	OBUS	6.6700e-004	6.5100e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.9200e-004	2.0100e-004
tblVehicleEF	OBUS	2.0910e-003	2.6360e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.04	0.06
tblVehicleEF	OBUS	9.0600e-004	1.1390e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.38	0.13
tblVehicleEF	OBUS	0.01	8.6200e-003
tblVehicleEF	OBUS	5.7930e-003	4.8760e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.24	0.50
tblVehicleEF	OBUS	0.40	0.59
tblVehicleEF	OBUS	5.16	2.29

tblVehicleEF	OBUS	71.65	67.44
tblVehicleEF	OBUS	1,085.33	1,337.45
tblVehicleEF	OBUS	69.49	20.03
tblVehicleEF	OBUS	0.14	0.23
tblVehicleEF	OBUS	0.33	0.75
tblVehicleEF	OBUS	1.0000e-005	7.3000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.0000e-005	6.9000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	3.8840e-003	4.8010e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	1.7290e-003	2.1640e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.33	0.11
tblVehicleEF	OBUS	6.9600e-004	6.4400e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.8600e-004	1.9800e-004
tblVehicleEF	OBUS	3.8840e-003	4.8010e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.04	0.06
tblVehicleEF	OBUS	1.7290e-003	2.1640e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.27

tblVehicleEF	OBUS	0.36	0.12
tblVehicleEF	OBUS	0.01	8.4810e-003
tblVehicleEF	OBUS	5.6610e-003	4.7410e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.25	0.51
tblVehicleEF	OBUS	0.39	0.58
tblVehicleEF	OBUS	5.57	2.48
tblVehicleEF	OBUS	64.36	69.17
tblVehicleEF	OBUS	1,085.33	1,337.43
tblVehicleEF	OBUS	69.49	20.34
tblVehicleEF	OBUS	0.13	0.26
tblVehicleEF	OBUS	0.35	0.81
tblVehicleEF	OBUS	1.5000e-005	9.4000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.4000e-005	9.0000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	1.7990e-003	2.3770e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	8.3400e-004	1.0810e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.28
tblVehicleEF	OBUS	0.35	0.12
tblVehicleEF	OBUS	6.2600e-004	6.6000e-004
tblVehicleEF	OBUS	0.01	0.01

tblVehicleEF	OBUS	7.9300e-004	2.0100e-004
tblVehicleEF	OBUS	1.7990e-003	2.3770e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.06
tblVehicleEF	OBUS	8.3400e-004	1.0810e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.28
tblVehicleEF	OBUS	0.38	0.13
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.5650e-003	6.1380e-003
tblVehicleEF	SBUS	0.06	7.1540e-003
tblVehicleEF	SBUS	7.84	3.12
tblVehicleEF	SBUS	0.57	0.50
tblVehicleEF	SBUS	6.44	0.94
tblVehicleEF	SBUS	1,128.57	363.20
tblVehicleEF	SBUS	1,093.03	1,093.96
tblVehicleEF	SBUS	55.12	6.12
tblVehicleEF	SBUS	8.81	3.37
tblVehicleEF	SBUS	3.97	4.43
tblVehicleEF	SBUS	8.4250e-003	3.4460e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	8.0610e-003	3.2970e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005

tblVehicleEF	SBUS	5.0680e-003	1.5010e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.93	0.37
tblVehicleEF	SBUS	2.4310e-003	7.2500e-004
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.36	0.04
tblVehicleEF	SBUS	0.01	3.4700e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.6300e-004	6.1000e-005
tblVehicleEF	SBUS	5.0680e-003	1.5010e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	2.4310e-003	7.2500e-004
tblVehicleEF	SBUS	0.12	0.10
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.39	0.05
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.7050e-003	6.2090e-003
tblVehicleEF	SBUS	0.05	5.9970e-003
tblVehicleEF	SBUS	7.74	3.09
tblVehicleEF	SBUS	0.58	0.50
tblVehicleEF	SBUS	4.67	0.68
tblVehicleEF	SBUS	1,179.47	372.25
tblVehicleEF	SBUS	1,093.03	1,093.97
tblVehicleEF	SBUS	55.12	5.68
tblVehicleEF	SBUS	9.10	3.45

tblVehicleEF	SBUS	3.73	4.17
tblVehicleEF	SBUS	7.1020e-003	2.9130e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	6.7950e-003	2.7870e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	9.1290e-003	2.7020e-003
tblVehicleEF	SBUS	0.04	0.01
tblVehicleEF	SBUS	0.92	0.37
tblVehicleEF	SBUS	4.4980e-003	1.3370e-003
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.30	0.03
tblVehicleEF	SBUS	0.01	3.5550e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.3300e-004	5.6000e-005
tblVehicleEF	SBUS	9.1290e-003	2.7020e-003
tblVehicleEF	SBUS	0.04	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	4.4980e-003	1.3370e-003
tblVehicleEF	SBUS	0.12	0.11
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.33	0.04
tblVehicleEF	SBUS	0.82	0.08

tblVehicleEF	SBUS	9.5210e-003	6.1310e-003
tblVehicleEF	SBUS	0.06	7.4110e-003
tblVehicleEF	SBUS	8.00	3.17
tblVehicleEF	SBUS	0.57	0.50
tblVehicleEF	SBUS	6.79	0.98
tblVehicleEF	SBUS	1,058.28	350.71
tblVehicleEF	SBUS	1,093.03	1,093.96
tblVehicleEF	SBUS	55.12	6.19
tblVehicleEF	SBUS	8.43	3.26
tblVehicleEF	SBUS	3.93	4.40
tblVehicleEF	SBUS	0.01	4.1830e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	9.8080e-003	4.0020e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	4.3640e-003	1.2920e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.93	0.37
tblVehicleEF	SBUS	2.3310e-003	6.9700e-004
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.07
tblVehicleEF	SBUS	0.37	0.04
tblVehicleEF	SBUS	0.01	3.3520e-003
tblVehicleEF	SBUS	0.01	0.01

tblVehicleEF	SBUS	6.6900e-004	6.1000e-005
tblVehicleEF	SBUS	4.3640e-003	1.2920e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	2.3310e-003	6.9700e-004
tblVehicleEF	SBUS	0.12	0.10
tblVehicleEF	SBUS	0.02	0.07
tblVehicleEF	SBUS	0.40	0.05
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.08	0.02
tblVehicleEF	UBUS	7.52	26.09
tblVehicleEF	UBUS	13.83	1.44
tblVehicleEF	UBUS	1,788.21	1,610.65
tblVehicleEF	UBUS	153.17	17.72
tblVehicleEF	UBUS	3.79	0.32
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	9.0420e-003	1.9590e-003
tblVehicleEF	UBUS	0.10	0.01
tblVehicleEF	UBUS	4.5390e-003	8.8500e-004
tblVehicleEF	UBUS	0.42	0.05

tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.09	0.07
tblVehicleEF	UBUS	9.5090e-003	4.8150e-003
tblVehicleEF	UBUS	1.7820e-003	1.7500e-004
tblVehicleEF	UBUS	9.0420e-003	1.9590e-003
tblVehicleEF	UBUS	0.10	0.01
tblVehicleEF	UBUS	4.5390e-003	8.8500e-004
tblVehicleEF	UBUS	1.82	3.43
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.19	0.08
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.07	0.02
tblVehicleEF	UBUS	7.58	26.09
tblVehicleEF	UBUS	11.85	1.22
tblVehicleEF	UBUS	1,788.21	1,610.66
tblVehicleEF	UBUS	153.17	17.36
tblVehicleEF	UBUS	3.53	0.31
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	0.02	3.4780e-003
tblVehicleEF	UBUS	0.13	0.01

tblVehicleEF	UBUS	9.0520e-003	1.7490e-003
tblVehicleEF	UBUS	0.43	0.05
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	0.99	0.07
tblVehicleEF	UBUS	9.5110e-003	4.8150e-003
tblVehicleEF	UBUS	1.7480e-003	1.7200e-004
tblVehicleEF	UBUS	0.02	3.4780e-003
tblVehicleEF	UBUS	0.13	0.01
tblVehicleEF	UBUS	9.0520e-003	1.7490e-003
tblVehicleEF	UBUS	1.83	3.43
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.09	0.07
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.08	0.02
tblVehicleEF	UBUS	7.51	26.09
tblVehicleEF	UBUS	14.02	1.42
tblVehicleEF	UBUS	1,788.21	1,610.65
tblVehicleEF	UBUS	153.17	17.70
tblVehicleEF	UBUS	3.75	0.31
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004

tblVehicleEF	UBUS	8.1990e-003	1.9860e-003
tblVehicleEF	UBUS	0.12	0.01
tblVehicleEF	UBUS	4.1400e-003	9.2700e-004
tblVehicleEF	UBUS	0.42	0.05
tblVehicleEF	UBUS	0.03	0.07
tblVehicleEF	UBUS	1.10	0.07
tblVehicleEF	UBUS	9.5090e-003	4.8150e-003
tblVehicleEF	UBUS	1.7850e-003	1.7500e-004
tblVehicleEF	UBUS	8.1990e-003	1.9860e-003
tblVehicleEF	UBUS	0.12	0.01
tblVehicleEF	UBUS	4.1400e-003	9.2700e-004
tblVehicleEF	UBUS	1.82	3.43
tblVehicleEF	UBUS	0.03	0.07
tblVehicleEF	UBUS	1.20	0.08
tblVehicleTrips	WD_TR	12.89	30.10

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.2755	3.0393	1.5015	4.5300e-003	0.8318	0.1210	0.9528	0.3375	0.1119	0.4493	0.0000	401.6776	401.6776	0.1014	0.0000	404.2121
2023	0.3545	2.2704	1.7336	4.6400e-003	0.0882	0.0927	0.1809	0.0224	0.0865	0.1089	0.0000	409.1902	409.1902	0.0887	0.0000	411.4083
Maximum	**0.3545**	**3.0393**	**1.7336**	**4.6400e-003**	**0.8318**	**0.1210**	**0.9528**	**0.3375**	**0.1119**	**0.4493**	**0.0000**	**409.1902**	**409.1902**	**0.1014**	**0.0000**	**411.4083**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.2755	3.0393	1.5015	4.5300e-003	0.3554	0.1210	0.4764	0.1400	0.1119	0.2518	0.0000	401.6772	401.6772	0.1014	0.0000	404.2117
2023	0.3545	2.2704	1.7336	4.6400e-003	0.0814	0.0927	0.1741	0.0214	0.0865	0.1079	0.0000	409.1899	409.1899	0.0887	0.0000	411.4079
Maximum	**0.3545**	**3.0393**	**1.7336**	**4.6400e-003**	**0.3554**	**0.1210**	**0.4764**	**0.1400**	**0.1119**	**0.2518**	**0.0000**	**409.1899**	**409.1899**	**0.1014**	**0.0000**	**411.4079**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**52.52**	**0.00**	**42.62**	**55.16**	**0.00**	**35.56**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	8-1-2022	10-31-2022	2.4739	2.4739
2	11-1-2022	1-31-2023	1.1314	1.1314
3	2-1-2023	4-30-2023	0.9988	0.9988
4	5-1-2023	7-31-2023	1.2222	1.2222
5	8-1-2023	9-30-2023	0.0347	0.0347
		Highest	2.4739	2.4739

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1815	1.0000e-005	1.1800e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.3000e-003	2.3000e-003	1.0000e-005	0.0000	2.4500e-003
Energy	1.4900e-003	0.0136	0.0114	8.0000e-005		1.0300e-003	1.0300e-003		1.0300e-003	1.0300e-003	0.0000	90.4312	90.4312	3.4100e-003	9.2000e-004	90.7897
Mobile	0.3908	1.8585	4.3494	0.0164	1.5122	0.0166	1.5288	0.4048	0.0156	0.4204	0.0000	1,533.7605	1,533.7605	0.0528	0.0000	1,535.0792
Waste						0.0000	0.0000		0.0000	0.0000	10.9514	0.0000	10.9514	0.6472	0.0000	27.1315
Water						0.0000	0.0000		0.0000	0.0000	0.4372	18.2602	18.6974	0.0457	1.2200e-003	20.2012
Total	**0.5737**	**1.8720**	**4.3620**	**0.0165**	**1.5122**	**0.0176**	**1.5298**	**0.4048**	**0.0167**	**0.4215**	**11.3885**	**1,642.4542**	**1,653.8428**	**0.7490**	**2.1400e-003**	**1,673.2041**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1815	1.0000e-005	1.1800e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.3000e-003	2.3000e-003	1.0000e-005	0.0000	2.4500e-003
Energy	1.4900e-003	0.0136	0.0114	8.0000e-005		1.0300e-003	1.0300e-003		1.0300e-003	1.0300e-003	0.0000	90.4312	90.4312	3.4100e-003	9.2000e-004	90.7897
Mobile	0.3908	1.8585	4.3494	0.0164	1.5122	0.0166	1.5288	0.4048	0.0156	0.4204	0.0000	1,533.760 5	1,533.760 5	0.0528	0.0000	1,535.079 2
Waste						0.0000	0.0000		0.0000	0.0000	10.9514	0.0000	10.9514	0.6472	0.0000	27.1315
Water						0.0000	0.0000		0.0000	0.0000	0.4372	18.2602	18.6974	0.0457	1.2200e-003	20.2012
Total	**0.5737**	**1.8720**	**4.3620**	**0.0165**	**1.5122**	**0.0176**	**1.5298**	**0.4048**	**0.0167**	**0.4215**	**11.3885**	**1,642.454 2**	**1,653.842 8**	**0.7490**	**2.1400e-003**	**1,673.204 1**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/1/2022	9/30/2022	5	45	
2	Grading	Grading	8/1/2022	9/30/2022	5	45	
3	Building Construction	Building Construction	10/1/2022	6/23/2023	5	190	
4	Paving	Paving	5/28/2023	6/23/2023	5	20	
5	Architectural Coating	Architectural Coating	5/28/2023	6/23/2023	5	20	
6	Demolition	Demolition	6/24/2023	8/4/2023	5	30	

Acres of Grading (Site Preparation Phase): 225

Acres of Grading (Grading Phase): 225

Acres of Paving: 3.56

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 62,250; Non-Residential Outdoor: 20,750; Striped Parking Area: 9,306 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Crawler Tractors	4	8.00	212	0.43
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Grading	Crawler Tractors	3	8.00	212	0.43
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Crawler Tractors	3	8.00	212	0.43
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Cement and Mortar Mixers	2	8.00	9	0.56
Paving	Crawler Tractors	1	8.00	212	0.43
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	100.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	750.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	83.00	32.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	17.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5258	0.0000	0.5258	0.2363	0.0000	0.2363	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1008	1.1343	0.4501	1.2800e-003		0.0486	0.0486		0.0447	0.0447	0.0000	112.6159	112.6159	0.0364	0.0000	113.5265
Total	**0.1008**	**1.1343**	**0.4501**	**1.2800e-003**	**0.5258**	**0.0486**	**0.5744**	**0.2363**	**0.0447**	**0.2810**	**0.0000**	**112.6159**	**112.6159**	**0.0364**	**0.0000**	**113.5265**

3.2 Site Preparation - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.6300e-003	1.0500e-003	0.0117	4.0000e-005	4.4500e-003	3.0000e-005	4.4800e-003	1.1800e-003	2.0000e-005	1.2100e-003	0.0000	3.4685	3.4685	8.0000e-005	0.0000	3.4704
Total	**1.6300e-003**	**1.0500e-003**	**0.0117**	**4.0000e-005**	**4.4500e-003**	**3.0000e-005**	**4.4800e-003**	**1.1800e-003**	**2.0000e-005**	**1.2100e-003**	**0.0000**	**3.4685**	**3.4685**	**8.0000e-005**	**0.0000**	**3.4704**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2051	0.0000	0.2051	0.0922	0.0000	0.0922	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1008	1.1343	0.4501	1.2800e-003		0.0486	0.0486		0.0447	0.0447	0.0000	112.6158	112.6158	0.0364	0.0000	113.5263
Total	**0.1008**	**1.1343**	**0.4501**	**1.2800e-003**	**0.2051**	**0.0486**	**0.2536**	**0.0922**	**0.0447**	**0.1369**	**0.0000**	**112.6158**	**112.6158**	**0.0364**	**0.0000**	**113.5263**

3.2 Site Preparation - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.6300e-003	1.0500e-003	0.0117	4.0000e-005	4.4500e-003	3.0000e-005	4.4800e-003	1.1800e-003	2.0000e-005	1.2100e-003	0.0000	3.4685	3.4685	8.0000e-005	0.0000	3.4704
Total	**1.6300e-003**	**1.0500e-003**	**0.0117**	**4.0000e-005**	**4.4500e-003**	**3.0000e-005**	**4.4800e-003**	**1.1800e-003**	**2.0000e-005**	**1.2100e-003**	**0.0000**	**3.4685**	**3.4685**	**8.0000e-005**	**0.0000**	**3.4704**

3.3 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2552	0.0000	0.2552	0.0874	0.0000	0.0874	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0659	0.7617	0.3488	9.9000e-004		0.0304	0.0304		0.0280	0.0280	0.0000	86.6562	86.6562	0.0280	0.0000	87.3569
Total	**0.0659**	**0.7617**	**0.3488**	**9.9000e-004**	**0.2552**	**0.0304**	**0.2856**	**0.0874**	**0.0280**	**0.1154**	**0.0000**	**86.6562**	**86.6562**	**0.0280**	**0.0000**	**87.3569**

3.3 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.7500e-003	0.0758	0.0111	2.8000e-004	6.4600e-003	2.1000e-004	6.6700e-003	1.7700e-003	2.0000e-004	1.9700e-003	0.0000	26.5971	26.5971	1.5800e-003	0.0000	26.6365
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3600e-003	8.8000e-004	9.7900e-003	3.0000e-005	3.7100e-003	2.0000e-005	3.7300e-003	9.9000e-004	2.0000e-005	1.0000e-003	0.0000	2.8904	2.8904	6.0000e-005	0.0000	2.8920
Total	**3.1100e-003**	**0.0766**	**0.0209**	**3.1000e-004**	**0.0102**	**2.3000e-004**	**0.0104**	**2.7600e-003**	**2.2000e-004**	**2.9700e-003**	**0.0000**	**29.4875**	**29.4875**	**1.6400e-003**	**0.0000**	**29.5285**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0995	0.0000	0.0995	0.0341	0.0000	0.0341	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0659	0.7617	0.3488	9.9000e-004		0.0304	0.0304		0.0280	0.0280	0.0000	86.6561	86.6561	0.0280	0.0000	87.3568
Total	**0.0659**	**0.7617**	**0.3488**	**9.9000e-004**	**0.0995**	**0.0304**	**0.1299**	**0.0341**	**0.0280**	**0.0621**	**0.0000**	**86.6561**	**86.6561**	**0.0280**	**0.0000**	**87.3568**

3.3 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.7500e-003	0.0758	0.0111	2.8000e-004	6.4600e-003	2.1000e-004	6.6700e-003	1.7700e-003	2.0000e-004	1.9700e-003	0.0000	26.5971	26.5971	1.5800e-003	0.0000	26.6365
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3600e-003	8.8000e-004	9.7900e-003	3.0000e-005	3.7100e-003	2.0000e-005	3.7300e-003	9.9000e-004	2.0000e-005	1.0000e-003	0.0000	2.8904	2.8904	6.0000e-005	0.0000	2.8920
Total	**3.1100e-003**	**0.0766**	**0.0209**	**3.1000e-004**	**0.0102**	**2.3000e-004**	**0.0104**	**2.7600e-003**	**2.2000e-004**	**2.9700e-003**	**0.0000**	**29.4875**	**29.4875**	**1.6400e-003**	**0.0000**	**29.5285**

3.4 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0909	0.9673	0.5743	1.4000e-003		0.0414	0.0414		0.0387	0.0387	0.0000	121.1929	121.1929	0.0329	0.0000	122.0149
Total	**0.0909**	**0.9673**	**0.5743**	**1.4000e-003**		**0.0414**	**0.0414**		**0.0387**	**0.0387**	**0.0000**	**121.1929**	**121.1929**	**0.0329**	**0.0000**	**122.0149**

3.4 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3200e-003	0.0914	0.0174	2.6000e-004	6.5700e-003	1.6000e-004	6.7200e-003	1.8900e-003	1.5000e-004	2.0400e-003	0.0000	25.1550	25.1550	1.8300e-003	0.0000	25.2008
Worker	0.0108	7.0100e-003	0.0782	2.6000e-004	0.0297	1.7000e-004	0.0298	7.8700e-003	1.6000e-004	8.0300e-003	0.0000	23.1017	23.1017	5.0000e-004	0.0000	23.1142
Total	**0.0132**	**0.0984**	**0.0956**	**5.2000e-004**	**0.0362**	**3.3000e-004**	**0.0365**	**9.7600e-003**	**3.1000e-004**	**0.0101**	**0.0000**	**48.2566**	**48.2566**	**2.3300e-003**	**0.0000**	**48.3150**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0909	0.9673	0.5743	1.4000e-003		0.0414	0.0414		0.0387	0.0387	0.0000	121.1928	121.1928	0.0329	0.0000	122.0148
Total	**0.0909**	**0.9673**	**0.5743**	**1.4000e-003**		**0.0414**	**0.0414**		**0.0387**	**0.0387**	**0.0000**	**121.1928**	**121.1928**	**0.0329**	**0.0000**	**122.0148**

3.4 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3200e-003	0.0914	0.0174	2.6000e-004	6.5700e-003	1.6000e-004	6.7200e-003	1.8900e-003	1.5000e-004	2.0400e-003	0.0000	25.1550	25.1550	1.8300e-003	0.0000	25.2008
Worker	0.0108	7.0100e-003	0.0782	2.6000e-004	0.0297	1.7000e-004	0.0298	7.8700e-003	1.6000e-004	8.0300e-003	0.0000	23.1017	23.1017	5.0000e-004	0.0000	23.1142
Total	**0.0132**	**0.0984**	**0.0956**	**5.2000e-004**	**0.0362**	**3.3000e-004**	**0.0365**	**9.7600e-003**	**3.1000e-004**	**0.0101**	**0.0000**	**48.2566**	**48.2566**	**2.3300e-003**	**0.0000**	**48.3150**

3.4 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1595	1.6378	1.0842	2.6900e-003		0.0698	0.0698		0.0651	0.0651	0.0000	232.9333	232.9333	0.0629	0.0000	234.5068
Total	**0.1595**	**1.6378**	**1.0842**	**2.6900e-003**		**0.0698**	**0.0698**		**0.0651**	**0.0651**	**0.0000**	**232.9333**	**232.9333**	**0.0629**	**0.0000**	**234.5068**

3.4 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4100e-003	0.1314	0.0291	4.9000e-004	0.0126	1.3000e-004	0.0128	3.6400e-003	1.3000e-004	3.7700e-003	0.0000	47.1004	47.1004	2.7000e-003	0.0000	47.1679
Worker	0.0196	0.0122	0.1387	4.7000e-004	0.0570	3.2000e-004	0.0573	0.0151	3.0000e-004	0.0154	0.0000	42.7402	42.7402	8.7000e-004	0.0000	42.7619
Total	**0.0230**	**0.1435**	**0.1678**	**9.6000e-004**	**0.0697**	**4.5000e-004**	**0.0701**	**0.0188**	**4.3000e-004**	**0.0192**	**0.0000**	**89.8406**	**89.8406**	**3.5700e-003**	**0.0000**	**89.9298**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1595	1.6378	1.0842	2.6900e-003		0.0698	0.0698		0.0651	0.0651	0.0000	232.9330	232.9330	0.0629	0.0000	234.5066
Total	**0.1595**	**1.6378**	**1.0842**	**2.6900e-003**		**0.0698**	**0.0698**		**0.0651**	**0.0651**	**0.0000**	**232.9330**	**232.9330**	**0.0629**	**0.0000**	**234.5066**

3.4 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4100e-003	0.1314	0.0291	4.9000e-004	0.0126	1.3000e-004	0.0128	3.6400e-003	1.3000e-004	3.7700e-003	0.0000	47.1004	47.1004	2.7000e-003	0.0000	47.1679
Worker	0.0196	0.0122	0.1387	4.7000e-004	0.0570	3.2000e-004	0.0573	0.0151	3.0000e-004	0.0154	0.0000	42.7402	42.7402	8.7000e-004	0.0000	42.7619
Total	**0.0230**	**0.1435**	**0.1678**	**9.6000e-004**	**0.0697**	**4.5000e-004**	**0.0701**	**0.0188**	**4.3000e-004**	**0.0192**	**0.0000**	**89.8406**	**89.8406**	**3.5700e-003**	**0.0000**	**89.9298**

3.5 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0140	0.1417	0.1456	2.7000e-004		6.4900e-003	6.4900e-003		5.9900e-003	5.9900e-003	0.0000	23.6927	23.6927	7.4600e-003	0.0000	23.8792
Paving	1.2700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0153**	**0.1417**	**0.1456**	**2.7000e-004**		**6.4900e-003**	**6.4900e-003**		**5.9900e-003**	**5.9900e-003**	**0.0000**	**23.6927**	**23.6927**	**7.4600e-003**	**0.0000**	**23.8792**

3.5 Paving - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.5000e-004	4.7000e-004	5.3500e-003	2.0000e-005	2.2000e-003	1.0000e-005	2.2100e-003	5.8000e-004	1.0000e-005	6.0000e-004	0.0000	1.6478	1.6478	3.0000e-005	0.0000	1.6487
Total	**7.5000e-004**	**4.7000e-004**	**5.3500e-003**	**2.0000e-005**	**2.2000e-003**	**1.0000e-005**	**2.2100e-003**	**5.8000e-004**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**1.6478**	**1.6478**	**3.0000e-005**	**0.0000**	**1.6487**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0140	0.1417	0.1456	2.7000e-004		6.4900e-003	6.4900e-003		5.9900e-003	5.9900e-003	0.0000	23.6927	23.6927	7.4600e-003	0.0000	23.8792
Paving	1.2700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0153**	**0.1417**	**0.1456**	**2.7000e-004**		**6.4900e-003**	**6.4900e-003**		**5.9900e-003**	**5.9900e-003**	**0.0000**	**23.6927**	**23.6927**	**7.4600e-003**	**0.0000**	**23.8792**

3.5 Paving - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.5000e-004	4.7000e-004	5.3500e-003	2.0000e-005	2.2000e-003	1.0000e-005	2.2100e-003	5.8000e-004	1.0000e-005	6.0000e-004	0.0000	1.6478	1.6478	3.0000e-005	0.0000	1.6487
Total	**7.5000e-004**	**4.7000e-004**	**5.3500e-003**	**2.0000e-005**	**2.2000e-003**	**1.0000e-005**	**2.2100e-003**	**5.8000e-004**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**1.6478**	**1.6478**	**3.0000e-005**	**0.0000**	**1.6487**

3.6 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1177					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.5600e-003	0.0174	0.0242	4.0000e-005		9.4000e-004	9.4000e-004		9.4000e-004	9.4000e-004	0.0000	3.4043	3.4043	2.0000e-004	0.0000	3.4094
Total	**0.1203**	**0.0174**	**0.0242**	**4.0000e-005**		**9.4000e-004**	**9.4000e-004**		**9.4000e-004**	**9.4000e-004**	**0.0000**	**3.4043**	**3.4043**	**2.0000e-004**	**0.0000**	**3.4094**

3.6 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4000e-004	4.0000e-004	4.5400e-003	2.0000e-005	1.8700e-003	1.0000e-005	1.8800e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.4006	1.4006	3.0000e-005	0.0000	1.4014
Total	**6.4000e-004**	**4.0000e-004**	**4.5400e-003**	**2.0000e-005**	**1.8700e-003**	**1.0000e-005**	**1.8800e-003**	**5.0000e-004**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**1.4006**	**1.4006**	**3.0000e-005**	**0.0000**	**1.4014**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1177					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.5600e-003	0.0174	0.0242	4.0000e-005		9.4000e-004	9.4000e-004		9.4000e-004	9.4000e-004	0.0000	3.4043	3.4043	2.0000e-004	0.0000	3.4094
Total	**0.1203**	**0.0174**	**0.0242**	**4.0000e-005**		**9.4000e-004**	**9.4000e-004**		**9.4000e-004**	**9.4000e-004**	**0.0000**	**3.4043**	**3.4043**	**2.0000e-004**	**0.0000**	**3.4094**

3.6 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4000e-004	4.0000e-004	4.5400e-003	2.0000e-005	1.8700e-003	1.0000e-005	1.8800e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.4006	1.4006	3.0000e-005	0.0000	1.4014
Total	**6.4000e-004**	**4.0000e-004**	**4.5400e-003**	**2.0000e-005**	**1.8700e-003**	**1.0000e-005**	**1.8800e-003**	**5.0000e-004**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**1.4006**	**1.4006**	**3.0000e-005**	**0.0000**	**1.4014**

3.7 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0111	0.0000	0.0111	1.6900e-003	0.0000	1.6900e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0340	0.3223	0.2947	5.8000e-004		0.0150	0.0150		0.0139	0.0139	0.0000	50.9881	50.9881	0.0143	0.0000	51.3451
Total	**0.0340**	**0.3223**	**0.2947**	**5.8000e-004**	**0.0111**	**0.0150**	**0.0261**	**1.6900e-003**	**0.0139**	**0.0156**	**0.0000**	**50.9881**	**50.9881**	**0.0143**	**0.0000**	**51.3451**

3.7 Demolition - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.6000e-004	6.3000e-003	1.2900e-003	4.0000e-005	8.6000e-004	1.0000e-005	8.7000e-004	2.4000e-004	1.0000e-005	2.5000e-004	0.0000	3.4290	3.4290	1.7000e-004	0.0000	3.4332
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.5000e-004	5.3000e-004	6.0100e-003	2.0000e-005	2.4700e-003	1.0000e-005	2.4900e-003	6.6000e-004	1.0000e-005	6.7000e-004	0.0000	1.8538	1.8538	4.0000e-005	0.0000	1.8547
Total	**1.0100e-003**	**6.8300e-003**	**7.3000e-003**	**6.0000e-005**	**3.3300e-003**	**2.0000e-005**	**3.3600e-003**	**9.0000e-004**	**2.0000e-005**	**9.2000e-004**	**0.0000**	**5.2828**	**5.2828**	**2.1000e-004**	**0.0000**	**5.2880**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.3500e-003	0.0000	4.3500e-003	6.6000e-004	0.0000	6.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0340	0.3223	0.2947	5.8000e-004		0.0150	0.0150		0.0139	0.0139	0.0000	50.9880	50.9880	0.0143	0.0000	51.3450
Total	**0.0340**	**0.3223**	**0.2947**	**5.8000e-004**	**4.3500e-003**	**0.0150**	**0.0193**	**6.6000e-004**	**0.0139**	**0.0146**	**0.0000**	**50.9880**	**50.9880**	**0.0143**	**0.0000**	**51.3450**

3.7 Demolition - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.6000e-004	6.3000e-003	1.2900e-003	4.0000e-005	8.6000e-004	1.0000e-005	8.7000e-004	2.4000e-004	1.0000e-005	2.5000e-004	0.0000	3.4290	3.4290	1.7000e-004	0.0000	3.4332
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.5000e-004	5.3000e-004	6.0100e-003	2.0000e-005	2.4700e-003	1.0000e-005	2.4900e-003	6.6000e-004	1.0000e-005	6.7000e-004	0.0000	1.8538	1.8538	4.0000e-005	0.0000	1.8547
Total	**1.0100e-003**	**6.8300e-003**	**7.3000e-003**	**6.0000e-005**	**3.3300e-003**	**2.0000e-005**	**3.3600e-003**	**9.0000e-004**	**2.0000e-005**	**9.2000e-004**	**0.0000**	**5.2828**	**5.2828**	**2.1000e-004**	**0.0000**	**5.2880**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.3908	1.8585	4.3494	0.0164	1.5122	0.0166	1.5288	0.4048	0.0156	0.4204	0.0000	1,533.7605	1,533.7605	0.0528	0.0000	1,535.0792
Unmitigated	0.3908	1.8585	4.3494	0.0164	1.5122	0.0166	1.5288	0.4048	0.0156	0.4204	0.0000	1,533.7605	1,533.7605	0.0528	0.0000	1,535.0792

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
High School	1,249.00	181.36	74.29	3,966,119	3,966,119
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	1,249.00	181.36	74.29	3,966,119	3,966,119

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
High School	16.60	8.40	6.90	77.80	17.20	5.00	75	19	6
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
High School	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898
Other Asphalt Surfaces	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898
Other Non-Asphalt Surfaces	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898
Parking Lot	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	75.6598	75.6598	3.1200e-003	6.5000e-004	75.9305
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	75.6598	75.6598	3.1200e-003	6.5000e-004	75.9305
NaturalGas Mitigated	1.4900e-003	0.0136	0.0114	8.0000e-005		1.0300e-003	1.0300e-003		1.0300e-003	1.0300e-003	0.0000	14.7714	14.7714	2.8000e-004	2.7000e-004	14.8592
NaturalGas Unmitigated	1.4900e-003	0.0136	0.0114	8.0000e-005		1.0300e-003	1.0300e-003		1.0300e-003	1.0300e-003	0.0000	14.7714	14.7714	2.8000e-004	2.7000e-004	14.8592

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
High School	276805	1.4900e-003	0.0136	0.0114	8.0000e-005		1.0300e-003	1.0300e-003		1.0300e-003	1.0300e-003	0.0000	14.7714	14.7714	2.8000e-004	2.7000e-004	14.8592
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**1.4900e-003**	**0.0136**	**0.0114**	**8.0000e-005**		**1.0300e-003**	**1.0300e-003**		**1.0300e-003**	**1.0300e-003**	**0.0000**	**14.7714**	**14.7714**	**2.8000e-004**	**2.7000e-004**	**14.8592**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
High School	276805	1.4900e-003	0.0136	0.0114	8.0000e-005		1.0300e-003	1.0300e-003		1.0300e-003	1.0300e-003	0.0000	14.7714	14.7714	2.8000e-004	2.7000e-004	14.8592
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**1.4900e-003**	**0.0136**	**0.0114**	**8.0000e-005**		**1.0300e-003**	**1.0300e-003**		**1.0300e-003**	**1.0300e-003**	**0.0000**	**14.7714**	**14.7714**	**2.8000e-004**	**2.7000e-004**	**14.8592**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
High School	230740	73.5187	3.0400e-003	6.3000e-004	73.7817
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	6720	2.1411	9.0000e-005	2.0000e-005	2.1488
Total		**75.6599**	**3.1300e-003**	**6.5000e-004**	**75.9305**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
High School	230740	73.5187	3.0400e-003	6.3000e-004	73.7817
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	6720	2.1411	9.0000e-005	2.0000e-005	2.1488
Total		**75.6599**	**3.1300e-003**	**6.5000e-004**	**75.9305**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1815	1.0000e-005	1.1800e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.3000e-003	2.3000e-003	1.0000e-005	0.0000	2.4500e-003
Unmitigated	0.1815	1.0000e-005	1.1800e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.3000e-003	2.3000e-003	1.0000e-005	0.0000	2.4500e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0214					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1600					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.1000e-004	1.0000e-005	1.1800e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.3000e-003	2.3000e-003	1.0000e-005	0.0000	2.4500e-003
Total	**0.1815**	**1.0000e-005**	**1.1800e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.3000e-003**	**2.3000e-003**	**1.0000e-005**	**0.0000**	**2.4500e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0214					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1600					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.1000e-004	1.0000e-005	1.1800e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.3000e-003	2.3000e-003	1.0000e-005	0.0000	2.4500e-003
Total	**0.1815**	**1.0000e-005**	**1.1800e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.3000e-003**	**2.3000e-003**	**1.0000e-005**	**0.0000**	**2.4500e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	18.6974	0.0457	1.2200e-003	20.2012
Unmitigated	18.6974	0.0457	1.2200e-003	20.2012

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
High School	1.37799 / 3.54341	18.6974	0.0457	1.2200e-003	20.2012
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**18.6974**	**0.0457**	**1.2200e-003**	**20.2012**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
High School	1.37799 / 3.54341	18.6974	0.0457	1.2200e-003	20.2012
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**18.6974**	**0.0457**	**1.2200e-003**	**20.2012**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	10.9514	0.6472	0.0000	27.1315
Unmitigated	10.9514	0.6472	0.0000	27.1315

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
High School	53.95	10.9514	0.6472	0.0000	27.1315
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**10.9514**	**0.6472**	**0.0000**	**27.1315**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
High School	53.95	10.9514	0.6472	0.0000	27.1315
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**10.9514**	**0.6472**	**0.0000**	**27.1315**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

This page intentionally left blank

APPENDIX 4.2:

EMFAC2017

EMFAC2017 (v1.0.2) Emissions Inventory
Region Type: County
Region: RIVERSIDE
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption. Note 'day' in the unit is operation day.

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Fuel_Consumption	Fuel_Consumption	Total Fuel	VMT	Total VMT	Miles per Gallon	Vehicle Class
RIVERSIDE	2022	HHDT	Aggregated	Aggregated	GAS	7.255051716	664.5948944	0.153526957	153.5269575	551883.0316	664.5948944	3918090.953	7.10	HHDT
RIVERSIDE	2022	HHDT	Aggregated	Aggregated	DSL	27819.82011	3904544.33	546.282737	546282.737		3904544.33			
RIVERSIDE	2022	HHDT	Aggregated	Aggregated	NG	316.9853667	12882.0286	5.446767633	5446.767633		12882.0286			
RIVERSIDE	2022	LDA	Aggregated	Aggregated	GAS	772785.866	30295680.28	950.2947165	950294.7165	956074.6572	30295680.28	31104496.06	32.53	LDA
RIVERSIDE	2022	LDA	Aggregated	Aggregated	DSL	7300.590587	301308.548	5.779940701	5779.940701		301308.548			
RIVERSIDE	2022	LDA	Aggregated	Aggregated	ELEC	12758.74743	507507.2353	0	0		507507.2353			
RIVERSIDE	2022	LDT1	Aggregated	Aggregated	GAS	82772.07046	3076687.964	113.8535898	113853.5898	113886.9867	3076687.964	3097672.244	27.20	LDT1
RIVERSIDE	2022	LDT1	Aggregated	Aggregated	DSL	39.17987902	864.4773595	0.033396863	33.39686287		864.4773595			
RIVERSIDE	2022	LDT1	Aggregated	Aggregated	ELEC	485.0753078	20119.80263	0	0		20119.80263			
RIVERSIDE	2022	LDT2	Aggregated	Aggregated	GAS	252998.013	9768781.977	384.1060904	384106.0904	385765.5036	9768781.977	9906416.269	25.68	LDT2
RIVERSIDE	2022	LDT2	Aggregated	Aggregated	DSL	1463.534782	64682.45233	1.659413246	1659.413246		64682.45233			
RIVERSIDE	2022	LDT2	Aggregated	Aggregated	ELEC	2319.019739	72951.84037	0	0		72951.84037			
RIVERSIDE	2022	LHDT1	Aggregated	Aggregated	GAS	20620.88251	680334.7046	63.19981722	63199.81722	96090.00978	680334.7046	1371393.63	14.27	LHDT1
RIVERSIDE	2022	LHDT1	Aggregated	Aggregated	DSL	20161.77202	691058.9252	32.89019256	32890.19256		691058.9252			
RIVERSIDE	2022	LHDT2	Aggregated	Aggregated	GAS	3286.375404	107419.4478	11.44267416	11442.67416	25303.82051	107419.4478	374281.6414	14.79	LHDT2
RIVERSIDE	2022	LHDT2	Aggregated	Aggregated	DSL	7795.76126	266862.1937	13.86114635	13861.14635		266862.1937			
RIVERSIDE	2022	MCY	Aggregated	Aggregated	GAS	36240.6615	267199.3063	6.981836229	6981.836229	6981.836229	267199.3063	267199.3063	38.27	MCY
RIVERSIDE	2022	MDV	Aggregated	Aggregated	GAS	208995.205	7586687.895	373.0302077	373030.2077	379343.7253	7586687.895	7808952.293	20.59	MDV
RIVERSIDE	2022	MDV	Aggregated	Aggregated	DSL	4324.736187	181512.7606	6.313517611	6313.517611		181512.7606			
RIVERSIDE	2022	MDV	Aggregated	Aggregated	ELEC	1262.694008	40751.63814	0	0		40751.63814			
RIVERSIDE	2022	MH	Aggregated	Aggregated	GAS	6006.899407	48243.06745	9.356650581	9356.650581	11275.46068	48243.06745	69133.58244	6.13	MH
RIVERSIDE	2022	MH	Aggregated	Aggregated	DSL	2591.605795	20890.51499	1.918810096	1918.810096		20890.51499			
RIVERSIDE	2022	MHDT	Aggregated	Aggregated	GAS	2027.159212	107896.4899	20.67464454	20674.64454	108170.6844	107896.4899	1082516.825	10.01	MHDT
RIVERSIDE	2022	MHDT	Aggregated	Aggregated	DSL	15610.0447	974620.3351	87.4960399	87496.0399		974620.3351			
RIVERSIDE	2022	OBUS	Aggregated	Aggregated	GAS	588.3426118	26677.78704	5.181782563	5181.782563	8000.723523	26677.78704	52401.56366	6.55	OBUS
RIVERSIDE	2022	OBUS	Aggregated	Aggregated	DSL	351.6438765	25723.77662	2.818940959	2818.940959		25723.77662			
RIVERSIDE	2022	SBUS	Aggregated	Aggregated	GAS	490.8817654	19662.47585	2.188356834	2188.356834	6997.25334	19662.47585	56211.13603	8.03	SBUS
RIVERSIDE	2022	SBUS	Aggregated	Aggregated	DSL	1154.012525	36548.66018	4.808896505	4808.896505		36548.66018			
RIVERSIDE	2022	UBUS	Aggregated	Aggregated	GAS	164.4551683	23154.43353	3.756059553	3756.059553	13187.75228	23154.43353	65715.39058	4.98	UBUS
RIVERSIDE	2022	UBUS	Aggregated	Aggregated	DSL	1.105797941	58.57190354	0.006566346	6.56634569		58.57190354			
RIVERSIDE	2022	UBUS	Aggregated	Aggregated	ELEC	5.058469431	271.5303965	0	0		271.5303965			
RIVERSIDE	2022	UBUS	Aggregated	Aggregated	NG	308.4780966	42230.85475	9.425126379	9425.126379		42230.85475			

EMFAC2017 (v1.0.2) Emissions Inventory
Region Type: County
Region: RIVERSIDE
Calendar Year: 2023
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption. Note 'day' in the unit is operation day.

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Fuel_Consumption	Fuel_Consumption	Total Fuel	VMT	Total VMT	Miles per Gallon	Vehicle Class
RIVERSIDE	2023	HHDT	Aggregated	Aggregated	GAS	7.088213861	706.002724	0.159011057	159.0110574	539050.4842	706.002724	3998900.694	7.42	HHDT
RIVERSIDE	2023	HHDT	Aggregated	Aggregated	DSL	28234.19178	3983728.886	532.8663115	532866.3115		3983728.886			
RIVERSIDE	2023	HHDT	Aggregated	Aggregated	NG	355.8192923	14465.8062	6.025161593	6025.161593		14465.8062			
RIVERSIDE	2023	LDA	Aggregated	Aggregated	GAS	794639.2029	30779832.27	939.6757195	939675.7195	945614.9631	30779832.27	31736952.65	33.56	LDA
RIVERSIDE	2023	LDA	Aggregated	Aggregated	DSL	7815.519769	317502.0366	5.939243578	5939.243578		317502.0366			
RIVERSIDE	2023	LDA	Aggregated	Aggregated	ELEC	15793.22136	639618.3379	0	0		639618.3379			
RIVERSIDE	2023	LDT1	Aggregated	Aggregated	GAS	84985.27695	3138138.903	113.0505146	113050.5146	113081.2712	3138138.903	3167809.264	28.01	LDT1
RIVERSIDE	2023	LDT1	Aggregated	Aggregated	DSL	36.35712403	808.0659384	0.030756577	30.75657687		808.0659384			
RIVERSIDE	2023	LDT1	Aggregated	Aggregated	ELEC	683.9080674	28862.29498	0	0		28862.29498			
RIVERSIDE	2023	LDT2	Aggregated	Aggregated	GAS	259439.0419	9916616.973	376.5423108	376542.3108	378303.8656	9916616.973	10080894.42	26.65	LDT2
RIVERSIDE	2023	LDT2	Aggregated	Aggregated	DSL	1634.209588	70613.82663	1.761554855	1761.554855		70613.82663			
RIVERSIDE	2023	LDT2	Aggregated	Aggregated	ELEC	3040.981025	93663.62252	0	0		93663.62252			
RIVERSIDE	2023	LHDT1	Aggregated	Aggregated	GAS	20379.39989	669594.6702	61.48191588	61481.91588	93736.16107	669594.6702	1356378.099	14.47	LHDT1
RIVERSIDE	2023	LHDT1	Aggregated	Aggregated	DSL	20310.55706	686783.4285	32.25424519	32254.24519		686783.4285			
RIVERSIDE	2023	LHDT2	Aggregated	Aggregated	GAS	3277.015398	106175.6322	11.18653986	11186.53986	24832.61929	106175.6322	372313.6711	14.99	LHDT2
RIVERSIDE	2023	LHDT2	Aggregated	Aggregated	DSL	7906.78759	266138.039	13.64607942	13646.07942		266138.039			
RIVERSIDE	2023	MCY	Aggregated	Aggregated	GAS	36804.72978	267173.3255	6.983217686	6983.217686	6983.217686	267173.3255	267173.3255	38.26	MCY
RIVERSIDE	2023	MDV	Aggregated	Aggregated	GAS	209260.3837	7517129.194	358.095213	358095.213	364562.2474	7517129.194	7765345.052	21.30	MDV
RIVERSIDE	2023	MDV	Aggregated	Aggregated	DSL	4651.863516	191155.3985	6.46703442	6467.03442		191155.3985			
RIVERSIDE	2023	MDV	Aggregated	Aggregated	ELEC	1809.970435	57060.4591	0	0		57060.4591			
RIVERSIDE	2023	MH	Aggregated	Aggregated	GAS	5776.95938	46142.35748	8.858874447	8858.874447	10718.84555	46142.35748	66539.16407	6.21	MH
RIVERSIDE	2023	MH	Aggregated	Aggregated	DSL	2588.434841	20396.80659	1.8599711	1859.9711		20396.80659			
RIVERSIDE	2023	MHDT	Aggregated	Aggregated	GAS	2097.292591	111900.5641	21.15571054	21155.71054	106071.9459	111900.5641	1098108.234	10.35	MHDT
RIVERSIDE	2023	MHDT	Aggregated	Aggregated	DSL	15231.0851	986207.6701	84.91623531	84916.23531		986207.6701			
RIVERSIDE	2023	OBUS	Aggregated	Aggregated	GAS	588.235633	26194.80523	5.020584528	5020.584528	7846.768453	26194.80523	52772.59344	6.73	OBUS
RIVERSIDE	2023	OBUS	Aggregated	Aggregated	DSL	354.6623224	26577.78821	2.826183925	2826.183925		26577.78821			
RIVERSIDE	2023	SBUS	Aggregated	Aggregated	GAS	506.2151924	20097.2932	2.225975375	2225.975375	7074.38034	20097.2932	57336.67574	8.10	SBUS
RIVERSIDE	2023	SBUS	Aggregated	Aggregated	DSL	1175.903827	37239.38255	4.848404965	4848.404965		37239.38255			
RIVERSIDE	2023	UBUS	Aggregated	Aggregated	GAS	165.4254964	23291.05069	3.744875418	3744.875418	13213.36354	23291.05069	66103.12843	5.00	UBUS
RIVERSIDE	2023	UBUS	Aggregated	Aggregated	DSL	0.141961099	11.67769301	0.001254634	1.254634181		11.67769301			
RIVERSIDE	2023	UBUS	Aggregated	Aggregated	ELEC	4.058469431	248.5082415	0	0		248.5082415			
RIVERSIDE	2023	UBUS	Aggregated	Aggregated	NG	312.298405	42551.8918	9.467233488	9467.233488		42551.8918			

This page intentionally left blank

Appendix E: Geotechnical/Geologic Hazard Report

GEOTECHNICAL/GEOLOGIC HAZARD REPORT
PROPOSED NEW CLASSROOM BUILDINGS
MURRIETA CANYON ACADEMY
24150 HAYES AVENUE, MURRIETA, CALIFORNIA

Prepared for

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT
41870 McAlby Court
Murrieta, California 92562

Project No. 12393.001

August 20, 2019

Leighton Consulting, Inc.
A LEIGHTON GROUP COMPANY

Leighton Consulting, Inc.
A LEIGHTON GROUP COMPANY

August 20, 2019

Project No. 12393.001

Murrieta Valley Unified School District
41870 McAlby Court
Murrieta, California 92562

Attention: Mr. Randy White

Subject: Geotechnical/Geologic Hazard Report
Proposed New Classroom Buildings
Murrieta Canyon Academy
24150 Hayes Avenue, Murrieta, California

In accordance with your request and authorization, we have performed a geotechnical/ geologic exploration for the proposed Classroom Buildings located within the existing Murrieta Canyon Academy/Thompson Middle School campuses in the City of Murrieta, California. This report summarizes our geotechnical findings, conclusions and recommendations regarding the proposed building. Although this is an existing school site, our report is prepared in general accordance with California Geologic Survey (CGS), Note 48. It should be noted that Leighton previously performed a subsurface fault investigation for the overall property that included also Murrieta Valley HS and Thompson MS (see references) and determined that active faulting does not exist at this site. Further, Leighton also performed compaction testing during grading.

If you have any questions regarding this report, please do not hesitate to contact the undersigned. We appreciate this opportunity to be of service on this project.

Respectfully submitted,

LEIGHTON CONSULTING, INC.

Simon I. Saiid, GE 2641
Principal Engineer

Mitch Bornyasz CEG 2416
Senior Project Geologist

Distribution: (1) Addressee
(1) BND, Attn: Eric Schulz

41715 Enterprise Circle N., Suite 103 ▪ Temecula, CA 92590-5661
951.296.0530 ▪ Fax 951.296.0534

TABLE OF CONTENTS

Section | Page

Leighton

Accompanying Tables, Figures, Plates and Appendices

Tables

Figures (end of text)

Appendices

1.0 INTRODUCTION

1.1 Purpose and Scope

This geotechnical/geologic hazard report is for the proposed Classroom Buildings at the Murrieta Canyon Academy/Thompson Middle School campuses located at 24150 Hayes Avenue, City of Murrieta, California (*see Figure 1, Site Location Map*). Our scope of services included the following:

- Review of available site-specific geologic information, including previous geotechnical reports listed in the references at the end of this report.
- A site reconnaissance and excavation of fourteen (14) exploratory borings and two percolation tests. Approximate locations of these exploratory borings are depicted on Figure 2.
- Geotechnical laboratory testing of selected soil samples obtained from this exploration. Test procedures and results are presented in Appendix B.
- Geotechnical engineering analyses performed or as directed by a California registered Geotechnical Engineer (GE) and reviewed by a California Certified Engineering Geologist (CEG).
- Preparation of this report which presents our geotechnical conclusions and recommendations regarding the proposed structures.

This report is not intended to be used as an environmental assessment (Phase I or other), or foundation and/or grading plan review.

1.2 Site and Project Description

The Murrieta Canyon Academy located at 24150 Hayes Avenue, Murrieta, California, is a fully functioning adult education school campus constructed during various phases. As depicted on Figure 2, the proposed buildings are generally located within the existing softball fields located immediately north of the existing campus and south of Thompson Middle School. The existing Murrieta Canyon Academy buildings are to be demolished and new parking/landscape to be constructed. Access to all portions of the site was through a locked gate along the south side of the campus.

Our understanding of this project is based on our review of a conceptual site plan prepared by Baker-Nowicki Design Studio (see Figure 2). The project will generally include the design of a new campus (Buildings A through D) with approximately 33,000 square-feet footprint total and associated parking lot, and other site improvements. More specifically, the new campus will include construction of a single-story laboratory and

Leighton

classroom building, student pavilion, administration office, various academic and activity courts with additional parking and landscape at the existing campus. The proposed buildings will contain various classrooms, a library, restrooms, and storage rooms. Details of the proposed grading and construction are not known at this time. The proposed buildings are expected to be single-story structures founded on isolated/spread or continuous wall footings with typical structural loads near existing grades.

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 Field Exploration

Our field exploration for the proposed buildings and parking areas consisted of the excavation of fourteen (14) borings within accessible areas of the site to explore subsurface conditions and provide basis for ground preparation and foundation design. During excavation, in-situ undisturbed (Cal Ring) and disturbed/bulk samples were collected from the exploration borings for further laboratory testing and evaluation. Approximate locations of these exploratory borings are depicted on the *Boring Location Plan* (Figure 2). Sampling was conducted by a staff geologist/engineer from our firm. After logging and sampling, the excavations were loosely backfilled with spoils generated during excavation and cold patch asphalt or rapid-set concrete was used where drilled in existing concrete pavement. The exploration logs from this and previous explorations are included in Appendix A.

2.2 Laboratory Testing

Laboratory tests were performed on representative bulk samples to provide a basis for development of remedial earthwork and geotechnical design parameters. Selected samples were tested to determine the following parameters: maximum dry density and optimum moisture, particle size, expansion index, swell or collapse potential, in-situ moisture and density, and soluble sulfate content. The results of our laboratory testing are presented in Appendix B.

3.0 GEOTECHNICAL AND GEOLOGIC FINDINGS

3.1 Regional Geology

The site is located within a prominent natural geomorphic province in southwestern California known as the Peninsular Ranges. This province is characterized by steep, elongated ranges and valleys that trend northwestward. More specifically, the site is situated within the southern portion of the Perris Block, an eroded mass of Cretaceous and older crystalline rock.

The Perris Block is approximately 20 miles by 50 miles in extent, is bounded by the San Jacinto Fault Zone to the northeast, the Elsinore Fault Zone to the southwest, the Cucamonga Fault Zone to the northwest, and the Temecula Basin to the south. The Perris Block has had a complex tectonic history, apparently undergoing relative vertical land-movements of several thousand feet in response to movement on the Elsinore and San Jacinto Fault Zones. Thin sedimentary and volcanic materials locally mantle crystalline bedrock. Young and older alluvial deposits fill the lower valley areas, as mapped regionally on Figure 4, *Regional Geology Map*.

3.2 Site Specific Geology

3.2.1 Earth Materials

Our field exploration, observations, and review of the pertinent literature indicate that the site is underlain by alluvial deposits and dense formational materials locally known as Pauba Formation. Artificial fill associated with previous site grading mantles the site. The following is a summary of the geologic conditions based on our borings.

- **Artificial Fill:** Artificial fill soils were generally observed within the upper 10 feet below ground surface. As encountered, these fills consist of moist, medium dense to dense, silty to clayey sand and sandy clay. Based on the results of our laboratory testing, these materials are expected to possess low to medium expansion potential (EI<91).

- **Pauba Formation:** Pleistocene aged Pauba Formation materials were encountered in our borings below the artificial fill. As encountered in the exploratory excavations, these materials consist of damp to moist, very stiff to dense, silty to clayey sand and sandy to silty clay. These materials are expected to possess similar expansion potential as the artificial fill.

3.3 Groundwater and Surface Water

No standing or surface water was observed on the site at the time of our field exploration. In addition, no groundwater was encountered during this investigation to the total depth explored of 31.5 feet. Historic groundwater data is not available for this site or nearby sites.

3.4 Faulting

The subject site, like the rest of Southern California, is located within a seismically active region as a result of being located near the active margin between the North American and Pacific tectonic plates. The principal source of seismic activity is movement along the northwest-trending regional fault systems such as the San Andreas, San Jacinto, and Elsinore Fault Zones. Based on published geologic maps, this site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone, but located within Riverside County Fault Hazard Zone (see Figure 5). However, this site was cleared of any active faulting based on previous fault studies (Leighton, 1989). Moreover, no indications of faulting or fault related fissuring or fracturing was observed onsite during this investigation. The nearest known active fault is the Temecula Segment of the Elsinore Fault Zone located approximately 0.6 miles (0.97 kilometers) northeast of the site.

Historically, the Elsinore fault zone has produced earthquakes in the magnitude range of 6.5Mw to 7.1Mw (‘Mw’ is the Moment Magnitude as defined by the U.S.G.S). A table of major quakes (>5.5 Mw) within 30 miles of the site in the last 150 years (per CGS Website, December 2017), is presented in table below:

Table 1. Major Quakes (>5.5 Mw) in the last 150 years

Date	Moment Magnitude (Mw)	Approx. Distance from Site (km)	General Location
1880-12-19	6.0	37.8	East San Bernardino
1899-12-25	6.4	34.2	San Jacinto / Hemet
1910-05-15	6.0	21.8	Glen Ivy Hot Springs
1918-04-21	6.8	30.1	San Jacinto

3.5 Ground Shaking / Site-Specific Ground Motion Analysis

A site-specific ground motion analysis was performed in accordance with the 2016 California Building Code (CBC) following the procedures of ASCE 7-10 Publication, Section 21.2, as presented in Appendix C.

Leighton

The probabilistic seismic hazard analysis was performed using the computer program EZ-FRISK (Risk Engineering, 2011) to estimate peak horizontal ground acceleration (PHGA) that could occur at the site, and to develop design response spectra. Various probabilistic density functions were used in this analysis to assess uncertainty inherent in these calculations with respect to magnitude, distance and ground motion. An averaging of the following four next-generation attenuation relationships (NGAs) was used with equal weights to calculate site-specific PHGA and spectra:

- Abrahamson-Silva (2008)
- Boore-Atkinson (2008),
- Campbell-Bozorgnia (2008), and
- Chiou-Youngs (2007)

The design response spectrum shown on Figure C-1 is derived from a comparison of probabilistic Maximum Considered Earthquake (MCE) and the 150 percent of the deterministic MCE as presented in Figures C-2 through C-3. In accordance with the 2016 CBC, peak ground accelerations are estimated based on maximum considered earthquake ground motion having a 2 percent probability of exceedance in 50 years) or site specific seismic hazard analysis (ASCE, 2010). The site-specific seismic coefficients are presented in Table 2 below.

Table 2. Site-Specific Seismic Coefficients

CBC Categorization/Coefficient		USGS General Procedure (g)*	EZ-Frisk Procedure (g)
Site Longitude (decimal degrees)	-117.23306		
Site Latitude (decimal degrees)	33.56075		
Site Class Definition	**D**		
Mapped Spectral Response Acceleration at 0.2s Period, S_s		**2.02**	**2.05**
Mapped Spectral Response Acceleration at 1s Period, S_1		**0.81**	**0.71**
Short Period Site Coefficient at 0.2s Period, F_a		**1.00**	**1.00**
Long Period Site Coefficient at 1s Period, F_v		**1.50**	**1.50**
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS}		**2.02**	**2.05**
Adjusted Spectral Response Acceleration at 1s Period, S_{M1}		**1.22**	**1.07**
Design Spectral Response Acceleration at 0.2s Period, S_{DS}		**1.35**	**1.37**
Design Spectral Response Acceleration at 1s Period, S_{D1}		**0.81**	**0.71**

*g- Gravity acceleration, **S_{D1} *is calculated based on 2xSa* at 2s

The above listed seismic coefficients were calculated following the ASCE 7-10 procedures. We recommend the higher of the seismic coefficients be used in the design.

3.6 Secondary Seismic Hazards

Ground shaking can induce "secondary" seismic hazards such as liquefaction, dynamic densification, and differential subsidence along ground fissures, seiches and tsunamis, as discussed in the following subsections:

3.6.1 Dynamic Settlement (Liquefaction and Dry Settlement)

Liquefaction-induced or dynamic dry settlement is not considered a hazard at this site due to the lack of shallow groundwater and dense underlying Pauba formation. The seismic differential settlement is expected to be less than 0.5 inch in a 40-foot horizontal distance within this site.

3.6.2 Lateral Spreading

The potential for lateral spreading is considered non-existent on this site.

3.6.3 Ground Rupture

Since no active faults are known to cross or trend into the site, the possibility of damage due to ground surface-fault-rupture at this site is considered very low.

3.6.4 Seiches, Tsunamis, Inundation Due to Large Water Storage Facilities

Due to the great distance to large bodies of water, the possibility of seiches and tsunamis impacting the site is considered remote. This report does not address conventional flood hazard risk.

3.6.5 Rock Falls

The potential for rock fall due to either erosion or seismic ground shaking is considered non-existent on this area.

3.6.6 Slope Stability and Landslides

Due to the relatively modest relief across the site, the risk of deep-seated slope failure on this site or adjacent sites is considered non-existent. The existing 2:1 fill slope along the south side of the campus is considered grossly stable. The site is not considered susceptible to seismically induced landslides.

3.6.7 Dam Inundation/Flood Hazard

This report does not address conventional flood hazard risk associated with this site. However, per the official FEMA Flood Hazard Areas Map (FIRM Panel 06065C2715G), this site is located in Zone X – "Area of minimal flood hazard" In accordance with Figure 8, the site is not located within Diamond Valley Saddle dam inundation zone (Riverside, 2019).

3.6.8 Subsidence

In accordance with County of Riverside Geologic Hazard Maps (Riverside, 2019), the site is located within an area susceptible to subsidence. However, based on the results of our subsurface evaluation and lack of evidence of differential subsidence and associated ground fissuring, we consider the potential for differential subsidence and ground fissuring on this site to be very low.

3.7 Percolation/Infiltration Test Results

Two percolation tests were performed within the proposed infiltration areas at the site in the existing playfield area (see Figure 2). The percolation tests were performed in accordance with procedures of Section 2.3 of the Riverside County Flood Control and Water Conservation District (RCFC&WCD) Design Handbook (RCFC, 2011). Results presented below are the most conservative reading in minutes per inch drop. The infiltration rates were estimated using the Porchet Method. No factor of Safety was applied to these values.

Table 3. Summary of Percolation/Infiltration Test Results

Test Hole #	Depth BGS (ft)	Percolation Rate (min/in)	Infiltration Rate (in/hr)	Soil Description
P-1	4	>120	<0.01	Silty/Clayey SAND (SC-SM) / Artificial Fill
P-2	4	27.8	0.20	Silty SAND (SM) / Artificial Fill

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 General

The proposed buildings/improvements appear feasible from a geotechnical viewpoint provided that the following recommendations are incorporated into the design and construction phases of development.

4.2 Earthwork

Earthwork should be performed in accordance with the following recommendations and the *Earthwork and Grading Specifications* included in Appendix D of this report. In case of conflict, the following recommendations should supersede those in Appendix D. The contract between the Owner and the earthwork contractor should be worded such that it is the responsibility of the contractor to place fill properly and in accordance with recommendations presented in this report, including the guide specifications in Appendix D, notwithstanding the testing and observation of the geotechnical consultant.

4.2.1 Site Preparation and Remedial Grading

Prior to grading, the proposed structural improvement areas (i.e. all-structural fill areas, pavement areas, buildings, etc.) of the site should be cleared of surface and subsurface obstructions. Heavy vegetation, roots and debris should be disposed of offsite. Although not anticipated, water wells, septic tanks and cesspools, if encountered, should be removed or abandoned in accordance with the Riverside County Department of Health Services guidelines. Voids created by removal of buried material should be backfilled with properly compacted soil in general accordance with the recommendations of this report. Area specific remedial grading recommendations are provided as follows:

- **Building Footprints:** Within the building footprint, the upper 3 feet of soils, or 2 feet below bottom of footings/slab-on-grade, whichever is deeper, should be removed/over-excavated and recompacted. If bottom of footings are deeper than 3 feet below existing grade, no over-excavation will be required provided the exposed bottom of excavation is scarified and recompacted to minimum of 90 percent of the ASTM D 1557 and approved by the geotechnical consultant. The over-excavation and recompaction should extend a minimum horizontal distance equal to the depth of removal. Localized areas of deeper removals/over-excavation may be required depending on the actual conditions encountered pending verification by our field representative during grading to confirm encountered soils are suitable.

Leighton

- **Flatwork/Pavement:** In areas of proposed concrete flatwork or pavement, a minimum remedial removal and recompaction of 2-feet below existing grade or 12-inches below proposed subgrade elevation, whichever is deeper, should be performed. This remedial removal should be performed to a minimum of 2 feet beyond the limits of improvements. The bottom of the removal should be proof-rolled with heavy equipment to identify yielding subgrade conditions (for additional removal, if necessary) under the observation of the geotechnical consultant.

After completion of the recommended removal of existing fill soils and prior to fill placement, the exposed surface should be scarified to a minimum depth of 8-inches, moisture conditioned as necessary to near optimum moisture content and recompacted using heavy compaction equipment to an unyielding condition. All structural fill within the building footprints should be compacted throughout to 90 percent per ASTM D 1557.

4.2.2 Suitability of Site Soils for Fills

Topsoil and vegetation layers, root zones, and similar surface materials should be striped and stockpiled for either reuse in landscape surface areas or removed from the site. Site existing fill should be considered suitable for re-use as compacted fills provided the recommendations contained herein are followed. If cobbles/boulders larger than 6-inches in largest diameter or expansive soils ($21<EI<91$) are encountered, these materials should not be placed with the upper 5 feet of subgrade soils.

4.2.3 Import Soils

Import soils and/or borrow sites, if needed, should be evaluated by us prior to import. Import soils should be uncontaminated, granular in nature, free of organic material (loss on ignition less-than 2 percent), have low expansion potential ($EI<91$) and have a low corrosion impact to the proposed improvements.

4.2.4 Utility Trenches

Utility trenches should be backfilled with compacted fill in accordance with the *Standard Specifications for Public Works Construction,* (“Greenbook”), 2018 Edition. Fill material above the pipe zone should be placed in lifts not exceeding 8 inches in uncompacted thickness and should be compacted to at least 90 percent relative compaction (ASTM D 1557) by mechanical means only. Site soils may generally be suitable as trench backfill provided these soils are screened of rocks over 1½ inches in diameter and organic matter. The upper 6 inches of backfill in all pavement areas should be compacted to at least 95 percent relative compaction.

Where granular backfill is used in utility trenches adjacent moisture sensitive subgrades and foundation soils, we recommend that a cut-off “plug” of impermeable material be placed in these trenches at the perimeter of buildings, and at pavement edges adjacent to irrigated landscaped areas. A "plug" can consist of a 5-foot long section of clayey soils with more than 35-percent passing the No. 200 sieve, or a Controlled Low Strength Material (CLSM) consisting of one sack of Portland-cement plus one sack of bentonite per cubic-yard of sand. CLSM should generally conform to "Greenbook", latest edition. This is intended to reduce the likelihood of water permeating trenches from landscaped areas, then seeping along permeable trench backfill into the building and pavement subgrades, resulting in wetting of moisture sensitive subgrade earth materials under buildings and pavements.

Excavation of utility trenches should be performed in accordance with the project plans, specifications and the *California Construction Safety Orders*. The contractor should be responsible for providing a "competent person" as defined in Article 6 of the *California Construction Safety Orders*. Contractors should be advised that sandy soils (such as fills generated from the onsite alluvium) could make excavations particularly unsafe if all safety precautions are not properly implemented. In addition, excavations at or near the toe of slopes and/or parallel to slopes may be highly unstable due to the increased driving force and load on the trench wall. Spoil piles from the excavation(s) and construction equipment should be kept away from the sides of the trenches. Leighton Consulting, Inc. does not consult in the area of safety engineering.

4.2.5 Shrinkage

The volume change of excavated onsite soils upon recompaction is expected to vary with materials, density, insitu moisture content, and location and compaction effort. The in-place and compacted densities of soil materials vary and accurate overall determination of shrinkage and bulking cannot be made. Therefore, we recommend site grading include, if possible, a balance area or ability to adjust grades slightly to accommodate some variation. Based on our geotechnical laboratory results, we expect a recompaction shrinkage (when recompacted at 90 to 95 percent of ASTM D 1557) of 5- to 15-percent by volume, for the onsite fill or alluvium. Subsidence due solely to scarification, moisture conditioning and recompaction of the exposed bottom of over-excavation, is expected to be on the order of 0.10 foot. This should be added to the above shrinkage value for the recompacted fill zone, to calculate overall recompaction subsidence.

4.2.6 Drainage

All drainage should be directed away from structures and pavements by means of approved permanent/temporary drainage devices. Adequate storm drainage of any proposed pad should be provided to avoid wetting of foundation soils. Irrigation adjacent to buildings should be avoided when possible. As an option, sealed-bottom planter boxes and/or drought resistant vegetation should be used within 5-feet of buildings.

4.3 Foundation Design

Shallow spread footings bearing on a newly placed and properly compacted fill are anticipated for the proposed structures.

4.3.1 Design Parameters – Spread/Continuous Shallow Footings

Conventional spread/continuous shallow footings appear to be feasible to support the proposed structures. Footings should be embedded at least 12-inches below lowest adjacent grade for the proposed structure. Footing embedments should be measured from lowest adjacent finished grade, considered as the top of interior slabs-on-grade or the finished exterior grade, excluding landscape topsoil, whichever is lower. Footings located adjacent to utility trenches or vaults should be embedded below an imaginary 1:1 (horizontal:vertical) plane projected upward and outward from the bottom edge of the trench or vault, up towards the footing.

- **Bearing Capacity**: A net allowable bearing capacity of 2,000 pounds per square foot (psf) may be used for design assuming that footings have a minimum base width of 18 inches for continuous wall footings and a minimum bearing area of 3 square feet (1.75-ft by 1.75-ft) for pad foundations. These bearing values may also be increased by one-third when considering short-term seismic or wind loads. All continuous perimeter or interior footings should be reinforced with at least one No. 5 bar placed both top and bottom.

- **Lateral loads**: Lateral loads may be resisted by friction between the footings and the supporting subgrade. A maximum allowable frictional resistance of 0.30 may be used for design. In addition, lateral resistance may be provided by passive pressures acting against foundations poured neat against properly compacted granular fill. We recommend that an allowable passive pressure based on an equivalent fluid pressure of 300 pounds-per-cubic-foot (pcf) be used in design. These friction and passive values have already been reduced by a factor-of-safety of 1.5.

Based on Section 1808.6.2 of the 2016 California Building Code, slab-on-grade design for expansive soils (EI>21) should be designed in accordance with *WRI/CRSI Design of Slab-On-Ground Foundations* or *PTI DC 10.5* taking into consideration the anticipated differential settlement. The following soil parameters may be used:

WRI/CRSI Design Method

- Effective Plasticity Index: 20
- Climatic Rating: Cw = 15
- Reinforcement: Per structural designer.
- Moisture condition subgrade soils to 100% of optimum moisture content to a depth of 12 inches prior to trenching for footings.

PTI DC 10.5 Design Method

The following PTI design parameters were derived using VOLFLO 1.5 computer program developed by Geostructural Tool Kit, Inc. and laboratory test results:

Table 4. PTI Design Parameters

Design Parameters	EI≤90
Thornthwaite Moisture Index	-20
Depth to Constant Soil Suction	9.0 feet
Constant Soil Suction	3.9 feet
Edge Moisture Variation Distance, e_m - Edge Lift - Center Lift	 4.8 feet 9.0 feet
Soil Differential Movement, y_m - Edge Lift - Swell - Center Lift – Shrink	 1.2 inches 0.7 inch

The differential settlements provided below should be considered in addition to the shrink/swell settlement given in table above.

4.3.2 Settlement Estimates

For settlement estimates, we assumed that column loads will be no larger than 100 kips, with bearing wall loads not exceeding 5 kips per foot of wall. If greater column or wall loads are required, we should re-evaluate our foundation recommendation, and re-calculate settlement estimates.

Buildings located on compacted fill soils (as recommended in Section 4.2.1) should be designed in anticipation of 1-inch of total static settlement and ½- inch of static differential settlement within a 40 foot horizontal run. The majority of this settlement is anticipated to occur during construction as the load is applied. The estimated differential dynamic settlement will be less than ½-inch within a 40 feet horizontal distance or between two similar structural elements. These settlement estimates should be reevaluated by this firm when foundation plans and actual loads for the proposed structure(s) become available. The structural engineer should consider the effects of both static and dynamic settlements.

4.4 Retaining Walls

The proposed building will require a large retaining wall up to approximately 10 feet in height. Retaining wall earth pressures are a function of the amount of wall yielding horizontally under load. If the wall can yield enough to mobilize full shear strength of backfill soils, then the wall can be designed for "active" pressure. If the wall cannot yield under the applied load, the shear strength of the soil cannot be mobilized and the earth pressure will be higher. Such walls should be designed for "at rest" conditions. If a structure moves toward the soils, the resulting resistance developed by the soil is the "passive" resistance. Retaining walls backfilled with non-expansive soils should be designed using the following equivalent fluid pressures:

Table 5. Retaining Wall Design Earth Pressures (Static, Drained)

Loading Conditions	Equivalent Fluid Density (pcf)	
	Level Backfill	2:1 Backfill
Active	36	50
At-Rest	55	85
Passive*	300	150 (2:1, sloping down)

* This assumes level condition in front of the wall will remain for the duration of the project, not to exceed 4,500 psf at depth.

Unrestrained (yielding) cantilever walls should be designed for the active equivalent-fluid weight value provided above for very low expansive soils that are free draining. In the design of walls restrained from movement at the top (non-yielding) such as basement or elevator pit/utility vaults, the at-rest equivalent fluid weight value should be used. Total depth of retained earth for design of cantilever walls should be measured as the vertical distance below the ground surface measured at the wall face for stem design, or measured at the heel of the footing for overturning and sliding calculations. Should a sloping backfill other than a 2:1 (horizontal:vertical) be constructed above the wall (or a backfill is loaded by an adjacent surcharge load), the equivalent fluid weight values provided above should be re-evaluated on an individual case basis by us. Non-standard wall designs should also be reviewed by us prior to construction to check that the proper soil parameters have been incorporated into the wall design.

All retaining walls should be provided with appropriate drainage. The outlet pipe should be sloped to drain to a suitable outlet. Wall backfill should be non-expansive (EI $\leq$ 21) sands compacted by mechanical methods to a minimum of 90 percent relative compaction (ASTM D 1557). Clayey site soils should not be used as wall backfill. Walls should not be backfilled until wall concrete attains the 28-day compressive strength and/or as determined by the Structural Engineer that the wall is structurally capable of supporting backfill. Lightweight compaction equipment should be used, unless otherwise approved by the Engineer.

4.5 Vapor Retarder

It has been a standard of care to install a moisture retarder underneath all slabs where moisture condensation is undesirable. Moisture vapor retarders may retard but not totally eliminate moisture vapor movement from the underlying soils up through the slabs. Moisture vapor transmission may be additionally reduced by use of concrete additives. Leighton Consulting, Inc., does not practice in the field of moisture vapor transmission evaluation/mitigation. Therefore, we recommend that a qualified person/firm be engaged/consulted with to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. This person/firm should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structure as deemed appropriate.

4.6 Footing Setbacks

We recommend a minimum horizontal setback distance from the face of slopes for all structural footings (including retaining and decorative walls, building footings, etc.). This distance is measured from the outside bottom edge of the footing horizontally to the slope face (or to the face of a retaining wall) and should be a minimum of H/3, where H is the slope height (in feet). The setback should not be less than 7 feet and need not be greater than 15 feet.

The soils within the structural setback area may possess poor lateral stability and improvements (such as retaining walls, decks, sidewalks, fences, pavements, etc.) constructed within this setback area may be subject to lateral movement and/or differential settlement. Potential distress to such improvements may be mitigated by providing a deepened footing or a pier and grade-beam foundation system to support the improvement. The deepened footing should meet the setback as described above.

4.7 Sulfate Attack

The results of our laboratory testing indicate that the onsite soils have soluble sulfate content of less than 2,000 ppm. Type II cement or similar may be used for design of concrete structures in contact with the onsite soils.

4.8 Preliminary Pavement Design

Our preliminary pavement design is based on an assumed R-value of 17 and the guidelines included in Caltrans Highway Design Manual. For planning and estimating purposes, the pavement sections are calculated based on Traffic Indexes (TI) as indicated in Table below:

Table 6. Asphalt Pavement Sections

General Traffic Condition	Design Traffic Index (TI)	Asphalt Concrete (inches)	Aggregate Base* (inches)
Automobile Parking Lanes	4.5	3.0	6.0
	5.0	3.0	7.5
Truck Access & Driveways	6.0	4.0	9.0
	6.5	4.5	10.0

Appropriate Traffic Index (TI) should be selected or verified by the project civil engineer or traffic engineering consultant and appropriate R-value of the subgrade soils will need to be verified after completion of rough grading to finalize the pavement design. Pavement design and construction should also conform to applicable local, county and industry standards. The Caltrans pavement section design calculations were based on a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance

For preliminary planning purposes, fire lanes and truck loading areas may be constructed of Portland Cement Concrete (PCC) with a minimum thickness of 6.0 inches assuming light axle loads and an average daily truck traffic (ADTT) of less than 500. For medium/heavy axle loads and an ADT of 500 or more, a minimum PCC thickness of 8 inches should be used, such as for trash corrals and trash truck aprons, loading docks, etc. All PCC pavement should have a minimum 28-day concrete compressive strength of 3,250 psi and have appropriate joints and saw cuts in accordance with either Portland Cement Association (PCA) or American Concrete Institute (ACI) guidelines. PCC subgrade should be compacted to 95 percent relative compaction in the upper 6 inches. A 4-inch (minimum) layer of Class 2 aggregate base at 95 percent relative compaction should be considered beneath the PCC paving. The upper 6 inches of the underlying subgrade soils should also be compacted to at least 95 percent relative compaction (ASTM D1557). Minimum relative compaction requirements for aggregate base should be 95 percent of the maximum laboratory density as determined by ASTM D1557. If applicable, aggregate base should conform to the “Standard Specifications for Public Works Construction” (green book) current edition or Caltrans Class 2 aggregate base.

If pavement areas are adjacent to heavily watered landscape areas, some deterioration of the subgrade load bearing capacity may result. Moisture control measures such as deepened curbs or other moisture barrier materials may be used to prevent the subgrade soils from becoming saturated. The use of concrete cutoff or edge barriers should be considered when pavement is planned adjacent to either open (unfinished) or irrigated landscaped areas.

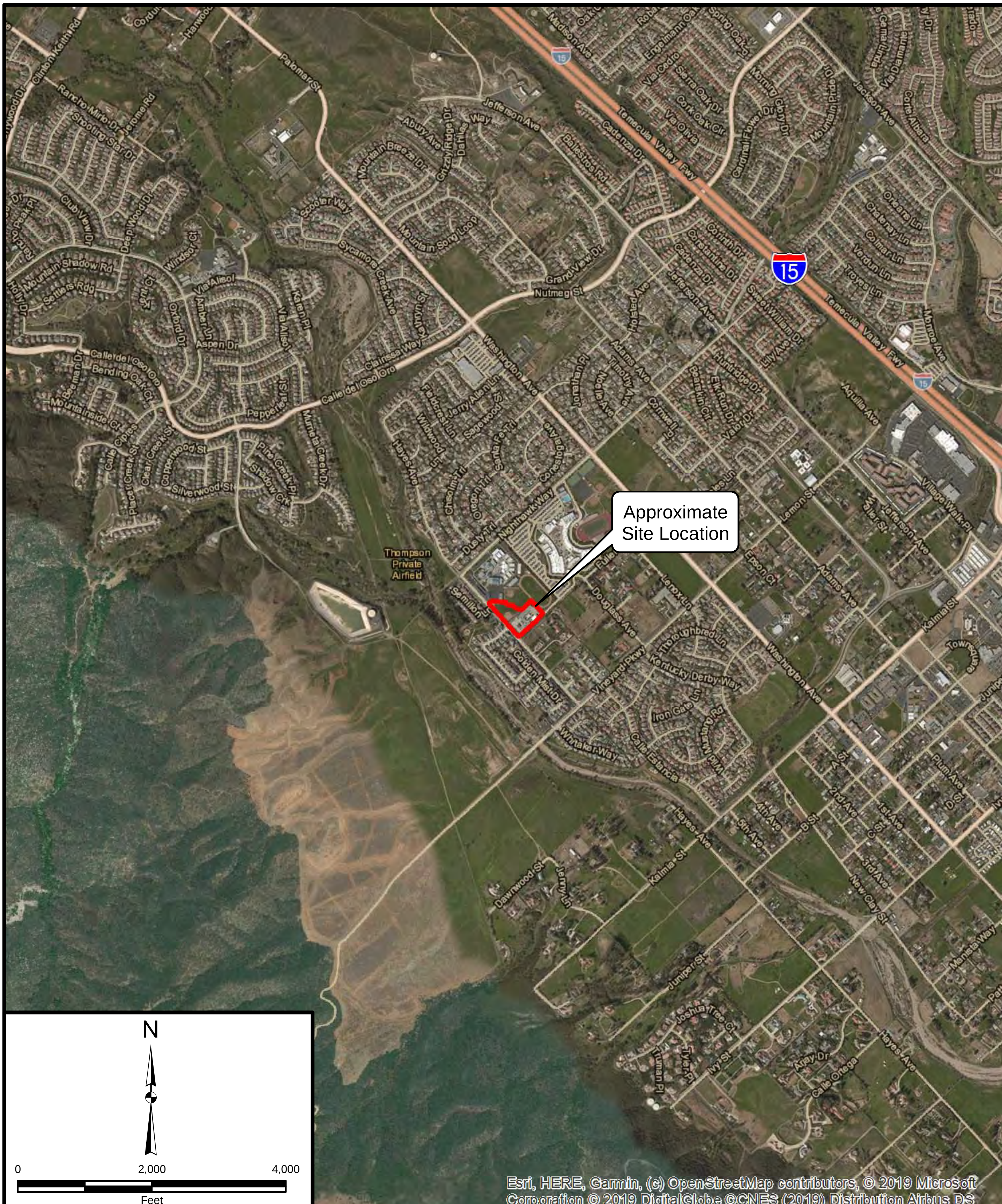
5.0 GEOTECHNICAL CONSTRUCTION SERVICES

Geotechnical review is of paramount importance in engineering practice. Poor performances of many foundation and earthwork projects have been attributed to inadequate construction review. We recommend that Leighton Consulting, Inc. be provided the opportunity to review the grading plan and foundation plan(s) prior to bid.

Reasonably-continuous construction observation and review during site grading and foundation installation allows for evaluation of the actual soil conditions and the ability to provide appropriate revisions where required during construction. Geotechnical conclusions and preliminary recommendations should be reviewed and verified by Leighton Consulting, Inc. during construction, and revised accordingly if geotechnical conditions encountered vary from our findings and interpretations. Geotechnical observation and testing should be provided:

- After completion of site demolition and clearing,
- During over-excavation of compressible soil,
- During compaction of all fill materials,
- After excavation of all footings and prior to placement of concrete,
- During utility trench backfilling and compaction, and
- When any unusual conditions are encountered.

Additional geotechnical exploration and analysis may be required based on final development plans, for reasons such as significant changes in proposed structure locations/footprints. We should review grading (civil) and foundation (structural) plans, and comment further on geotechnical aspects of this project.



Project: 12393.001	Eng/Geol: SIS/RFR
Scale:1 " = 2,000 '	Date: August 2019

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton
Author: Leighton Geomatics (btran)

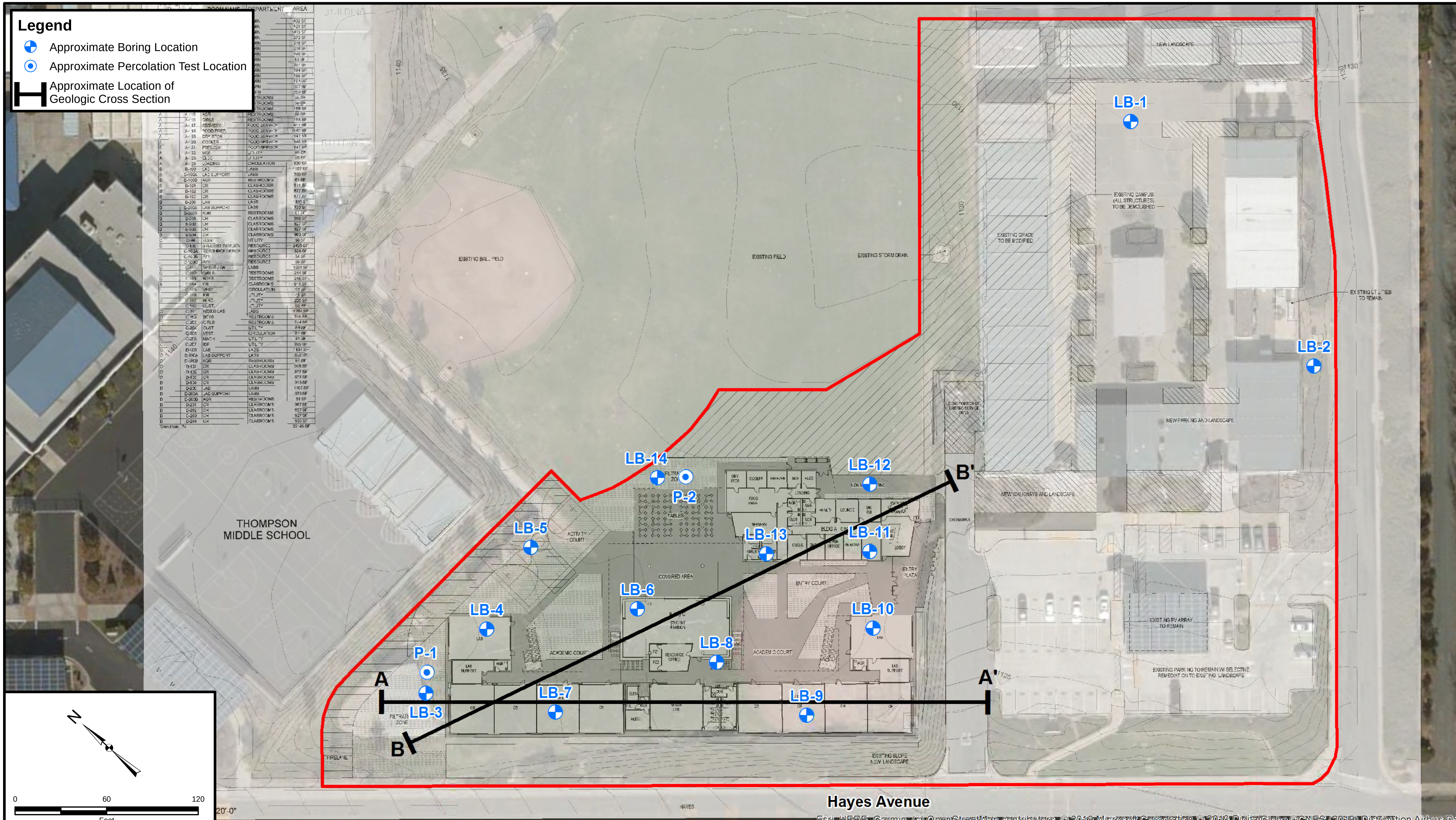
SITE LOCATION MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 1

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F01_SLM_2019-08-20.mxd on 8/20/2019 11:17:54 AM



Project: 12393.001 | Eng/Geol: SIS/RFR

Scale: 1 " = 60 ' | Date: August 2019

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton
Author: Leighton Geomatics (btran)

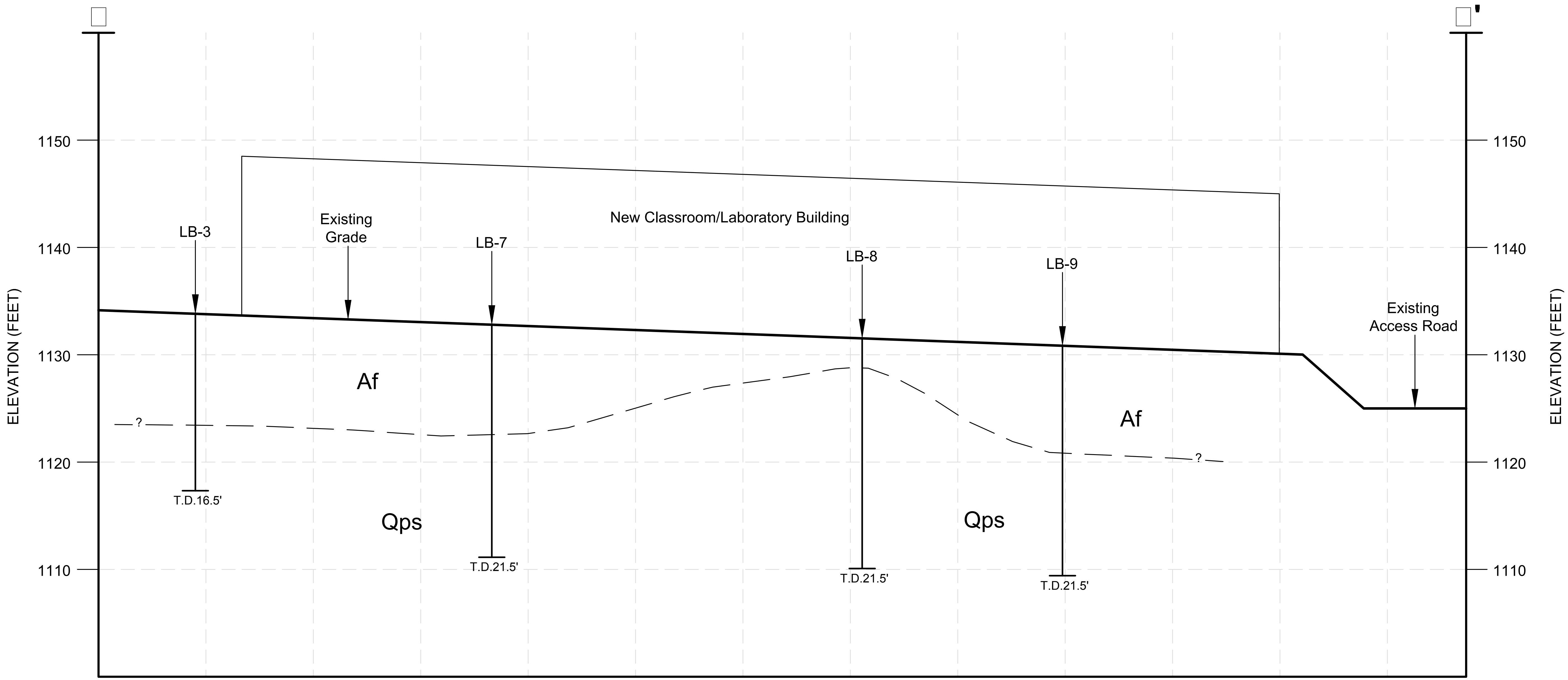
BORING LOCATION MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 2

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F02_BLM_2019-08-20.mxd on 8/20/2019 9:25:28 AM



GEOLOGIC CROSS SECTION □-□'

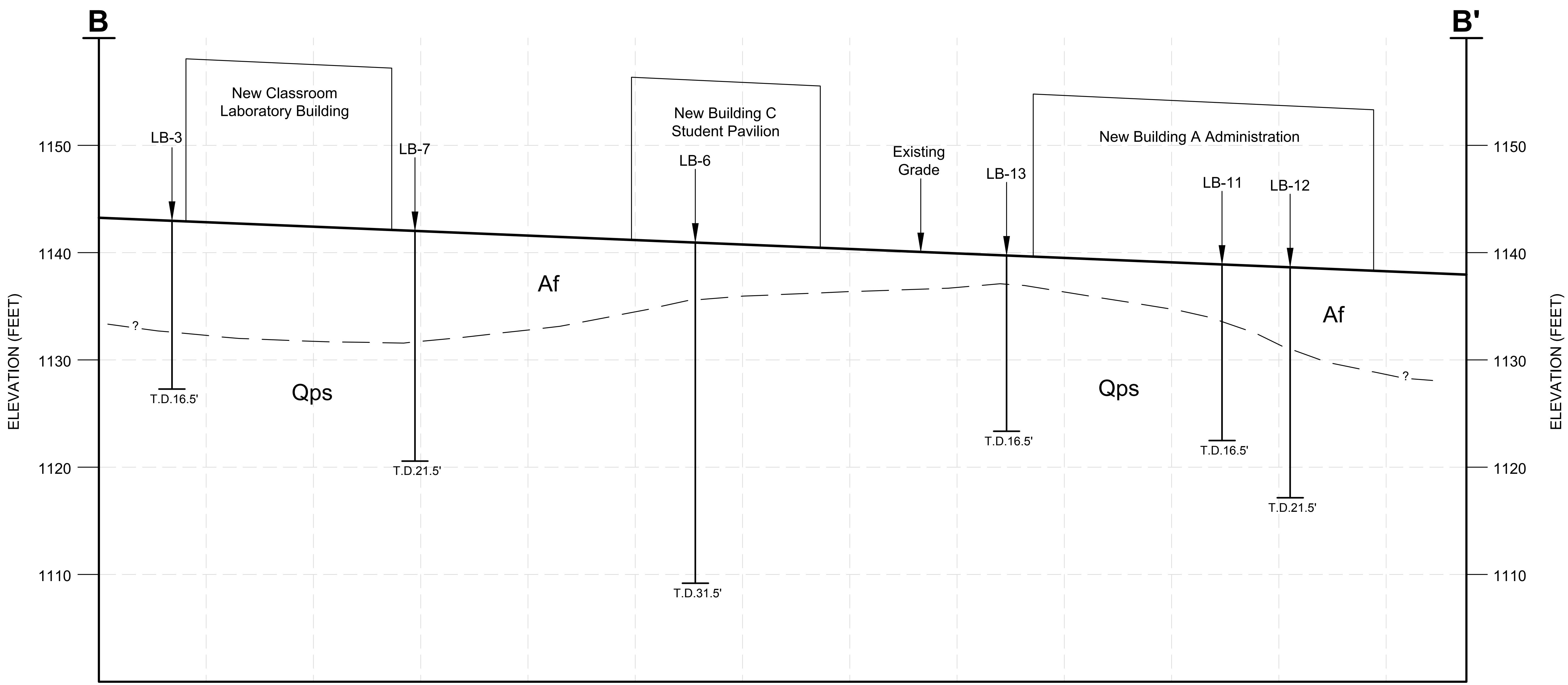
Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Proj: 12393.001	Eng/Geol: SIS/RFR
Scale: V: 1"=10' H: 1"=30'	Date: August 2019

Drafted By: BQT | Checked By: BQT | V:\DRAFTING\12393\001\CAD\2019-08-20\12393-001_FIGURES-3AB_2019-08-20.DWG (08-20-19 12:39:09PM) Plotted by: btran

Figure 3A

Leighton



GEOLOGIC CROSS SECTION B-B'

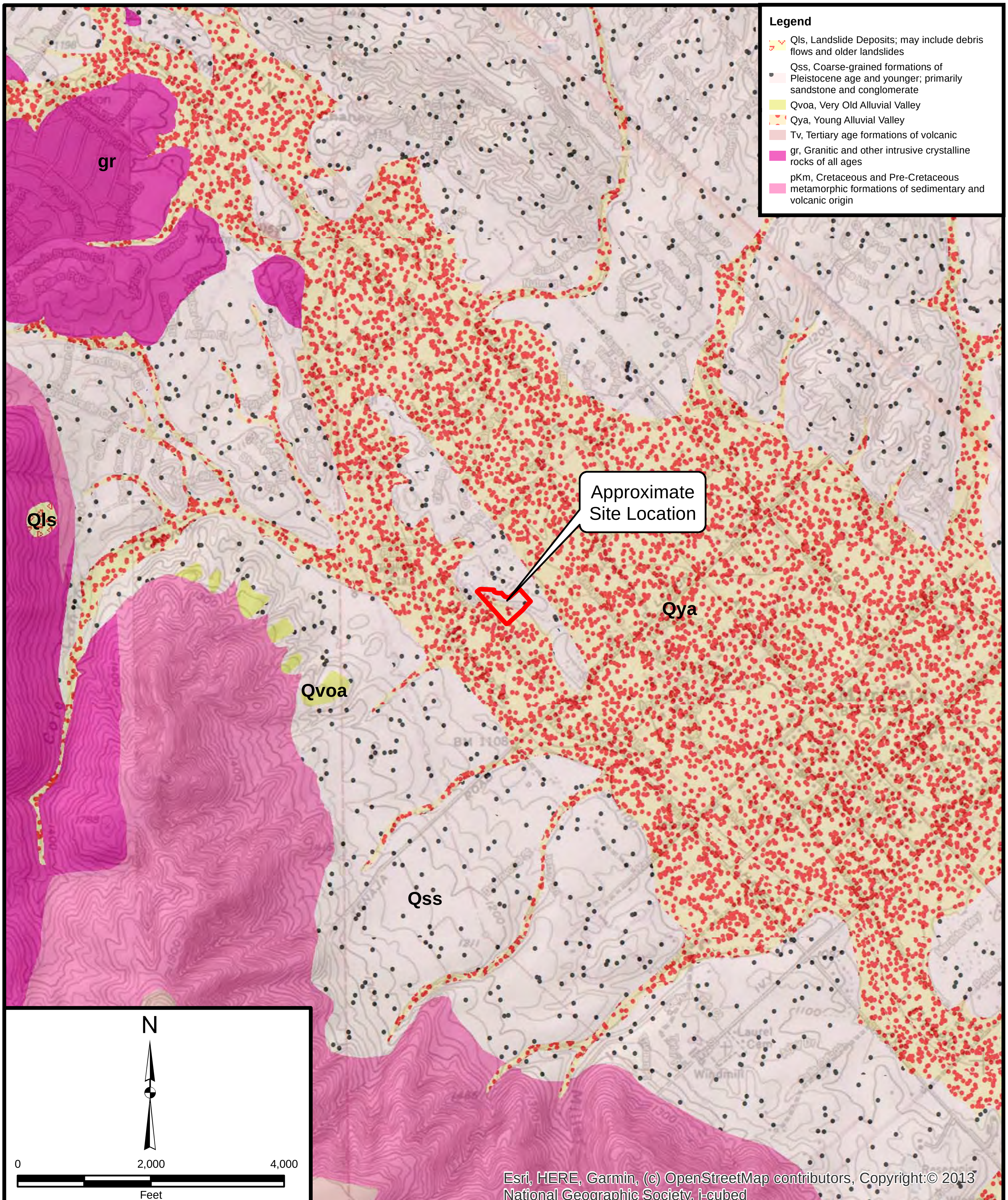
Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 3B

Proj: 12393.001	Eng/Geol: SIS/RFR
Scale: V: 1"=10' H: 1"=30'	Date: August 2019

Leighton

Drafted By: BQT Checked By: BQT



Project: 12393.001	Eng/Geol: SIS/RFR
Scale:1 " = 2,000 '	Date: August 2019

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton, USGS
Author: Leighton Geomatics (btran)

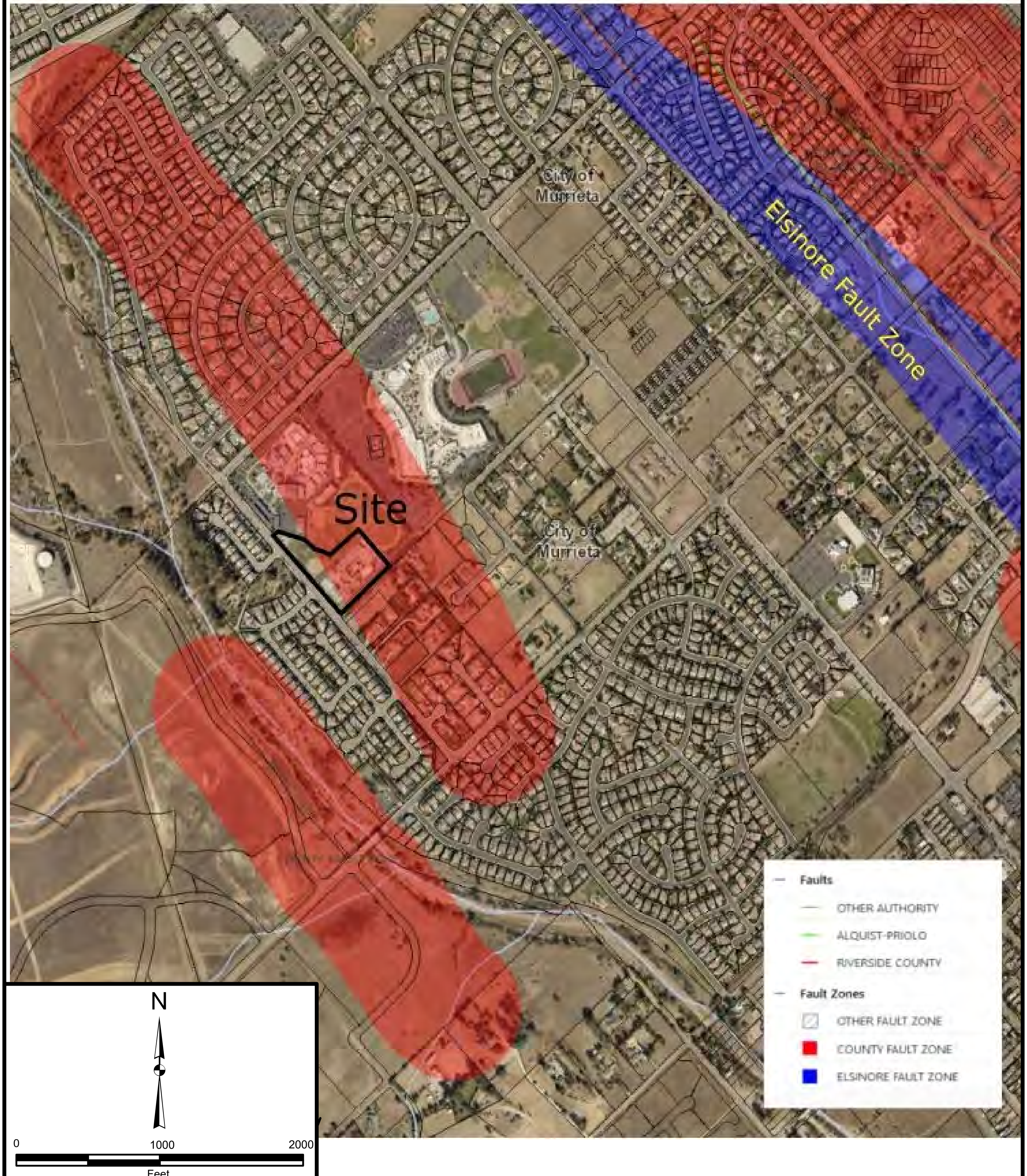
REGIONAL GEOLOGY MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 4

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F04_RGM_2019-07-11.mxd on 7/11/2019 2:39:37 PM



Project: 12393.001	Eng/Geol: SIS/RFR
Scale:1 " = 1000'	Date: August 2019

Base Map: ESRI Riverside Co RCIT 2019
Thematic Information: Leighton,
Author: Leighton Geomatics (msb)

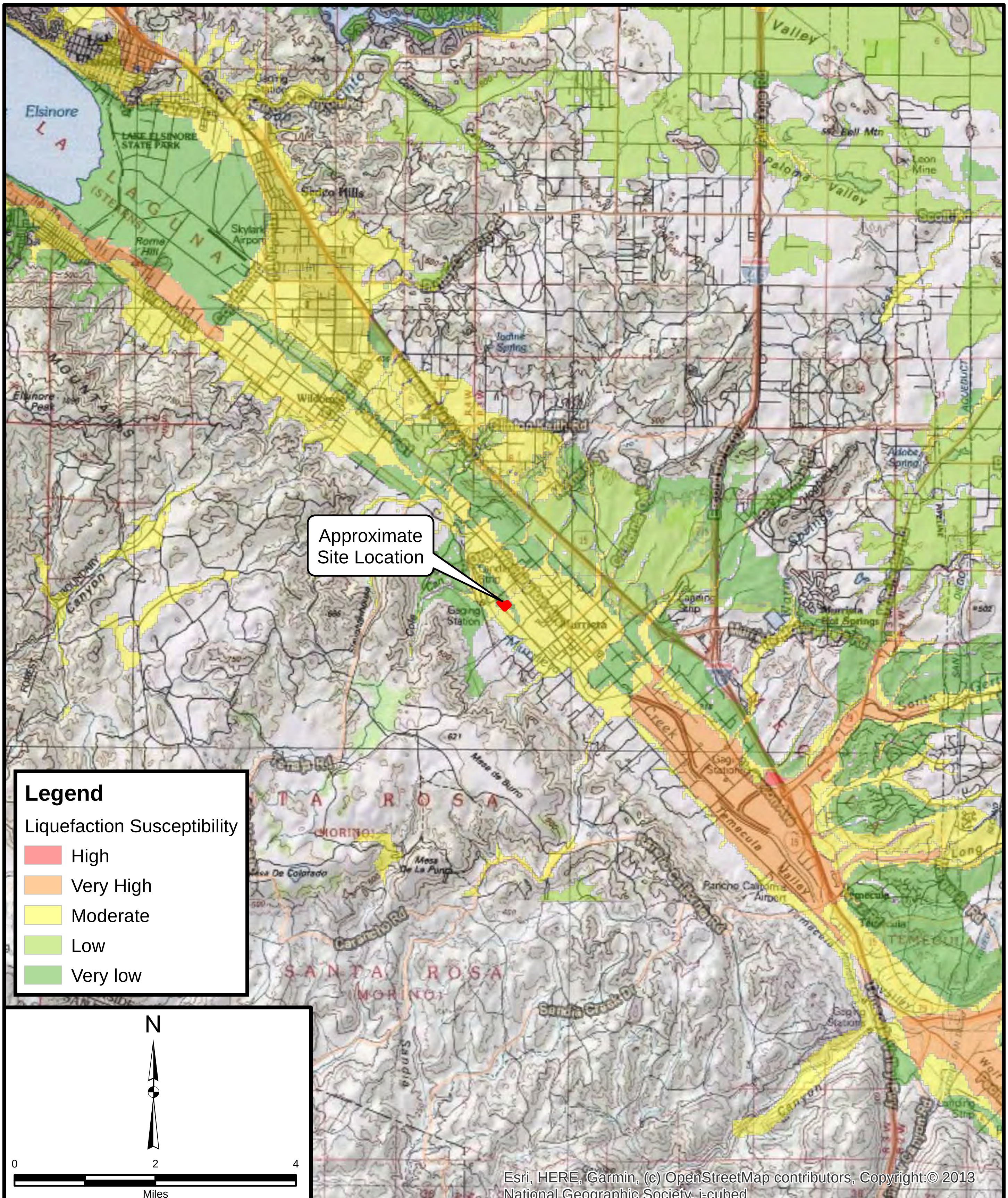
REGIONAL FAULT MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 5

Leighton

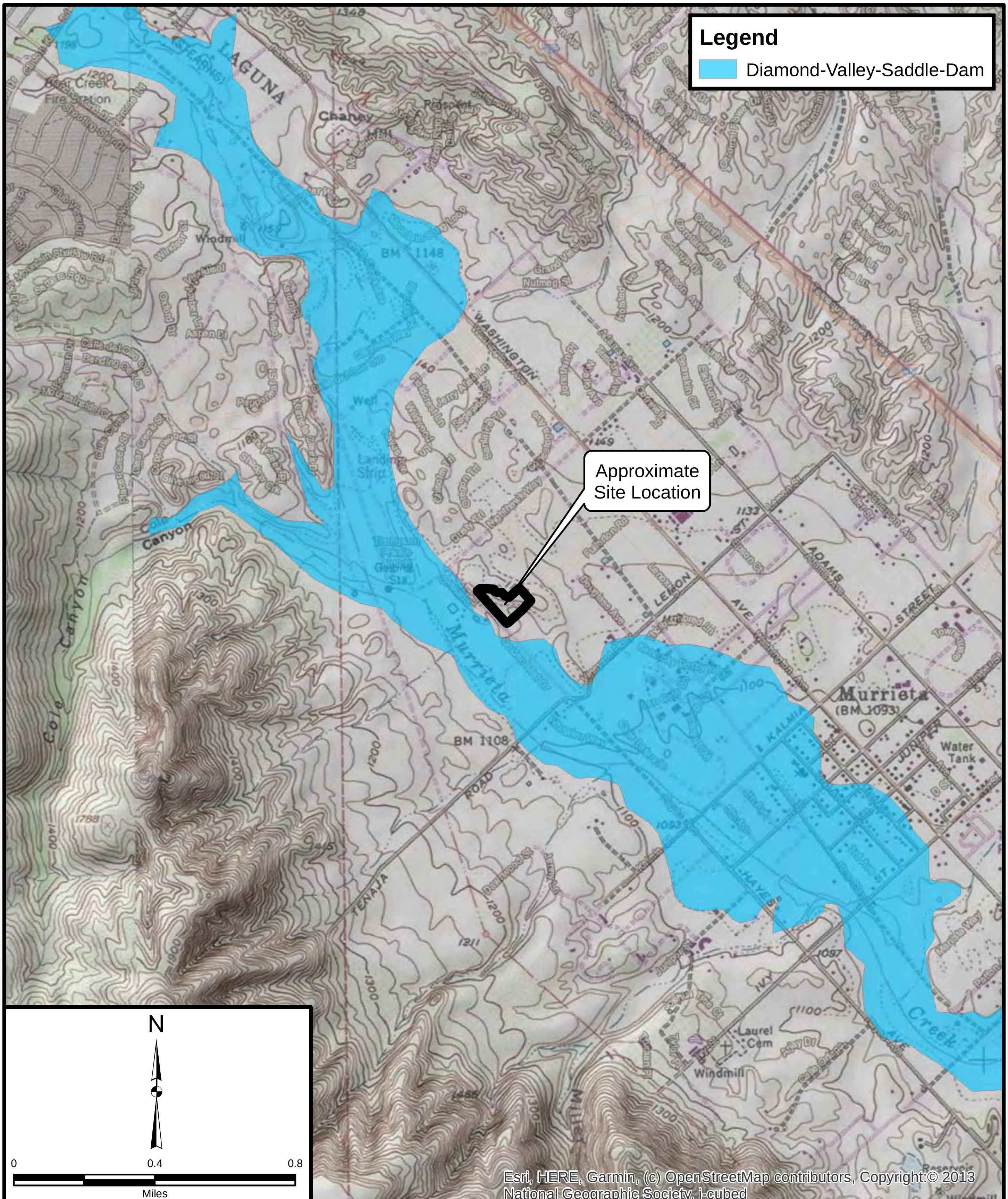
Map Saved as V:\Drafting\12393\001\Maps\12393-001_F05_RFM_2019-07-11.mxd on 7/11/2019 2:42:42 PM



Project: 12393.001	Eng/Geol: SIS/RFR	# LIQUEFACTION MAP	Figure 6
Scale:1 " = 2 miles	Date: August 2019	Murrieta Valley Unified School District Murrieta Canyon Academy New Buildings 24150 Hayes Avenue, Murrieta, California	Leighton

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton, CGS
Author: Leighton Geomatics (btran)

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F06_LM_2019-07-11.mxd on 7/11/2019 2:44:58 PM



Project: 12393.001	Eng/Geol: SIS/RFR
Scale:1 " = 0 miles	Date: August 2019

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton, CGS, Bryant 2010
Author: Leighton Geomatics (btran)

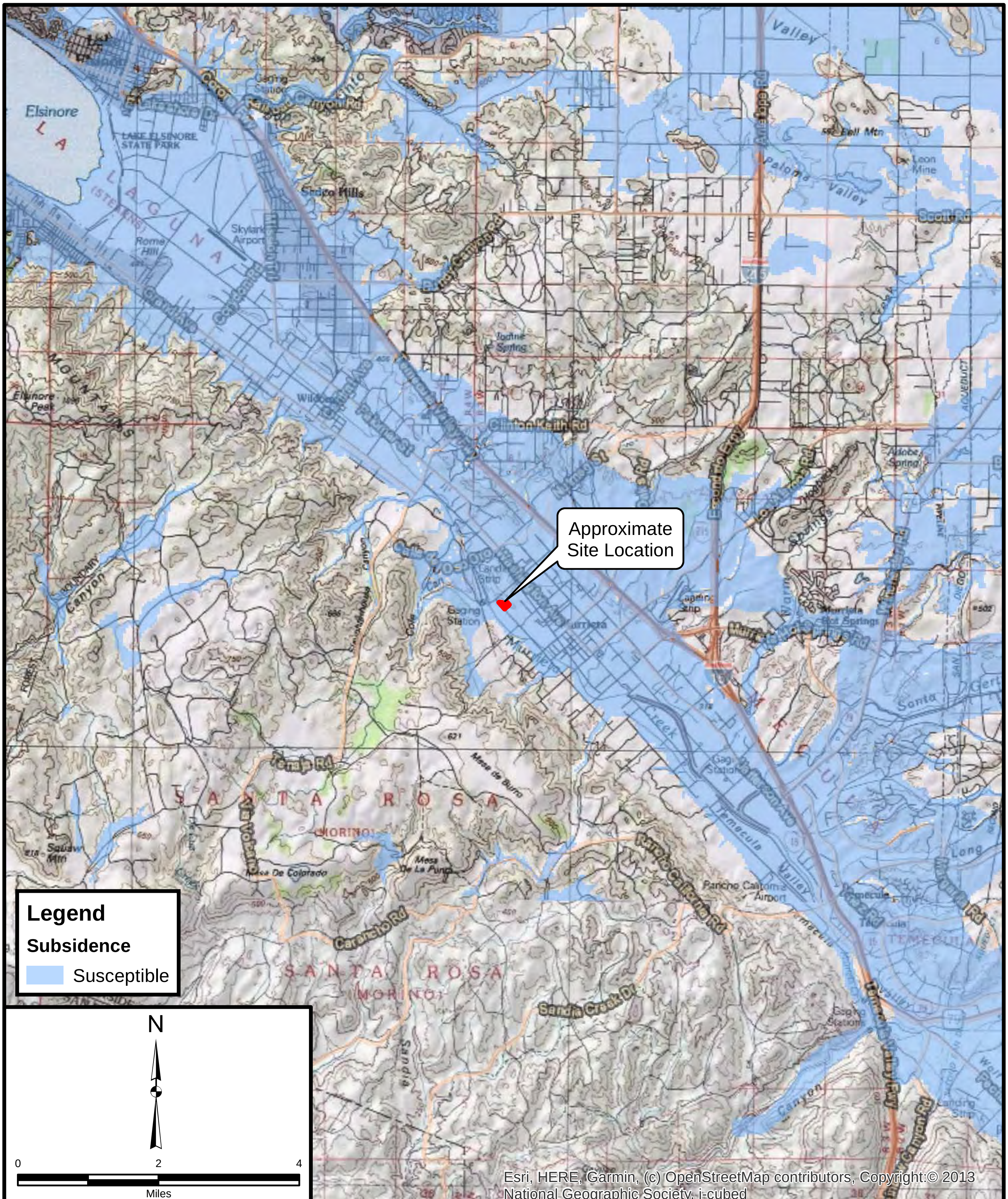
DAM INUNDATION MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 7

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F08_DIM_2019-07-11.mxd on 7/11/2019 2:51:55 PM



Project: 12393.001	Eng/Geol: SIS/RFR
Scale:1 " = 2 miles	Date: August 2019

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton, County of Riverside
Author: Leighton Geomatics (btran)

SUBSIDENCE MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 8

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F07_SM_2019-07-11.mxd on 7/11/2019 2:47:24 PM

6.0 LIMITATIONS

This report was based in part on data obtained from a limited number of observations, site visits, soil excavations, samples and tests. Such information is, by necessity, incomplete. The nature of many sites is such that differing soil or geologic conditions can be present within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, our findings, conclusions and recommendations presented in this report are based on the assumption that we (Leighton Consulting, Inc.) will provide geotechnical observation and testing during construction as the Geotechnical Engineer of Record for this project.

This report was prepared for the sole use of Client and their design team, for application to design of the proposed Murrieta Canyon Academy, Proposed New Classroom Buildings, in accordance with generally accepted geotechnical engineering practices at this time in California. In addition, since this is a public school project, our report may be subject to review by the California Geological Survey (CGS) and/or the California Division of the State Architect (DSA). As such, we recommend that geologic/geotechnical data in this report be only used in the design of this project after review and approval by CGS. Any premature (before CGS approval) or unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify Leighton Consulting, Inc. from and against any liability which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of Leighton Consulting, Inc.

REFERENCES

Applied Technology Council (ATC), 2019 An Interactive Computer Program to Calculate Seismic Hazard Curves and Response and Design Parameters based on ASCE 7-10 (April): https://hazards.atcouncil.org#/

Army Corps of Engineers, Evaluation of Settlement for Dynamic and Transient Loads, Technical Engineering and Design Guides as Adapted from the US Army Corps of Engineers, No. 9, American Society of Civil Engineers Press.

ASCE, 2010, ASCE Standard 7-10, Minimum Design Loads for Buildings and Other Structures by Structural Engineering Institute, ISBN 0-7844-0809-2, Second Printing, Published in 2010.

Baker Nowicki Design Studio, Site Plan, MCA – Murrieta Canyon Academy, not dated.

Blake, T. F., 2000a, EQSEARCH, *A Computer Program for the Estimation of Peak Horizontal Acceleration from California Historical Earthquake Catalogs*, IBM-PC Compatible Version, User's Manual, January 1996.

Blake T.F., 2000b, EQFAULT, Version 3, A Computer Program for the Deterministic Prediction of Peak Horizontal Acceleration from Digitized California Faults, User's Manual, 77pp.

California Building Code, 2016, California Code of Regulations Title 24, Part 2, Volume 2 of 2.

California Geologic Survey (CGS), 2003. The Revised 2002 California Probabilistic Seismic Hazard Maps, June 2003. By Tianquing Cao, William A. Bryant, Badie Rowshandel, David Branum and Christopher J. Wills.

California Geological Survey, (CGS), 2006, Geologic Map of the San Bernardino and Santa Ana 30' X 60' Quadrangle, Southern California, Version 1.0, Compiled by Douglas M. Morton and Fred K. Miller, Open File Report 06-1217.

California Geological Survey, (CGS), 2007, Note 48, Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings, dated October 2007.

California Geologic Survey, 2007, Seismic Hazard Zone Report for the Murrieta 7.5 Minute Quadrangle, Riverside County, California, Seismic Hazard Zone Report 115.

California Geologic Survey, 2017, Earthquake Zones of Required Investigation, Murrieta Quadrangle, Preliminary Review Map, released Aug. 17, 2017.

Gastil, G., et al, 1978, Mesozoic History of Peninsular California and Related Areas East of the Gulf of California, in: Mesozoic Paleogeography at the Western United States, D.G. Howell and K.A. McDougall, eds. Pacific Section of the S.E.P.M., Los Angeles, California.

Hart, E.W., Bryant, W. A., 2007, Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning with Index to Earthquake Zones Maps: Department of Conservation, Division of Mines and Geology, Special Publication 42. Interim Revision 2007.

Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas, California Division of Mines and Geology, Geologic Data Map Series, No. 6, Scale 1:750,000.

Kennedy, M.P., 1977, Recency and Character of Faulting Along the Elsinore Fault Zone in Southern Riverside County, California, CDMG Special Report 131.

Leighton, 1989, Geotechnical Investigation of Air Photo Lineaments, Liquefaction Potential, and General Geotechnical Parameters for the Proposed Murrieta High School, 80± Acre Site at the Southwest Corner of Washington and Magnolia Avenue, Murrieta, Riverside County, California, PN 892025-01, dated December 20.

Public Works Standard, Inc., 2018, *Greenbook, Standard Specifications for Public Works Construction: 2015 Edition*, BNI Building News, Anaheim, California.

Riverside County, 2019, *County of Riverside General Plan*, Riverside County Website. https://gis.countyofriverside.us/Html5Viewer/?viewer=MMC_Public, accessed 8/5/2019

Riverside County, 2011, Low Impact Development BMP Design Handbook, Riverside County Flood Control and Water Conservation District, Rev. 9/2011

Tokimatsu, K., and Seed, H.B., 1987, Evaluation of Settlements in Sands Due to Earthquake Shaking, ASCE Journal of Geotechnical Engineering, Vol. 113, No. 8, dated August.

Treiman, J.A., Compiler, 1998, Fault Number 126d, Elsinore Fault Zone, Temecula Section in Quaternary fault and fold database of the United States: U.S. Geological Website, http://earthquakes.usgs.gov/hazards/qfault, accessed 8/20/19.

APPENDIX A

LOGS OF EXPLORATORY BORINGS

Encountered earth materials were continuously logged and sampled in the field by our representative and described in accordance with the Unified Soil Classification System (ASTM D 2488). During drilling, bulk and relatively undisturbed ring-lined split-barrel driven earth material samples were obtained from our borings for geotechnical laboratory testing and classification. Drive-samples were driven with a 140-pound auto-hammer falling 30-inches. Samples were transported to our in-house Temecula laboratory for geotechnical testing. After logging and sampling, our borings were backfilled with spoils generated during drilling.

The attached subsurface exploration logs and related information depict subsurface conditions only at the locations indicated and at the particular date designated on these logs. Subsurface conditions at other locations may differ from conditions occurring at these logged locations. Passage of time may result in altered subsurface conditions due to environmental changes. In addition, any stratification lines on these logs represent an approximate boundary between sampling intervals and soil types; and transitions may be gradual.

GEOTECHNICAL BORING LOG LB-1

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1			21.3	CONCRETE	4" Concrete/4" Sand	MD, EI, RV
								CL	**Artificial Fill (Af)**; SANDY Lean CLAY, olive brown, moist, fine grained sand	
									Lean CLAY, brown, moist	
	5			R-1	5 11 18	114	15	SC	CLAYEY SAND, medium dense, brown, moist, fine grained sand	
	10			R-2	6 10 22	113	18	CL	**Pauba Formation (Qps)**; SANDY Lean CLAY, stiff, dark yellowish brown, moist, fine to medium grained sand	
									Drilled to 11.5' Sampled to 11.5' Groundwater not encountered Backfilled with cuttings	
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-2

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	4"
Drilling Method	Hand Auger - Hand Sampling	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1			15.1	CL	**Artificial Fill (Af)**; Lean CLAY, dark brown, moist to wet	
									SANDY Lean CLAY, brown, moist, fine to medium grained sand	
	5								Drilled to 3' Sampled to 3' Groundwater not encountered Backfilled with cuttings	
	10									
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-3

Project No. 12393.001
Project MVUSD Murrieta Canyon Academy New Buildings
Drilling Co. Martini Drilling Corp
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Boring Location Map

Date Drilled 7-9-19
Logged By JTD
Hole Diameter 8"
Ground Elevation '
Sampled By JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0								@ Surface: Grass	
								SM	**Artificial Fill (Af)**; SILTY SAND, grayish brown, moist, fine to medium grained sand	
								SC-SM	SILTY, CLAYEY SAND, reddish brown, moist, fine to medium grained sand	
	5			R-1	5 12 16	126	10	SC	CLAYEY SAND with GRAVEL, medium dense, dark brown, moist, fine to coarse grained sand with fine gravel	
	10			R-2	5 14 23	112	18	ML	**Pauba Formation (Qps)**; SANDY SILT, stiff, olive brown, moist, very fine to fine grained sand	CO
	15			R-3	15 22 24			SM	SILTY SAND, medium dense, olive brown, moist, fine grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG LB-4

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1			7.6		@ Surface: Grass	
								SC-SM	**Artificial Fill (Af)**; SILTY, CLAYEY SAND, yellowish brown, moist, fine to coarse grained sand	
				R-1	5 8 11	114	8		SILTY, CLAYEY SAND, medium dense, yellowish brown, moist, fine to coarse grained sand	
	5			R-2	4 9 16	99	23	CL	**Pauba Formation (Qps)**; Lean CLAY, stiff, olive brown, moist	
	10			R-3	4 10 18				SANDY Lean CLAY, very stiff, yellowish brown, moist, fine grained sand	
	15			R-4	6 13 22			ML	SANDY SILT, very stiff, olive brown, moist, very fine to fine grained sand	
	20			R-5	9 13 21			CL-ML	SILTY CLAY with sand, very stiff, grayish brown to olive brown, moist, very fine to fine grained sand	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-5

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1					@ Surface: Grass	CR, EI
								SC	**Artificial Fill (Af)**; CLAYEY SAND, dark grayish brown, moist, fine to coarse grained sand	
	5			R-1	5 10 12	90	30	CL-ML	**Pauba Formation (Qps)**; SILTY CLAY, stiff, olive, moist	
	10			R-2	8 16 26			SW-SM	Well-graded SAND with SILT, medium dense, yellowish brown, moist, fine to coarse grained sand	
									Drilled to 11.5' Sampled to 11.5' Groundwater not encountered Backfilled with cuttings	
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-6

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0								@ Surface: Grass	
								CL	**Artificial Fill (Af)**; SANDY Lean CLAY, dark grayish brown, moist, fine to medium grained sand	AL, MD, CR
	5			R-1 B-1	11 16 19			SC-SM	**Pauba Formation (Qps)**; SILTY, CLAYEY SAND, medium dense, dark yellowish brown, moist, fine grained sand	
								CL	SANDY Lean CLAY, stiff, dark yellowish brown and olive brown, moist, fine grained sand	
				R-2	8 17 29	78	58	SC	CLAYEY SAND, medium dense, olive brown, moist, fine grained sand	
	10			R-3	9 19 26			SW-SM	Well-graded SAND with SILT, medium dense, light gray to grayish brown, moist, fine to coarse grained sand	
	15			R-4	10 17 22			SM	SILTY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand	
	20			R-5	6 16 30			CL-ML	SILTY CLAY, hard, olive brown, moist	
	25			R-6	9 33 50			SM-ML	SILTY SAND to SANDY SILT, dense to hard, olive, moist, fine grained sand	
	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-6

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30			R-7	15 28 50			SC-SM	SILTY, CLAYEY SAND, dense, dark grayish brown, moist, very fine to fine grained sand	
									Drilled to 31.5' Sampled to 31.5' Groundwater not encountered Backfilled with cuttings	
	35									
	40									
	45									
	50									
	55									
	60									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG LB-7

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0								@ Surface: Grass	
								SC-SM	**Artificial Fill (Af)**; SILTY, CLAYEY SAND, gray, moist, fine to medium grained sand	
	5			R-1	9 11 17	120	13	CL	SANDY Lean CLAY, stiff, dark brown, moist, fine to coarse grained sand	
	10			R-2	6 9 31	118	14	SM	**Pauba Formation (Qps)**; SILTY SAND, medium dense, olive brown, moist, fine to medium grained sand	
	15			R-3	9 21 36			SC-SM	SILTY, CLAYEY SAND, dense, dark grayish brown to yellowish brown, moist, fine to coarse grained sand	
	20			R-4	5 12 23			CL	Lean CLAY, very stiff, olive, moist	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-8

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0			B-1					@ Surface: Grass	EI
								SC	**Artificial Fill (Af)**; CLAYEY SAND, gray, moist, fine to medium grained sand	
				R-1	9 15 25	115	16	SC	**Pauba Formation (Qps)**; CLAYEY SAND, medium dense, olive brown, moist, fine grained sand	
	5			R-2	7 11 18	110	18	SM	SILTY SAND, medium dense, olive brown, moist, fine grained sand	
	10			R-3	7 12 18			CL-ML	SILTY CLAY, stiff, olive, moist	
	15			R-4	8 11 16	113	16		SILTY CLAY with sand, stiff, olive brown, moist, fine grained sand	
	20			R-5	6 17 19				SILTY CLAY, stiff, olive, moist	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG LB-9

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0								Well-graded SAND with SILT, reddish brown, dry, fine to coarse grained sand, softball infield crushed brick	
								SC	**Artificial Fill (Af)**; CLAYEY SAND with GRAVEL, dark grayish brown, moist, fine to coarse grained sand	
	5			R-1	20 38 43	165	7		CLAYEY SAND with GRAVEL, dense, yellowish brown, moist, fine to coarse grained sand with fine gravel	
	10			R-2	24 33 42	122	6	SC	**Pauba Formation (Qps)**; CLAYEY SAND, dense, olive gray, moist, fine to coarse grained sand	
	15			R-3	9 22 28			SM	SILTY SAND, dense, olive, moist, fine to coarse grained sand	
	20			R-4	5 18 22			SC	CLAYEY SAND, medium dense, olive gray, moist, fine to medium grained sand	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-10

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0			B-1				SW-SM	Well-graded SAND with SILT, reddish brown, dry, fine to coarse grained sand, softball infield crushed brick	
								SC	**Artificial Fill (Af)**; CLAYEY SAND with GRAVEL, dark grayish brown, moist, fine to coarse grained sand	
				R-1	5 6 11	116	14		CLAYEY SAND with GRAVEL, medium dense, dark grayish brown to olive brown, moist, fine to coarse grained sand with fine gravel	
	5			R-2	5 10 20	118	13		CLAYEY SAND with GRAVEL, medium dense, dark grayish brown, moist, fine to coarse grained sand with fine gravel	
	10			R-3	20 20 27			SC	**Pauba Formation (Qps)**; CLAYEY SAND with GRAVEL, medium dense, dark grayish brown and olive brown, moist, fine to coarse grained sand	
	15			R-4	9 31 50/5"			SM-ML	SILTY SAND to SANDY SILT, dense to hard, dark olive gray, moist, fine to medium grained sand	
									Drilled to 16.42' Sampled to 16.42' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-11

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0							SW-SM	Well graded SAND with Silt (SW-SM), reddish brown, dry, fine to coarse grained sand, softball inield crushed brick	
								SC-SM	**Artificial Fill (Af)**; SILTY, CLAYEY SAND, olive brown, moist, fine to coarse grained sand	
	5			R-1	20 37 48	128	10	SM	**Pauba Formation (Qps)**; SILTY SAND, dense, olive, moist, fine to medium grained sand	
	10			R-2	10 16 28			CL	Lean CLAY, very stiff, olive, moist	
	15			R-3	15 24 35			SM	SILTY SAND, dense, olive, moist, fine grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-12

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N–S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0								@ Surface: Grass	
								CL	**Artificial Fill (Af)**; SANDY Lean CLAY, olive gray, moist, fine to medium grained sand	
	5			R-1 B-1	9 22 28	117	8	SW-SC	Well-graded SAND with CLAY (or SILTY CLAY), dense, reddish brown, moist, fine to coarse grained sand	
				R-2	5 9 15	104	21	CL	**Pauba Formation (Qps)**; SANDY Lean CLAY, stiff, dark grayish brown and olive gray, moist, very fine to fine grained sand	
	10			R-3	4 16 41			SM	SILTY SAND, dense, olive brown, moist, fine grained sand	
	15			R-4	7 12 22			SM-ML	SILTY SAND to SANDY SILT, medium dense to very stiff, olive gray, moist, very fine to fine grained sand	
	20			R-5	4 10 16			CL	SANDY Lean CLAY, stiff, olive, moist, very fine to fine grained sand	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG LB-13

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0		B-1				SW-SM	Well-graded SAND with SILT, reddish brown, dry, fine to coarse grained sand, softball infield crushed brick	EI
							CL	**Artificial Fill (Af)**; Lean CLAY, olive, moist	
			R-1	4 9 21	113	17	CL	**Pauba Formation (Qps)**; SANDY Lean CLAY, stiff, olive brown, moist, very fine to fine grained sand	
	5		R-2	7 12 23	115	16	SM	SILTY SAND, medium dense, olive, moist, fine grained sand	
	10		R-3	5 9 14			CL	Lean CLAY, stiff, olive, moist	
	15		R-4	12 23 34			SM	SILTY SAND, dense, olive brown, moist, fine grained sand	
								Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20								
	25								
	30								

Graphic Log: N S

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG LB-14

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0								@ Surface: Grass	
								CL	**Artificial Fill (Af)**; SANDY Lean CLAY, grayish brown, moist to wet, fine to coarse grained sand	
								SC	CLAYEY SAND, reddish brown, moist to wet, fine to coarse grained sand	
	5			R-1	5 16 20	117	7		CLAYEY SAND, medium dense, yellowish brown, moist, fine to coarse grained sand	
	10			R-2	4 8 18	104	21	CL	**Pauba Formation (Qps)**; SANDY Lean CLAY, stiff, olive brown, moist, fine to coarse grained sand	
	15			R-3	8 15 19				SANDY Lean CLAY, stiff, dark olive gray, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with Cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG P-1

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0								@ Surface: Grass	
								SC-SM	**Artificial Fill (Af)**; SILTY, CLAYEY SAND with GRAVEL, grayish brown, moist, fine to coarse grained sand	
				S-1	3 6 13				SILTY, CLAYEY SAND, medium dense, dark yellowish brown, moist, fine grained sand	
	5								Drilled to 4' Sampled to 4' Groundwater not encountered Backfilled with cuttings	
	10									
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG P-2

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0								@ Surface: Grass	
								CL	**Artificial Fill (Af)**; SANDY Lean CLAY, gray, moist, fine to coarse grained sand	
				S-1	5 8 9			SM	SILTY SAND, medium dense, yellowish brown, moist, fine to coarse grained sand	SA
	5								Drilled to 4' Sampled to 4' Groundwater not encountered Backfilled with cuttings	
	10									
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

APPENDIX B

GEOTECHNICAL LABORATORY TEST RESULTS

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS
ASTM D 6913

Leighton

Project Name:	MCA New Buildings Geohazard	Tested By:	FLM	Date:	08/07/19
Project No.:	12393.001	Checked By:	MRV	Date:	08/13/19
Boring No.:	P-2	Depth (feet):	2.5		
Sample No.:	S-1				
Soil Identification:	Silty Sand (SM), Reddish Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	123	Wt. of Air-Dry Soil + Cont. (g)	1082.2
Wt. of Air-Dried Soil + Cont.(g)	1082.2	Wt. of Dry Soil + Cont. (g)	1049.8
Wt. of Container (g)	699.8	Wt. of Container No.______ (g)	699.8
Dry Wt. of Soil (g)	350.0	Moisture Content (%)	9.3

After Wet Sieve	Container No.	123
	Wt. of Dry Soil + Container (g)	1000.5
	Wt. of Container (g)	699.8
	Dry Wt. of Soil Retained on # 200 Sieve (g)	300.7

U. S. Sieve Size (in.)	U. S. Sieve Size (mm.)	Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500	0.0	100.0
#4	4.750	2.3	99.3
#8	2.360	27.6	92.1
#16	1.180	82.5	76.4
#30	0.600	146.2	58.2
#50	0.300	219.9	37.2
#100	0.150	276.8	20.9
#200	0.075	299.7	14.4
PAN			

GRAVEL: **1 %**

SAND: **85 %**

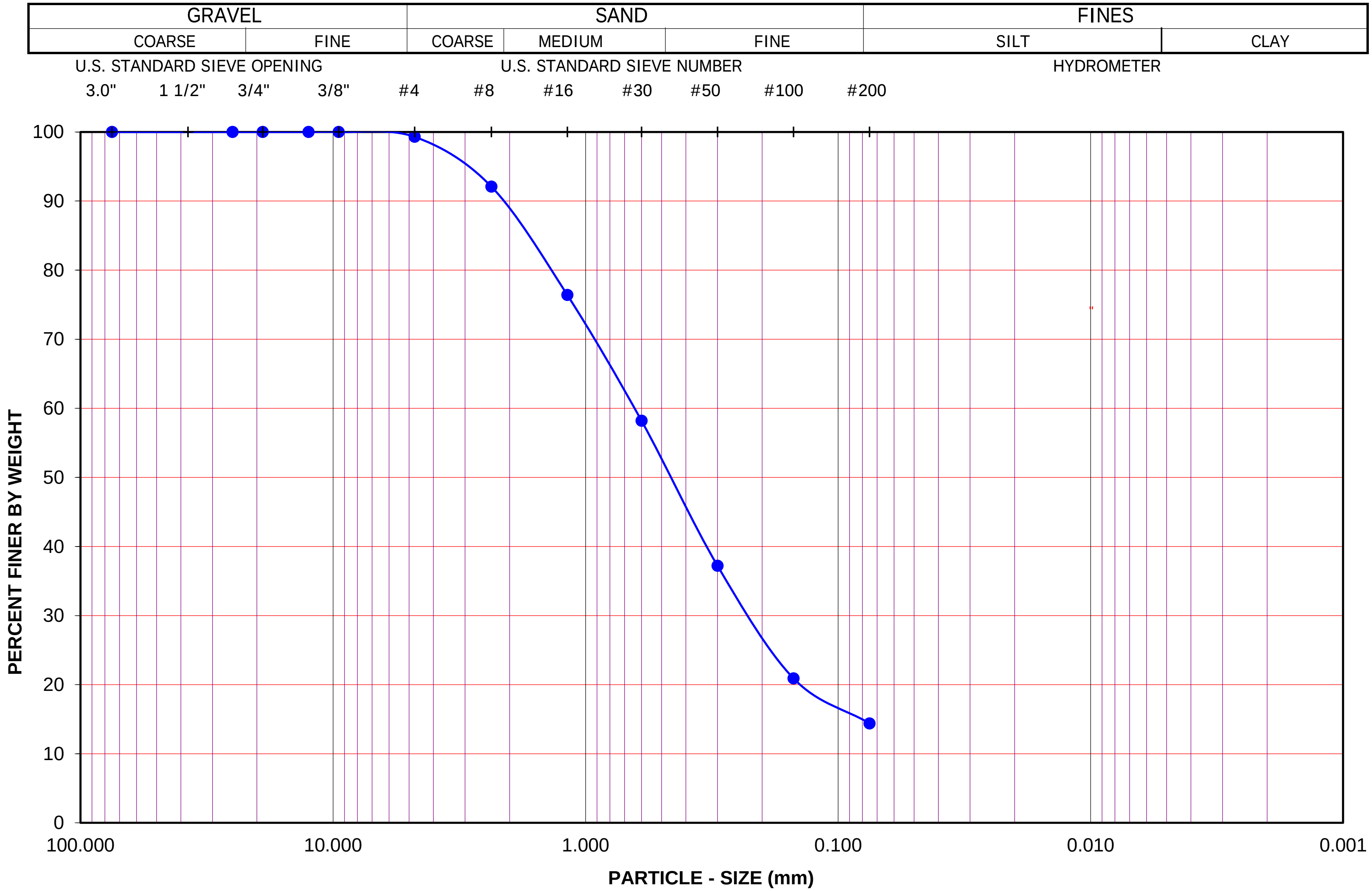
FINES: **14 %**

GROUP SYMBOL: **SM**

Cu = D60/D10 = N/A

Cc = $(D30)^2/(D60*D10)$ = N/A

Remarks:



Project Name: MCA New Buildings Geohazard

Project No.: 12393.001

Boring No.: P-2

Sample No.: S-1

Depth (feet): 2.5

Soil Type : SM

Soil Identification: Silty Sand (SM), Reddish Brown.

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

GR:SA:FI : (%) 1 : 85 : 14

Aug-19

Sieve; P-2, S-1 (07-09-19)

ATTERBERG LIMITS

ASTM D 4318

Leighton

Project Name:	MCA New Buildings Geohazard	Tested By:	F. Mina	Date:	8/12/19
Project No. :	12393.001	Input By:	M. Vinet	Date:	8/13/19
Boring No.:	LB-6	Checked By:	M. Vinet	Date:	8/13/19
Sample No.:	B-1	Depth (ft.)	5.0 - 10.0		

Sample Description: Sandy Lean Clay s(CL), Dark Yellowish Brown.

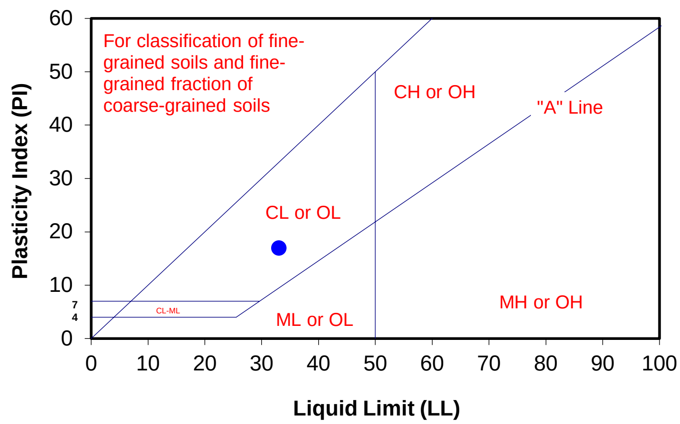
	PLASTIC LIMIT		LIQUID LIMIT			**IN-SITU
TEST NO.	1	2	1	2	3	MOISTURE
Number of Blows [N]			17	25	33	
Wet Wt. of Soil + Cont. (gm)	22.794	22.855	19.633	21.794	21.261	
Dry Wt. of Soil + Cont. (gm)	21.576	21.604	18.078	19.787	19.366	
Wt. of Container (gm)	13.601	13.697	13.602	13.734	13.539	
Moisture Content (%) [Wn]	15.3	15.8	34.7	33.2	32.5	

Liquid Limit	33
Plastic Limit	16
Plasticity Index	17
Classification	CL

PI at "A" - Line = 0.73(LL-20) = 9.49

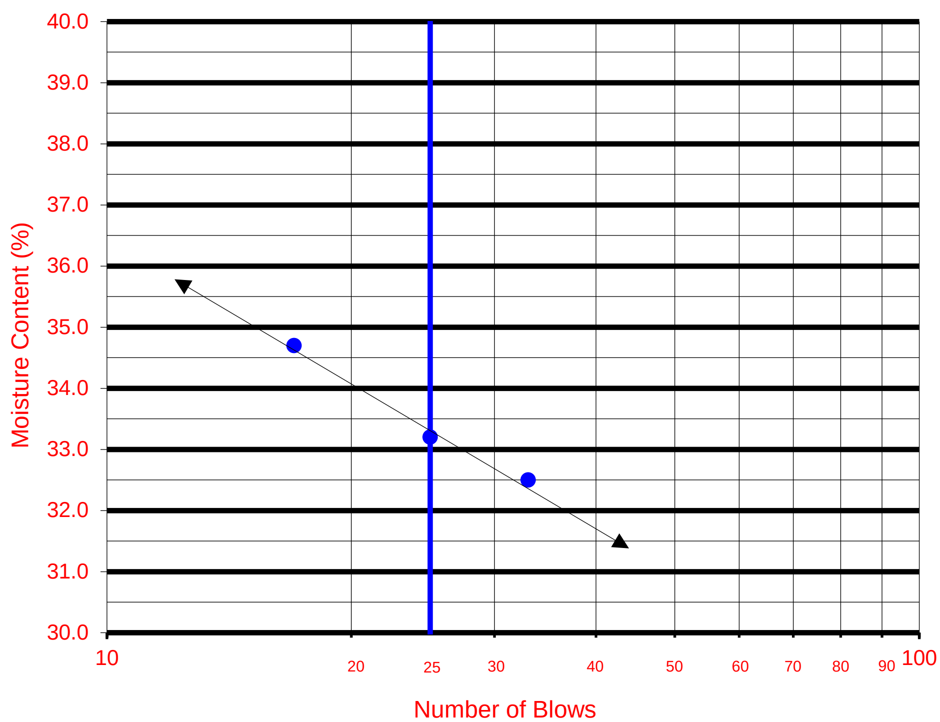
One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



PROCEDURES USED

- [ ] Wet Preparation
  Multipoint - Wet
- [X] Dry Preparation
  Multipoint - Dry
- [X] Procedure A
  Multipoint Test
- [ ] Procedure B
  One-point Test



Rev. 08-04

Leighton

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	MCA New Buildings Geoharzard	Tested By:	F. Mina	Date:	08/08/19
Project No.:	12393.001	Input By:	M. Vinet	Date:	08/13/19
Boring No.:	LB-1	Depth (ft.):	0 - 5.0		
Sample No.:	B-1				
Soil Identification:	Sandy Lean Clay s(CL), Yellowish Brown.				

Preparation Method: [X] Moist [ ] Dry — [X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03340 — *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	5510	5570	5582	5554		
Weight of Mold (g)	3578	3578	3578	3578		
Net Weight of Soil (g)	1932	1992	2004	1976		
Wet Weight of Soil + Cont. (g)	693.2	674.9	565.5	441.2		
Dry Weight of Soil + Cont. (g)	653.5	635.3	515.9	401.8		
Weight of Container (g)	157.4	239.8	127.4	130.6		
Moisture Content (%)	8.0	10.0	12.8	14.5		
Wet Density (pcf)	127.5	131.5	132.3	130.4		
Dry Density (pcf)	118.1	119.5	117.3	113.9		

Maximum Dry Density (pcf) 119.5 **Optimum Moisture Content (%)** 10.0

PROCEDURE USED

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

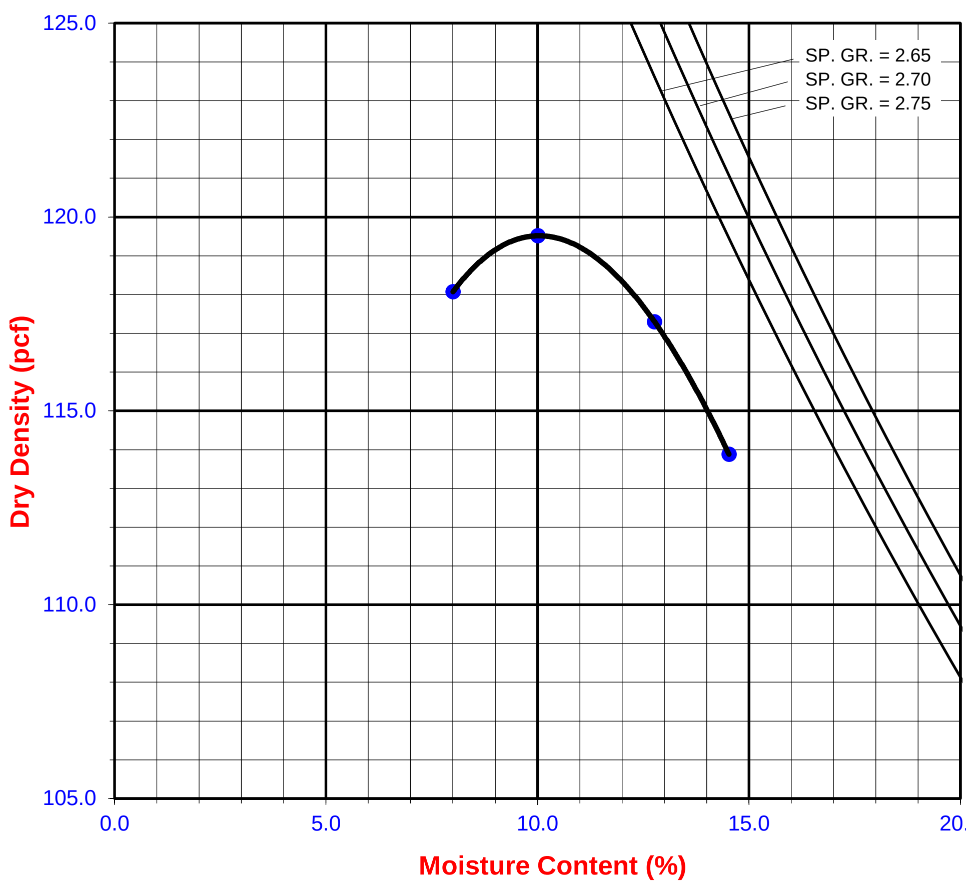
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



Compaction; LB-1, B-1 (07-09-19)

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Leighton

Project Name:	MCA New Buildings Geoharzard	Tested By:	F. Mina	Date:	08/08/19
Project No.:	12393.001	Input By:	M. Vinet	Date:	08/13/19
Boring No.:	LB-6	Depth (ft.):	5.0 - 10.0		
Sample No.:	B-1				
Soil Identification:	Sandy Lean Clay s(CL), Dark Yellowish Brown.				

Preparation Method: [X] Moist [ ] Dry — [X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03340 — *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	5540	5584	5557	5518		
Weight of Mold (g)	3578	3578	3578	3578		
Net Weight of Soil (g)	1962	2006	1979	1940		
Wet Weight of Soil + Cont. (g)	693.2	610.3	564.1	628.9		
Dry Weight of Soil + Cont. (g)	643.0	556.8	507.8	556.5		
Weight of Container (g)	201.2	159.6	152.2	163.4		
Moisture Content (%)	11.4	13.5	15.8	18.4		
Wet Density (pcf)	129.5	132.4	130.6	128.1		
Dry Density (pcf)	116.3	116.7	112.8	108.1		

Maximum Dry Density (pcf) **117.1** **Optimum Moisture Content (%)** **12.5**

PROCEDURE USED

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

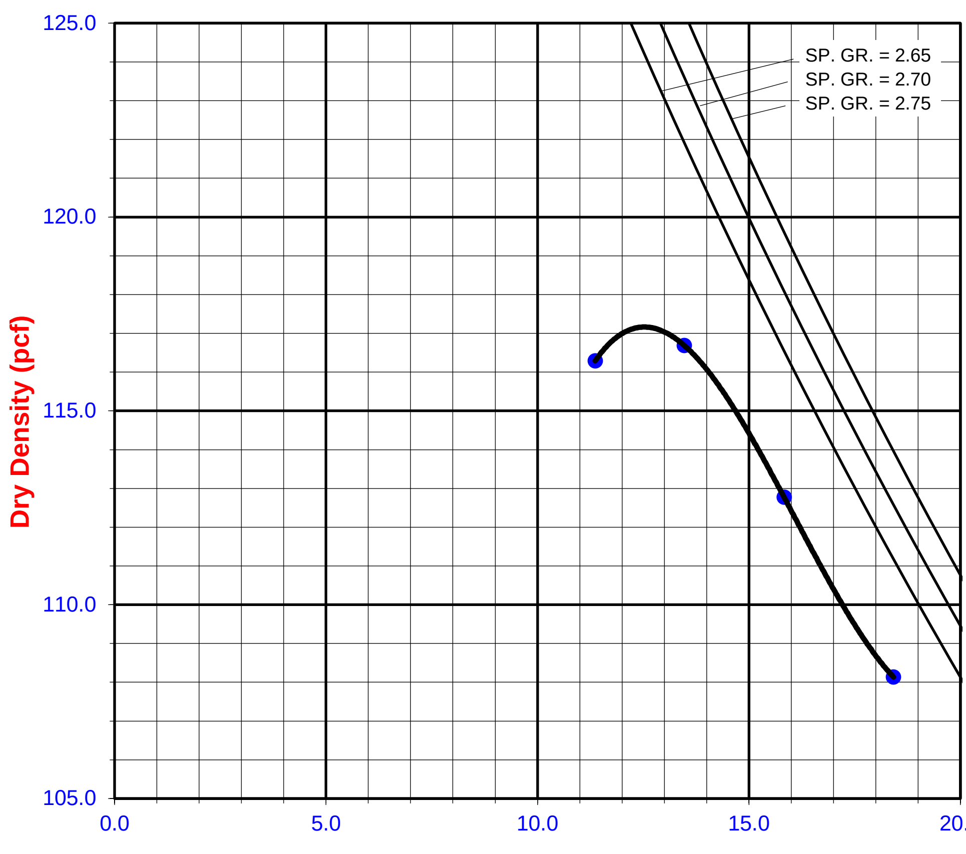
Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

33:16:17

LL,PL,PI



Compaction; LB-6, B-1 (07-09-19)

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	MCA New Buildings Geohazard	Tested By: F. Mina	Date: 8/8/19
Project No. :	12393.001	Checked By: M. Vinet	Date: 8/13/19
Boring No.:	LB-1	Depth: 0 - 5.0	
Sample No. :	B-1	Location: N/A	
Sample Description:	Sandy Lean Clay s(CL), Yellowish Brown.		

Dry Wt. of Soil + Cont. (gm.)	1883.8
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	1883.8
Weight Soil Retained on #4 Sieve	6.7
Percent Passing # 4	99.6

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0756
Wt. Comp. Soil + Mold (gm.)	590.1	633.1
Wt. of Mold (gm.)	208.7	208.7
Specific Gravity (Assumed)	2.70	2.70
Container No.	7	7
Wet Wt. of Soil + Cont. (gm.)	350.5	633.1
Dry Wt. of Soil + Cont. (gm.)	319.6	342.1
Wt. of Container (gm.)	50.5	208.7
Moisture Content (%)	11.5	24.1
Wet Density (pcf)	115.0	119.0
Dry Density (pcf)	103.2	95.9
Void Ratio	0.634	0.757
Total Porosity	0.388	0.431
Pore Volume (cc)	80.3	96.0
Degree of Saturation (%) [S meas]	**49.0**	**85.8**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/8/19	11:30	1.0	0	0.5000
8/8/19	11:40	1.0	10	0.5000
	Add Distilled Water to the Specimen			
8/9/19	8:00	1.0	1220	0.5756
8/9/19	9:00	1.0	1280	0.5756

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	75.6
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**76**

Rev. 03-08

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	MCA New Buildings Geohazard	Tested By:	F. Mina	Date:	8/8/19
Project No. :	12393.001	Checked By:	M. Vinet	Date:	8/13/19
Boring No.:	LB-5	Depth:	0 - 5.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Sandy Lean Clay s(CL), Dark Yellowish Brown.				

Dry Wt. of Soil + Cont. (gm.)	2938.8
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	2938.8
Weight Soil Retained on #4 Sieve	11.1
Percent Passing # 4	99.6

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0609
Wt. Comp. Soil + Mold (gm.)	595.7	642.5
Wt. of Mold (gm.)	188.3	188.3
Specific Gravity (Assumed)	2.70	2.70
Container No.	8	8
Wet Wt. of Soil + Cont. (gm.)	350.3	642.5
Dry Wt. of Soil + Cont. (gm.)	324.3	372.1
Wt. of Container (gm.)	50.3	188.3
Moisture Content (%)	9.5	22.1
Wet Density (pcf)	122.9	129.1
Dry Density (pcf)	112.2	105.8
Void Ratio	0.502	0.594
Total Porosity	0.334	0.373
Pore Volume (cc)	69.2	81.8
Degree of Saturation (%) [S meas]	**51.1**	**100.4**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/8/19	10:30	1.0	0	0.5000
8/8/19	10:40	1.0	10	0.5000
	Add Distilled Water to the Specimen			
8/9/19	8:00	1.0	1280	0.5609
8/9/19	9:00	1.0	1340	0.5609

Expansion Index (EI meas) =	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	60.9
Expansion Index (Report) =	Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**61**

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	MCA New Buildings Geohazard	Tested By:	F. Mina	Date:	8/8/19
Project No. :	12393.001	Checked By:	M. Vinet	Date:	8/13/19
Boring No.:	LB-8	Depth:	0 - 5.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Lean Clay (CL), Dark Yellowish Brown.				

Dry Wt. of Soil + Cont. (gm.)	2241.1
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	2241.1
Weight Soil Retained on #4 Sieve	5.0
Percent Passing # 4	99.8

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0874
Wt. Comp. Soil + Mold (gm.)	597.8	646.7
Wt. of Mold (gm.)	208.7	208.7
Specific Gravity (Assumed)	2.70	2.70
Container No.	9	9
Wet Wt. of Soil + Cont. (gm.)	350.3	646.7
Dry Wt. of Soil + Cont. (gm.)	319.8	349.6
Wt. of Container (gm.)	50.3	208.7
Moisture Content (%)	11.3	25.3
Wet Density (pcf)	117.4	121.5
Dry Density (pcf)	105.5	97.0
Void Ratio	0.599	0.738
Total Porosity	0.374	0.425
Pore Volume (cc)	77.5	95.6
Degree of Saturation (%) [S meas]	**51.0**	**92.5**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/8/19	10:00	1.0	0	0.5000
8/8/19	10:10	1.0	10	0.5000
	Add Distilled Water to the Specimen			
8/9/19	8:00	1.0	1310	0.5874
8/9/19	9:00	1.0	1370	0.5874

Expansion Index (EI meas) =	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	87.4
Expansion Index (Report) =	Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**87**

Rev. 03-08

Leighton

EXPANSION INDEX of SOILS
ASTM D 4829

Project Name: MCA New Buildings Geohazard Tested By: F. Mina Date: 8/8/19
Project No. : 12393.001 Checked By: M. Vinet Date: 8/13/19
Boring No.: LB-13 Depth: 0 - 5.0
Sample No. : B-1 Location: N/A
Sample Description: Sandy Lean Clay s(CL), Yellowish Brown.

Dry Wt. of Soil + Cont. (gm.)	2122.6
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	2122.6
Weight Soil Retained on #4 Sieve	18.3
Percent Passing # 4	99.1

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0554
Wt. Comp. Soil + Mold (gm.)	602.5	630.0
Wt. of Mold (gm.)	208.7	208.7
Specific Gravity (Assumed)	2.70	2.70
Container No.	11	11
Wet Wt. of Soil + Cont. (gm.)	350.3	630.0
Dry Wt. of Soil + Cont. (gm.)	323.0	358.0
Wt. of Container (gm.)	50.3	208.7
Moisture Content (%)	10.0	17.7
Wet Density (pcf)	118.8	120.4
Dry Density (pcf)	108.0	102.3
Void Ratio	0.561	0.648
Total Porosity	0.359	0.393
Pore Volume (cc)	74.4	85.9
Degree of Saturation (%) [S meas]	**48.1**	**73.7**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/8/19	9:00	1.0	0	0.5000
8/8/19	9:10	1.0	10	0.5000
	Add Distilled Water to the Specimen			
8/9/19	8:00	1.0	1370	0.5554
8/9/19	9:00	1.0	1430	0.5554

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	55.4
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**55**

Rev. 03-08

Leighton

One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

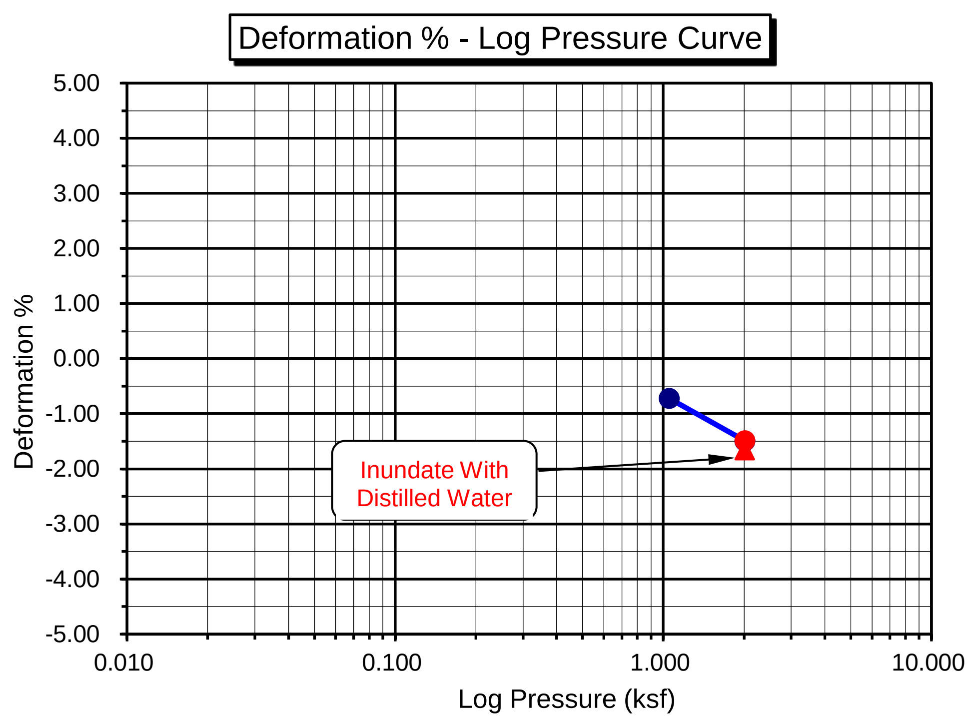
Project Name: MCA New Buildings Geohazard   Tested By: M. Vinet   Date: 8/12/19
Project No.: 12393.001   Checked By: M. Vinet   Date: 8/13/19
Boring No.: **LB-3**   Sample Type: IN SITU
Sample No.: **R-2**   Depth (ft.) 10.0
Sample Description: Silty Clay (CL-ML), Dark Olive Brown.
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	110.9
Initial Moisture (%):	16.9
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	112.8
Final Moisture (%) :	18.7
Initial Void ratio:	0.5194
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	87.6

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0072	0.9928	0.00	-0.72	0.5085	-0.72
2.013	0.0149	0.9851	0.00	-1.49	0.4968	-1.49
H2O	0.0166	0.9834	0.00	-1.66	0.4942	-1.66

Percent Swell / Settlement After Inundation = -0.17



Rev. 01-10

R-VALUE TEST RESULTS
ASTM D 2844

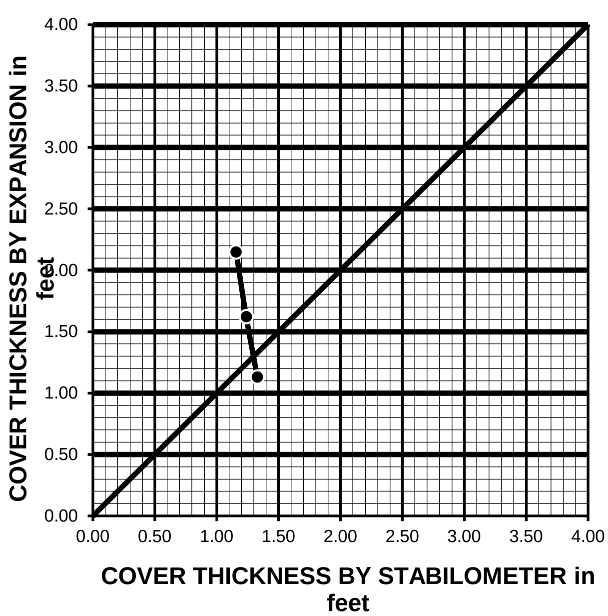
Leighton

Project Name:	MCA New Buildings Geohazard	Date:	8/9/19
Project Number:	12393.001	Technician:	F. Mina
Boring Number:	LB-1	Depth (ft.):	0 - 5.0
Sample Number:	B-1	Sample Location:	N/A
Sample Description:	Sandy Lean Clay s(CL), Dark Yellowish Brown.		

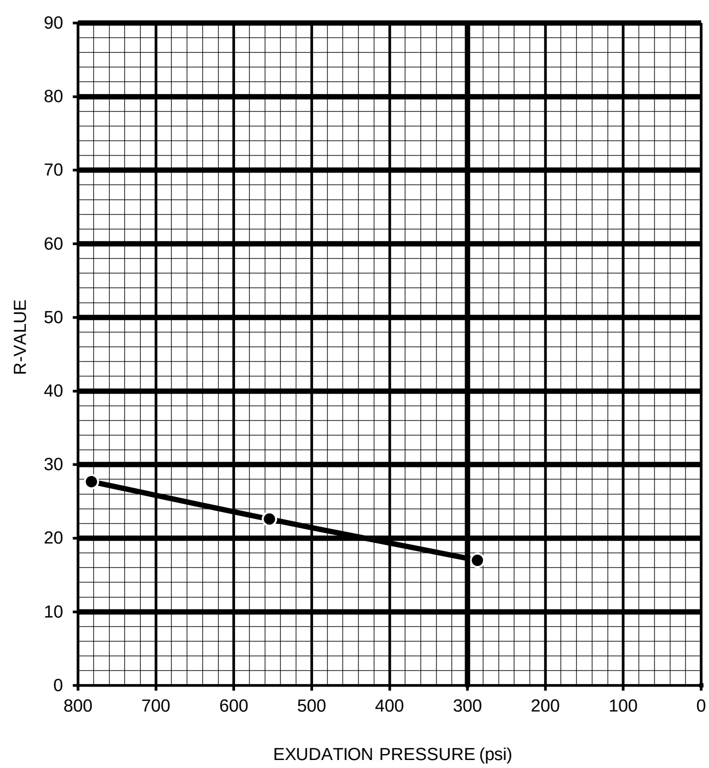
TEST SPECIMEN	A	B	C
MOISTURE AT COMPACTION %	13.8	15.8	17.9
HEIGHT OF SAMPLE, Inches	2.48	2.51	2.47
DRY DENSITY, pcf	102.0	104.3	98.4
COMPACTOR AIR PRESSURE, psi	125	75	25
EXUDATION PRESSURE, psi	783	554	287
EXPANSION, Inches x 10exp-4	57	43	30
STABILITY Ph 2,000 lbs (160 psi)	105	112	120
TURNS DISPLACEMENT	3.42	3.67	4.07
R-VALUE UNCORRECTED	28	23	17
R-VALUE CORRECTED	28	23	17

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	1.16	1.24	1.33
EXPANSION PRESSURE THICKNESS, ft.	2.15	1.62	1.13

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	19
R-VALUE BY EXUDATION:	17
EQUILIBRIUM R-VALUE:	17

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Leighton

Project Name: MCA New Buildings Geohazard | Tested By : F. Mina | Date: 08/12/19

Project No. : 12393.001 | Data Input By: M. Vinet | Date: 08/13/19

Boring No.	LB-5	LB-6		
Sample No.	B-1	B-1		
Sample Depth (ft)	0 - 5.0	5.0 - 10.0		
Soil Identification:	s(CL)	s(CL)		
Wet Weight of Soil + Container (g)	100.00	100.00		
Dry Weight of Soil + Container (g)	100.00	100.00		
Weight of Container (g)	0.00	0.00		
Moisture Content (%)	0.00	0.00		
Weight of Soaked Soil (g)	100.00	100.00		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	1	2		
Crucible No.	1	2		
Furnace Temperature (°C)	850	850		
Time In / Time Out	Timer	Timer		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	25.2205	24.6325		
Wt. of Crucible (g)	25.2113	24.6255		
Wt. of Residue (g) (A)	0.0092	0.0070		
PPM of Sulfate (A) x 41150	378.58	288.05		
PPM of Sulfate, Dry Weight Basis	**379**	**288**		

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	30			
ml of AgNO3 Soln. Used in Titration (C)	3.8			
PPM of Chloride (C -0.2) * 100 * 30 / B	360			
PPM of Chloride, Dry Wt. Basis	**360**			

pH TEST, DOT California Test 643

pH Value	**6.37**			
Temperature °C	21.0			

SOIL RESISTIVITY TEST

DOT CA TEST 643

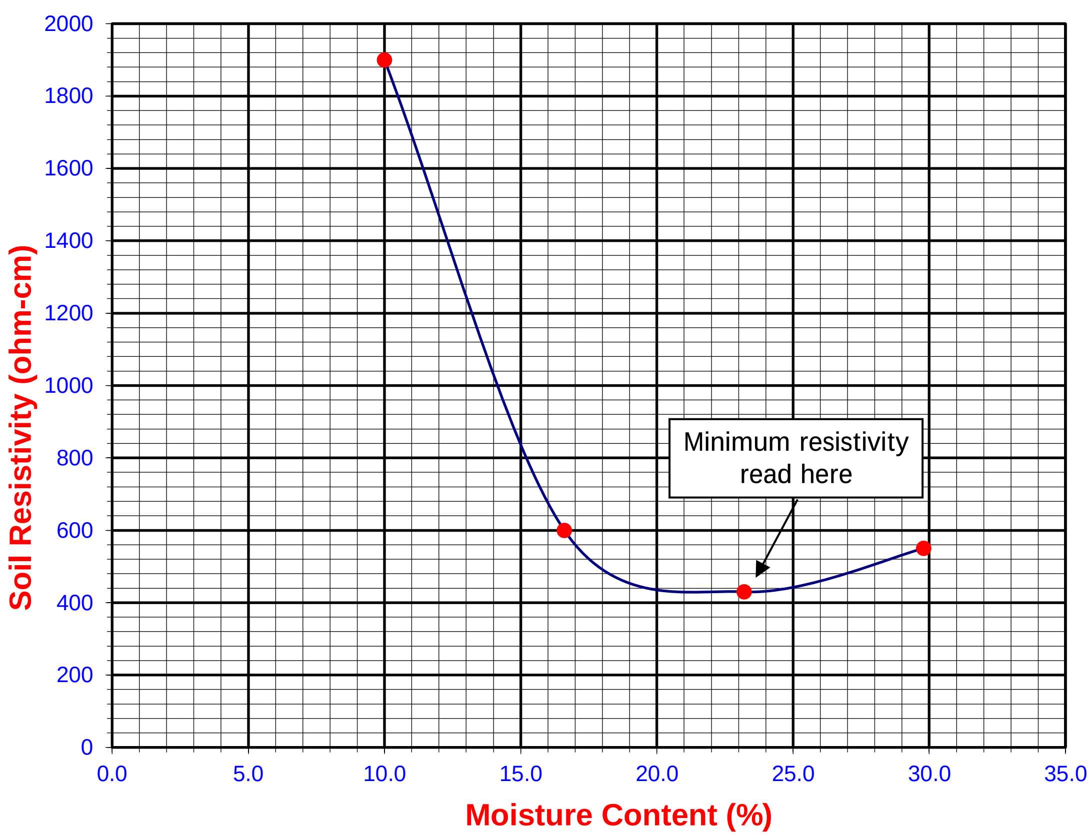
Project Name:	MCA New Buildings Geohazard	Tested By :	F. Mina	Date:	08/12/19
Project No. :	12393.001	Data Input By:	M. Vinet	Date:	08/13/19
Boring No.:	LB-5	Depth (ft.) :	0 - 5.0		
Sample No. :	B-1				
Soil Identification:*	s(CL)				

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	50	10.00	1900	1900
2	83	16.60	600	600
3	116	23.20	430	430
4	149	29.80	550	550
5				

Moisture Content (%) (MCi)	0.00
Wet Wt. of Soil + Cont. (g)	100.00
Dry Wt. of Soil + Cont. (g)	100.00
Wt. of Container (g)	0.00
Container No.	A
Initial Soil Wt. (g) (Wt)	500.00
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
430	**23.2**	**379**	**360**	**6.37**	**21.0**



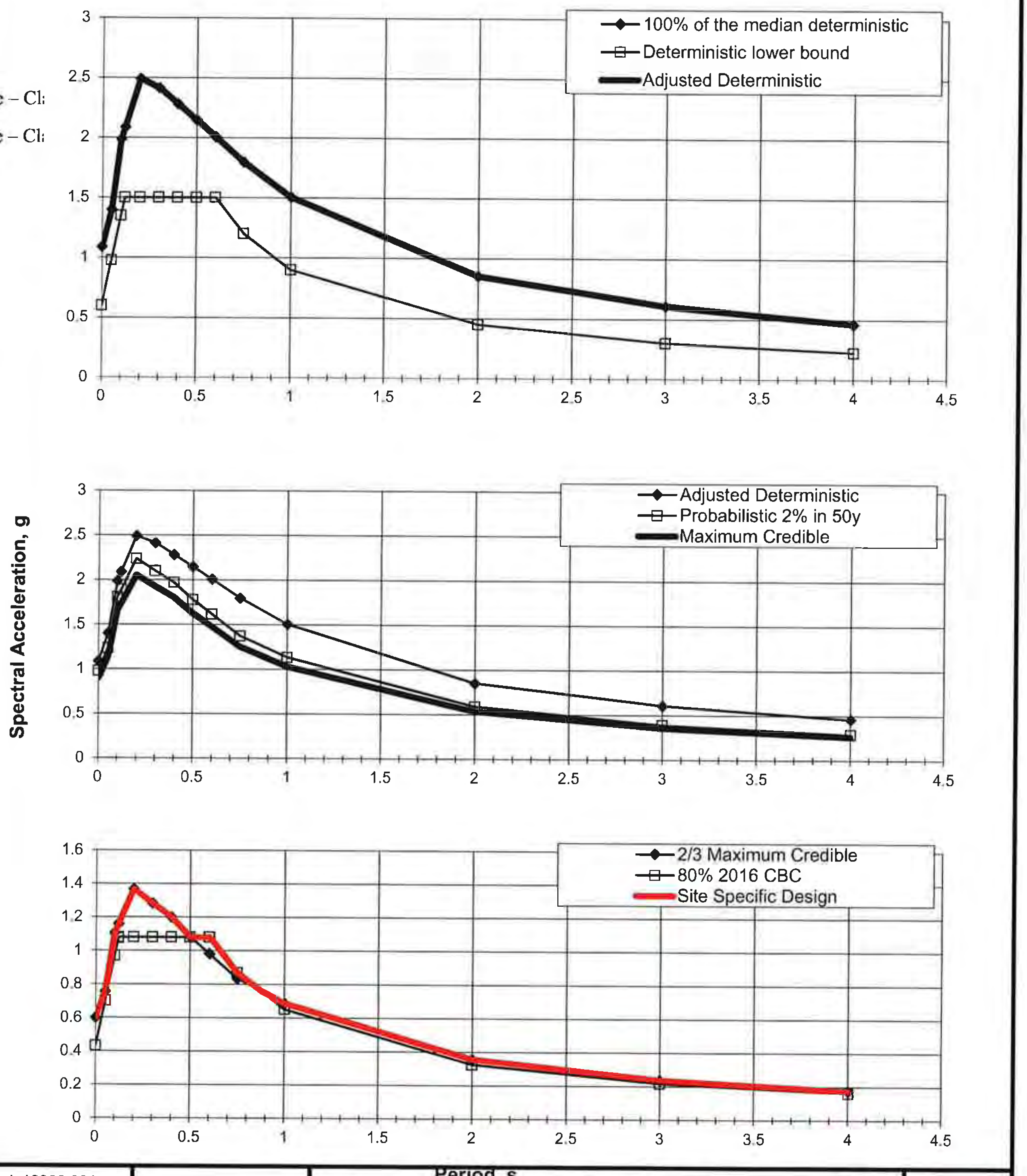
APPENDIX C

SITE-SPECIFIC SEISMIC ANALYSIS

Site Specific Response Spectrum

Project Name: MVUSD Murrieta Canyon Academy
Project No.: 12393.001

Parameter	Value
Spectral Response – Class C (short), S_S	2.052
Spectral Response – Class C (1 sec), S_1	0.713
Site Coefficient, F_a	1
Site Coefficient, F_v	1.5
Maximum Considered Earthquake Spectral Response Acceleration (short), S_{MS}	2.052
Maximum Considered Earthquake Spectral Response Acceleration – (1 sec), S_{M1}	1.07
5% Damped Design Spectral Response Acceleration (short), S_{DS}	1.368
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.713



Proj: 12393.001	Eng/Geol: SIS/RFR
Scale: NTS	Date: 08/2019
Reference:	

SITE-SPECIFIC RESPONSE SPECTRA

Murrieta VAlley Unified School District
Proposed Murrieta Canyon Academy
Murrieta, California

Figure C-1

Leighton

APPENDIX D

EARTHWORK AND GRADING SPECIFICATIONS

APPENDIX D

LEIGHTON CONSULTING, INC.
EARTHWORK AND GRADING GUIDE SPECIFICATIONS

TABLE OF CONTENTS

D-1.0 GENERAL

D-1.1 Intent

These Earthwork and Grading Guide Specifications are for grading and earthwork shown on the current, approved grading plan(s) and/or indicated in the Leighton Consulting, Inc. geotechnical report(s). These Guide Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the project-specific recommendations in the geotechnical report shall supersede these Guide Specifications. Leighton Consulting, Inc. shall provide geotechnical observation and testing during earthwork and grading. Based on these observations and tests, Leighton Consulting, Inc. may provide new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

D-1.2 Role of Leighton Consulting, Inc.

Prior to commencement of earthwork and grading, Leighton Consulting, Inc. shall meet with the earthwork contractor to review the earthwork contractor's work plan, to schedule sufficient personnel to perform the appropriate level of observation, mapping and compaction testing. During earthwork and grading, Leighton Consulting, Inc. shall observe, map, and document subsurface exposures to verify geotechnical design assumptions. If observed conditions are found to be significantly different than the interpreted assumptions during the design phase, Leighton Consulting, Inc. shall inform the owner, recommend appropriate changes in design to accommodate these observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include (1) natural ground after clearing to receiving fill but before fill is placed, (2) bottoms of all "remedial removal" areas, (3) all key bottoms, and (4) benches made on sloping ground to receive fill.

Leighton Consulting, Inc. shall observe moisture-conditioning and processing of the subgrade and fill materials, and perform relative compaction testing of fill to determine the attained relative compaction. Leighton Consulting, Inc. shall provide *Daily Field Reports* to the owner and the Contractor on a routine and frequent basis.

D-1.3 The Earthwork Contractor

The earthwork contractor (Contractor) shall be qualified, experienced and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Guide

Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing grading and backfilling in accordance with the current, approved plans and specifications.

The Contractor shall inform the owner and Leighton Consulting, Inc. of changes in work schedules at least one working day in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that Leighton Consulting, Inc. is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish earthwork and grading in accordance with the applicable grading codes and agency ordinances, these Guide Specifications, and recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of Leighton Consulting, Inc., unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, adverse weather, etc., are resulting in a quality of work less than required in these specifications, Leighton Consulting, Inc. shall reject the work and may recommend to the owner that earthwork and grading be stopped until unsatisfactory condition(s) are rectified.

D-2.0 PREPARATION OF AREAS TO BE FILLED

D-2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies and Leighton Consulting, Inc.. Care should be taken not to encroach upon or otherwise damage native and/or historic trees designated by the Owner or appropriate agencies to remain. Pavements, flatwork or other construction should not extend under the “drip line” of designated trees to remain.

Leighton Consulting, Inc. shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 3 percent of organic materials (by dry weight: ASTM D 2974). Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area. As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

D-2.2 Processing

Existing ground that has been declared satisfactory for support of fill, by Leighton Consulting, Inc., shall be scarified to a minimum depth of 6 inches (15 cm). Existing ground that is not satisfactory shall be over-excavated as specified in the following Section D-2.3. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

D-2.3 Overexcavation

In addition to removals and over-excavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be over-excavated to competent ground as evaluated by Leighton Consulting, Inc. during grading. All undocumented fill soils under proposed structure footprints should be excavated

D-2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), (>20 percent grade) the ground shall be stepped or benched. The lowest bench or key shall be a minimum of 15 feet (4.5 m) wide and at least 2 feet (0.6 m) deep, into competent material as evaluated by Leighton Consulting, Inc.. Other benches shall be excavated a minimum height of 4 feet (1.2 m) into competent material or as otherwise recommended by Leighton Consulting, Inc.. Fill placed on ground sloping flatter than 5:1 (horizontal to vertical units), (<20 percent grade) shall also be benched or otherwise over-excavated to provide a flat subgrade for the fill.

D-2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by Leighton Consulting, Inc. as suitable to receive fill. The Contractor shall obtain a written acceptance (*Daily Field Report*) from Leighton Consulting, Inc. prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys and benches.

D-3.0 FILL MATERIAL

D-3.1 Fill Quality

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by Leighton Consulting, Inc. prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to Leighton Consulting, Inc. or mixed with other soils to achieve satisfactory fill material.

D-3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 6 inches (15 cm), shall not be buried or placed in fill unless location, materials and placement methods are specifically accepted by Leighton Consulting, Inc.. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 feet (3 m) measured vertically from finish grade, or within 2 feet (0.61 m) of future utilities or underground construction.

D-3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of Section D-3.1, and be free of hazardous materials ("contaminants") and rock larger than 3-inches (8 cm) in largest dimension. All import soils shall have an Expansion Index (EI) of 20 or less and a sulfate content no greater than (≤) 500 parts-per-million (ppm). A representative sample of a potential import source shall be given to Leighton Consulting, Inc. at least four full working days before importing begins, so that suitability of this import material can be determined and appropriate tests performed.

D-4.0 FILL PLACEMENT AND COMPACTION

D-4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill, as described in Section D-2.0, above, in near-horizontal layers not exceeding 8 inches (20 cm) in loose thickness. Leighton Consulting, Inc. may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers, and only if the building officials with the appropriate jurisdiction approve. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

D-4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM) Test Method D 1557.

D-4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, each layer shall be uniformly compacted to not-less-than (≥) 90 percent of the maximum dry density as determined by ASTM Test Method D 1557. In some cases, structural fill may be specified (see project-specific geotechnical report) to be uniformly compacted to at-least (≥) 95 percent of the ASTM D 1557 modified Proctor laboratory maximum dry density. For fills thicker than (>) 15 feet (4.5 m), the portion of fill deeper than 15 feet below proposed finish grade shall be compacted to 95 percent of the ASTM D 1557 laboratory maximum density. Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

D-4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by back rolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet (1 to 1.2 m) in fill elevation, or by other methods producing satisfactory results acceptable to Leighton Consulting, Inc.. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of the ASTM D 1557 laboratory maximum density.

D-4.5 Compaction Testing

Field-tests for moisture content and relative compaction of the fill soils shall be performed by Leighton Consulting, Inc.. Location and frequency of tests shall be at our field representative(s) discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

D-4.6 Compaction Test Locations

Leighton Consulting, Inc. shall document the approximate elevation and horizontal coordinates of each density test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that Leighton

Consulting, Inc. can determine the test locations with sufficient accuracy. Adequate grade stakes shall be provided.

D-5.0 EXCAVATION

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by Leighton Consulting, Inc. during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by Leighton Consulting, Inc. based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, then observed and reviewed by Leighton Consulting, Inc. prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by Leighton Consulting, Inc..

D-6.0 TRENCH BACKFILLS

D-6.1 Safety

The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations. Work should be performed in accordance with Article 6 of the *California Construction Safety Orders*, 2009 Edition or more current (see also: http://www.dir.ca.gov/title8/sb4a6.html).

D-6.2 Bedding and Backfill

All utility trench bedding and backfill shall be performed in accordance with applicable provisions of the 2015 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Bedding material shall have a Sand Equivalent greater than 30 (SE>30). Bedding shall be placed to 1-foot (0.3 m) over the top of the conduit, and densified by jetting in areas of granular soils, if allowed by the permitting agency. Otherwise, the pipe-bedding zone should be backfilled with Controlled Low Strength Material (CLSM) consisting of at least one sack of Portland cement per cubic-yard of sand, and conforming to Section 201-6 of the 2015 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Backfill over the bedding zone shall be placed and densified mechanically to a minimum of 90 percent of relative compaction (ASTM D 1557) from 1 foot (0.3 m) above the top of the conduit to the surface. Backfill above the pipe zone shall **not** be jetted. Jetting of the bedding around the conduits shall be observed by Leighton Consulting, Inc. and backfill above the pipe zone (bedding) shall be observed and tested by Leighton Consulting, Inc..

D-6.3 <u>Lift Thickness</u>

Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to Leighton Consulting, Inc. that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method, and only if the building officials with the appropriate jurisdiction approve.

APPENDIX E

GBA – IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL REPORT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

Appendix F: Murrieta Canyon Academy Greenhouse Gas Analysis

Murrieta Canyon Academy

GREENHOUSE GAS ANALYSIS

CITY OF MURRIETA

PREPARED BY:

Haseeb Qureshi
hqureshi@urbanxroads.com
(949) 336-5987

Alyssa Tamase
atamase@urbanxroads.com
(949) 336-5988

MAY 5, 2020

TABLE OF CONTENTS

APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

%	Percent
°C	Degrees Celsius
°F	Degrees Fahrenheit
(1)	Reference
2016-2040 RTP/SCS	*Final 2016-2040 Regional Transportation Plan/Sustainable Communities Strategies*
2017 Scoping Plan	*Final 2017 Scoping Plan Update*
AB	Assembly Bill
AB 32	Global Warming Solutions Act of 2006
AB 1493	Pavley Fuel Efficiency Standards
AB 1881	California Water Conservation Landscaping Act of 2006
ACE	Affordable Clean Energy
Annex I	Industrialized Nations
APA	Administrative Procedure Act
AQIA	*Murrieta Canyon Academy Air Quality Impact Analysis*
BAU	Business As Usual
C_2F_6	Hexafluoroethane
C_2H_6	Ethane
$C_2H_2F_4$	Tetrafluroethane
$C_2H_4F_2$	Ethylidene Fluoride
CAA	Federal Clean Air Act
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CAL FIRE	California Department of Forestry and Fire Protection
CALGAPS	California LBNL GHG Analysis of Policies Spreadsheet
CALGreen	California Green Building Standards Code
CalSTA	California State Transportation Agency
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resource Board
CBSC	California Building Standards Commission
CEC	California Energy Commission
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CEQA Guidelines	*2019 CEQA Statute and Guidelines*

CDFA	California Department of Food and Agriculture
CF_4	Tetrafluoromethane
CFC	Chlorofluorocarbons
CFC-113	Trichlorotrifluoroethane
CH_4	Methane
CNRA	California Natural Resources Agency
CNRA 2009	*2009 California Climate Adaptation Strategy*
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
Convention	United Nation's Framework Convention on Climate Change
COP	Conference of the Parties
CPUC	California Public Utilities Commission
CTC	California Transportation Commission
DOF	Department of Finance
DWR	Department of Water Resources
EMFAC	Emission Factor Model
EPA	Environmental Protection Agency
EV	Electric Vehicle
GCC	Global Climate Change
Gg	Gigagram
GHGA	Greenhouse Gas Analysis
GO-Biz	Governor's Office of Business and Economic Development
GWP	Global Warming Potential
H_2O	Water
HFC	Hydrofluorocarbons
HDT	Heavy-Duty Trucks
HFC-23	Fluoroform
HFC-134a	1,1,1,2-tetrafluoroethane
HFC-152a	1,1-difluoroethane
HHDT	Heavy-Heavy-Duty Trucks
IBANK	California Infrastructure and Economic Development Bank
IPCC	Intergovernmental Panel on Climate Change
IRP	Integrated Resource Planning
ISO	Independent System Operator
kWh	Kilowatt Hours
lbs	Pounds
LBNL	Lawrence Berkeley National Laboratory
LCA	Life-Cycle Analysis

LCD	Liquid Crystal Display
LCFS	Low Carbon Fuel Standard or Executive Order S-01-07
LEV III	Low-Emission Vehicle
LULUCF	Land-Use, Land-Use Change and Forestry
MCA	Murrieta Canyon Academy
MDT	Medium-Duty Trucks
MRR	Mandatory Reporting Rule
$MMTCO_2e$	Million Metric Ton of Carbon Dioxide Equivalent
mpg	Miles Per Gallon
MPOs	Metropolitan Planning Organizations
$MMTCO_2e$/yr	Million Metric Ton of Carbon Dioxide Equivalent Per Year
MT/yr	Metric Tons Per Year
$MTCO_2e$	Metric Ton of Carbon Dioxide Equivalent
$MTCO_2e$/yr	Metric Ton of Carbon Dioxide Equivalent Per Year
MVUSD	Murrieta Valley Unified School District
MW	Megawatts
MWh	Megawatts Per Hour
MWELO	California Department of Water Resources' Model Water Efficient
N_2O	Nitrous Oxide
NDC	Nationally Determined Contributions
NF_3	Nitrogen Trifluoride
NHTSA	National Highway Traffic Safety Administration
NIOSH	National Institute for Occupational Safety and Health
NO_X	Nitrogen Oxides
Non-Annex I	Developing Nations
OAL	Office of Administrative Law
OPR	Office of Planning and Research
PFC	Perfluorocarbons
ppb	Parts Per Billion
ppm	Parts Per Million
ppt	Parts Per Trillion
Project	Murrieta Canyon Academy
RPS	Renewable Portfolio Standards
RTP	Regional Transportation Plan
SB	Senate Bill
SB 32	California Global Warming Solutions Act of 2006
SB 375	Regional GHG Emissions Reduction Targets/Sustainable

	Communities Strategies
SB 1078	Renewable Portfolio Standards
SB 1368	Statewide Retail Provider Emissions Performance Standards
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
Scoping Plan	California Air Resources Board Climate Change Scoping Plan
SCS	Sustainable Communities Strategy
sf	Square Feet
SF_6	Sulfur Hexaflouride
SGC	Strategic Growth Council
SLPS	Short-Lived Climate Pollutant Strategy
SP	Service Population
Supreme Court	United States Supreme Court
Title 20	Appliance Energy Efficiency Standards
Title 24	California Building Code
Traffic Study	*Murrieta Canyon Academy Expansion Traffic Impact Study*
U.N.	United Nations
U.S.	United States
UNFCCC	United Nations' Framework Convention on Climate Change
UTR	Utility Tractors
VMT	Vehicle Miles Traveled
WCI	Western Climate Initiative
WRI	World Resources Institute
ZE/NZE	Zero and Near-Zero Emissions
ZEV	Zero-Emissions Vehicles

This page intentionally left blank

EXECUTIVE SUMMARY

ES.1 SUMMARY OF FINDINGS

The results of this *Murrieta Canyon Academy Greenhouse Gas Analysis* (GHGA) is summarized below based on the significance criteria in Section 3 of this report consistent with Appendix G of the *California Environmental Quality Act (CEQA) Guidelines* (*CEQA Guidelines*) (1). Table ES-1 shows the findings of significance for potential greenhouse gas (GHG) impacts under CEQA.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
GHG Impact #1: Would the Project generate direct or indirect GHG emission that would result in a significant impact on the environment?	3.8	*Less Than Significant*	*n/a*
GHG Impact #2: Would the Project conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs?	3.8	*Less Than Significant*	*n/a*

ES.2 REGULATORY REQUIREMENTS

The Project would be required to comply with regulations imposed by the State of California and the South Coast Air Quality Management District (SCAQMD) aimed at the reduction of air pollutant emissions. Those that are directly and indirectly applicable to the Project and that would assist in the reduction of GHG emissions include:

- Global Warming Solutions Act of 2006 (Assembly Bill (AB) 32) (2).
- Regional GHG Emissions Reduction Targets/Sustainable Communities Strategies (Senate Bill (SB) 375) (3).
- Pavley Fuel Efficiency Standards (AB 1493). Establishes fuel efficiency ratings for new vehicles (4).
- California Building Code (Title 24 California Code of Regulations (CCR)). Establishes energy efficiency requirements for new construction (5).
- Appliance Energy Efficiency Standards (Title 20 CCR). Establishes energy efficiency requirements for appliances (6).
- Low Carbon Fuel Standard (LCFS). Requires carbon content of fuel sold in California to be 10 percent (%) less by 2020 (7).
- California Water Conservation in Landscaping Act of 2006 (AB 1881). Requires local agencies to adopt the Department of Water Resources updated Water Efficient Landscape Ordinance or equivalent by January 1, 2010 to ensure efficient landscapes in new development and reduced water waste in existing landscapes (8).

- Statewide Retail Provider Emissions Performance Standards (SB 1368). Requires energy generators to achieve performance standards for GHG emissions (9).
- Renewable Portfolio Standards (SB 1078 – also referred to as RPS). Requires electric corporations to increase the amount of energy obtained from eligible renewable energy resources to 20 % by 2010 and 33% by 2020 (10).
- California Global Warming Solutions Act of 2006 (SB 32). Requires the state to reduce statewide GHG emissions to 40% below 1990 levels by 2030, a reduction target that was first introduced in Executive Order B-30-15 (11).

Promulgated regulations that will affect the Project’s emissions are accounted for in the Project’s GHG calculations provided in this report. In particular, AB 1493, LCFS, and RPS, and therefore are accounted for in the Project’s emission calculations.

This page intentionally left blank

1 INTRODUCTION

This report presents the results of the GHGA prepared by Urban Crossroads, Inc., for the proposed Murrieta Canyon Academy (Project). The purpose of this GHGA is to evaluate net new Project-related construction and operational emissions and determine the level of GHG impacts as a result of constructing and operating the proposed Project.

1.1 SITE LOCATION

The proposed Murrieta Canyon Academy Project is located on the northeast corner of Hayes Avenue and Fullerton Road in the City of Murrieta, as shown on Exhibit 1-A. The area surrounding the Project Site includes residential to the east and south; Thompson Middle School field and Thompson Middle School to the west; and Murrieta Valley High School to the north.

1.2 PROJECT DESCRIPTION

Murrieta Valley Unified School District (MVUSD) proposes to construct new buildings and associated infrastructure at the Murrieta Canyon Academy (MCA). MCA is an existing school campus consisting of portable structures that provides alternative high school programs including, independent study, alternative high school, and adult education. MVUSD proposes to construct a new campus with permanent single and two-story buildings and associated infrastructure and demolish the existing MCA buildings (Project). The site plan for the proposed Project is shown on Exhibit 1-B.

The proposed Project includes the construction of a new campus with approximately 41,500 square feet (sf) of classrooms and administrative offices, an associated parking lot, and other site improvements, to replace an existing campus of 22,500 sf of portable classrooms. More specifically, the new campus will include construction of single and two-story buildings with 22 classroom, student pavilion, library, restrooms, storage rooms, administration office, and various academic and activity courts with additional parking and landscaping. The proposed buildings are designed as single and two-story structures. All utilities exist to the Project site. The proposed Project will increase current enrollment capacity from 234 students to 594 students.

The Project is proposed to be constructed in the general location of the existing softball fields associated with Thompson Middle School, located immediately north-west of the existing MCA campus and south of the adjacent Thompson Middle School buildings. While the construction of the new buildings occurs, the existing buildings will remain in operation. Following the completion of the new buildings, anticipated to be during summer recess from school, the original buildings and parking lot will be demolished, and the new parking and associated landscape will be constructed.

EXHIBIT 1-A: LOCATION MAP

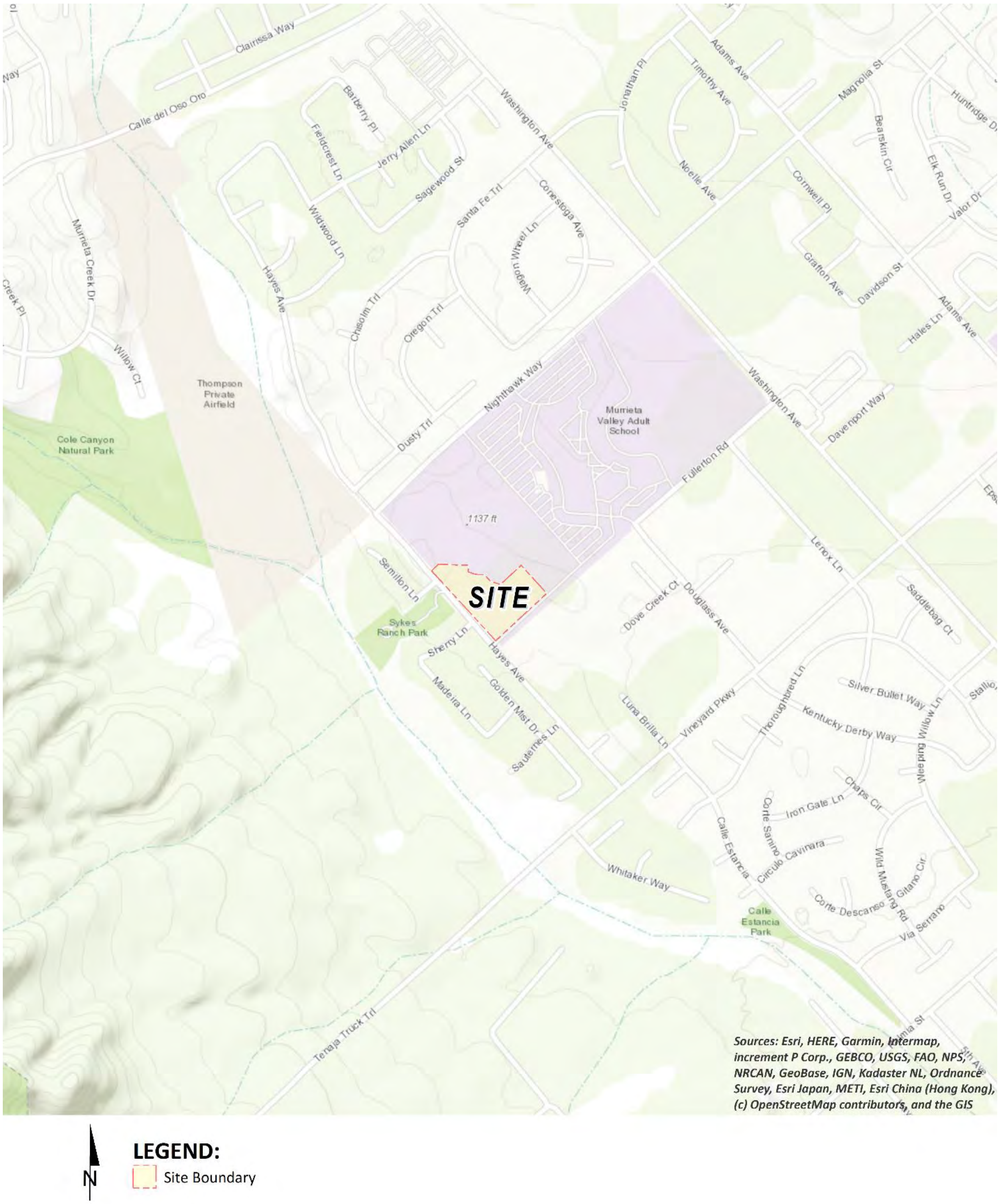


EXHIBIT 1-B: SITE PLAN

This page intentionally left blank

2 CLIMATE CHANGE SETTING

2.1 INTRODUCTION TO GLOBAL CLIMATE CHANGE (GCC)

GCC is defined as the change in average meteorological conditions on the earth with respect to temperature, precipitation, and storms. The majority of scientists believe that the climate shift taking place since the Industrial Revolution is occurring at a quicker rate and magnitude than in the past. Scientific evidence suggests that GCC is the result of increased concentrations of GHGs in the earth's atmosphere, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. The majority of scientists believe that this increased rate of climate change is the result of GHGs resulting from human activity and industrialization over the past 200 years.

An individual project like the proposed Project evaluated in this GHGA cannot generate enough GHG emissions to affect a discernible change in global climate. However, the proposed Project may participate in the potential for GCC by its incremental contribution of GHGs combined with the cumulative increase of all other sources of GHGs, which when taken together constitute potential influences on GCC. Because these changes may have serious environmental consequences, Section 3.0 will evaluate the potential for the proposed Project to have a significant effect upon the environment as a result of its potential contribution to the greenhouse effect.

2.2 GLOBAL CLIMATE CHANGE DEFINED

GCC refers to the change in average meteorological conditions on the earth with respect to temperature, wind patterns, precipitation and storms. Global temperatures are regulated by naturally occurring atmospheric gases such as water vapor, CO_2, N_2O, CH_4, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). These particular gases are important due to their residence time (duration they stay) in the atmosphere, which ranges from 10 years to more than 100 years. These gases allow solar radiation into the earth's atmosphere, but prevent radioactive heat from escaping, thus warming the earth's atmosphere. GCC can occur naturally as it has in the past with the previous ice ages.

Gases that trap heat in the atmosphere are often referred to as GHGs. GHGs are released into the atmosphere by both natural and anthropogenic activity. Without the natural GHG effect, the earth's average temperature would be approximately 61 degrees Fahrenheit (°F) cooler than it is currently. The cumulative accumulation of these gases in the earth's atmosphere is considered to be the cause for the observed increase in the earth's temperature.

2.3 GHGS

2.3.1 GHGS AND HEALTH EFFECTS

GHGs trap heat in the atmosphere, creating a GHG effect that results in global warming and climate change. Many gases demonstrate these properties and as discussed in Table 2-1. For the purposes of this analysis, emissions of CO_2, CH_4, and N_2O were evaluated (see Table 3-1 later in this report) because these gases are the primary contributors to GCC from development projects.

Although there are other substances such as fluorinated gases that also contribute to GCC, these fluorinated gases were not evaluated as their sources are not well-defined and do not contain accepted emissions factors or methodology to accurately calculate these gases.

TABLE 2-1: GHGS

GHGs	Description	Sources	Health Effects
Water	Water is the most abundant, important, and variable GHG in the atmosphere. Water vapor is not considered a pollutant; in the atmosphere it maintains a climate necessary for life. Changes in its concentration are primarily considered to be a result of climate feedbacks related to the warming of the atmosphere rather than a direct result of industrialization. A climate feedback is an indirect, or secondary, change, either positive or negative, that occurs within the climate system in response to a forcing mechanism. The feedback loop in which water is involved is critically important to projecting future climate change. As the temperature of the atmosphere rises, more water is evaporated from ground storage (rivers, oceans, reservoirs, soil). Because the air is warmer, the relative humidity can be higher (in essence, the air is able to 'hold' more water when it is warmer), leading to more water vapor in the atmosphere. As a GHG, the higher concentration of water vapor is then able to absorb more thermal indirect energy radiated from the Earth, thus further warming the atmosphere. The warmer atmosphere can then hold more water vapor and so on and so on. This is referred to as a "positive feedback loop." The extent to which this positive feedback loop will continue is	The main source of water vapor is evaporation from the oceans (approximately 85%). Other sources include evaporation from other water bodies, sublimation (change from solid to gas) from sea ice and snow, and transpiration from plant leaves.	There are no known direct health effects related to water vapor at this time. It should be noted however that when some pollutants react with water vapor, the reaction forms a transport mechanism for some of these pollutants to enter the human body through water vapor.

GHGs	Description	Sources	Health Effects
	unknown as there are also dynamics that hold the positive feedback loop in check. As an example, when water vapor increases in the atmosphere, more of it will eventually condense into clouds, which are more able to reflect incoming solar radiation (thus allowing less energy to reach the earth's surface and heat it up) (12).		
CO_2	CO_2 is an odorless and colorless GHG. Since the industrial revolution began in the mid-1700s, the sort of human activity that increases GHG emissions has increased dramatically in scale and distribution. Data from the past 50 years suggests a corollary increase in levels and concentrations. As an example, prior to the industrial revolution, CO_2 concentrations were fairly stable at 280 parts per million (ppm). Today, they are around 370 ppm, an increase of more than 30%. Left unchecked, the concentration of CO_2 in the atmosphere is projected to increase to a minimum of 540 ppm by 2100 as a direct result of anthropogenic sources (13).	CO_2 is emitted from natural and manmade sources. Natural sources include: the decomposition of dead organic matter; respiration of bacteria, plants, animals and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources include: the burning of coal, oil, natural gas, and wood. CO_2 is naturally removed from the air by photosynthesis, dissolution into ocean water, transfer to soils and ice caps, and chemical weathering of carbonate rocks (14).	Outdoor levels of CO_2 are not high enough to result in negative health effects. According to the National Institute for Occupational Safety and Health (NIOSH) high concentrations of CO_2 can result in health effects such as: headaches, dizziness, restlessness, difficulty breathing, sweating, increased heart rate, increased cardiac output, increased blood pressure, coma, asphyxia, and/or convulsions. It should be noted that current concentrations of CO_2 in the earth's atmosphere are estimated to be approximately 370 ppm, the actual reference exposure level (level at which adverse health effects typically occur) is at exposure levels of 5,000 ppm averaged over 10 hours in a 40-hour workweek and short-term reference exposure levels of 30,000 ppm averaged over a 15 minute period (15).

GHGs	Description	Sources	Health Effects
CH_4	CH_4 is an extremely effective absorber of radiation, although its atmospheric concentration is less than CO_2 and its lifetime in the atmosphere is brief (10-12 years), compared to other GHGs.	CH_4 has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of CH_4. Other anthropocentric sources include fossil-fuel combustion and biomass burning (16).	CH_4 is extremely reactive with oxidizers, halogens, and other halogen-containing compounds. Exposure to high levels of CH_4 can cause asphyxiation, loss of consciousness, headache and dizziness, nausea and vomiting, weakness, loss of coordination, and an increased breathing rate.
N_2O	N_2O, also known as laughing gas, is a colorless GHG. Concentrations of N_2O also began to rise at the beginning of the industrial revolution. In 1998, the global concentration was 314 parts per billion (ppb).	N_2O is produced by microbial processes in soil and water, including those reactions which occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant, i.e., in whipped cream bottles. It is also	N_2O can cause dizziness, euphoria, and sometimes slight hallucinations. In small doses, it is considered harmless. However, in some cases, heavy and extended use can cause Olney's Lesions (brain damage) (17).

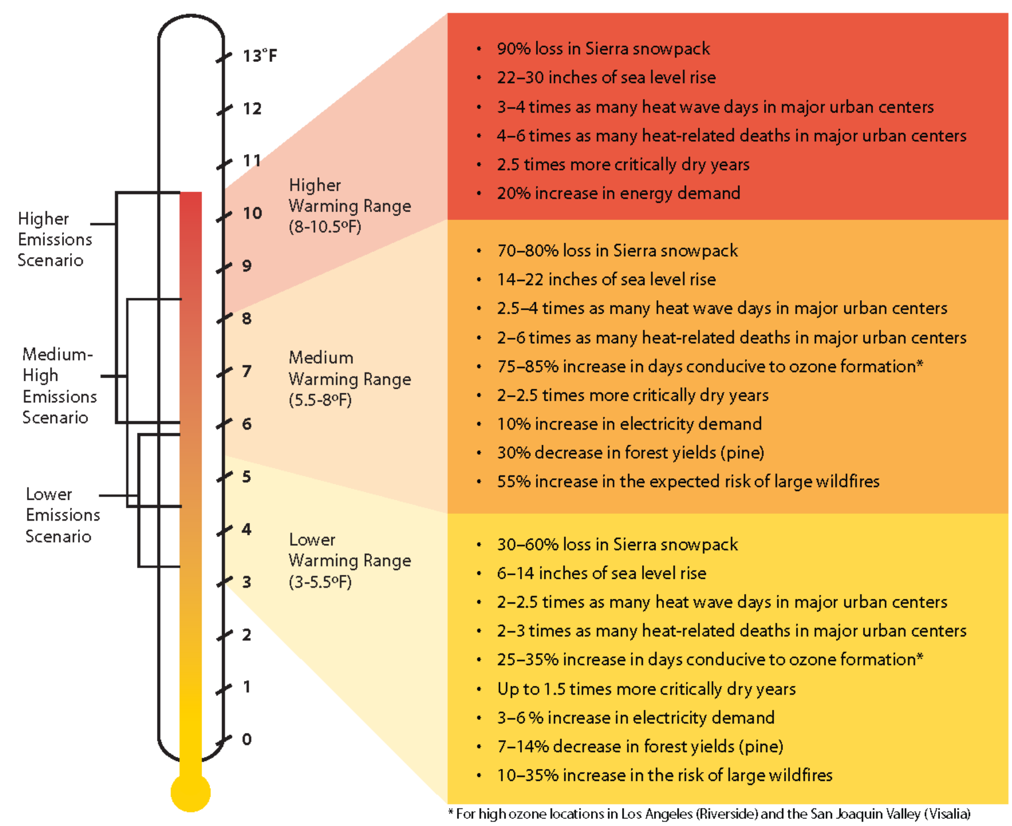
GHGs	Description	Sources	Health Effects
		used in potato chip bags to keep chips fresh. It is used in rocket engines and in race cars. N_2O can be transported into the stratosphere, be deposited on the earth's surface, and be converted to other compounds by chemical reaction (17).	
Chlorofluorocarbons (CFCs)	CFCs are gases formed synthetically by replacing all hydrogen atoms in CH_4 or ethane (C_2H_6) with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble and chemically unreactive in the troposphere (the level of air at the earth's surface).	CFCs have no natural source but were first synthesized in 1928. They were used for refrigerants, aerosol propellants and cleaning solvents. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and was extremely successful, so much so that levels of the major CFCs are now remaining steady or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years (18).	In confined indoor locations, working with CFC-113 or other CFCs is thought to result in death by cardiac arrhythmia (heart frequency too high or too low) or asphyxiation.

GHGs	Description	Sources	Health Effects
HFCs	HFCs are synthetic, man-made chemicals that are used as a substitute for CFCs. Out of all the GHGs, they are one of three groups with the highest global warming potential (GWP). The HFCs with the largest measured atmospheric abundances are (in order), Fluoroform (HFC-23), 1,1,1,2-tetrafluoroethane (HFC-134a), and 1,1-difluoroethane (HFC-152a). Prior to 1990, the only significant emissions were of HFC-23. HCF-134a emissions are increasing due to its use as a refrigerant.	HFCs are manmade for applications such as automobile air conditioners and refrigerants.	No health effects are known to result from exposure to HFCs.
PFCs	PFCs have stable molecular structures and do not break down through chemical processes in the lower atmosphere. High-energy ultraviolet rays, which occur about 60 kilometers above earth's surface, are able to destroy the compounds. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years. Two common PFCs are tetrafluoromethane (CF_4) and hexafluoroethane (C_2F_6). The EPA estimates that concentrations of CF_4 in the atmosphere are over 70 parts per trillion (ppt).	The two main sources of PFCs are primary aluminum production and semiconductor manufacture.	No health effects are known to result from exposure to PFCs.
SF_6	SF_6 is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It also has the highest GWP of any gas evaluated (23,900) (19). The EPA indicates that concentrations in the 1990s were about 4 ppt.	SF_6 is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.	In high concentrations in confined areas, the gas presents the hazard of suffocation because it displaces the oxygen needed for breathing.

GHGs	Description	Sources	Health Effects
Nitrogen Trifluoride (NF_3)	NF_3 is a colorless gas with a distinctly moldy odor. The World Resources Institute (WRI) indicates that NF_3 has a 100-year GWP of 17,200 (20).	NF_3 is used in industrial processes and is produced in the manufacturing of semiconductors, Liquid Crystal Display (LCD) panels, types of solar panels, and chemical lasers.	Long-term or repeated exposure may affect the liver and kidneys and may cause fluorosis (21).

The potential health effects related directly to the emissions of CO_2, CH_4, and N_2O as they relate to development projects such as the proposed Project are still being debated in the scientific community. Their cumulative effects to GCC have the potential to cause adverse effects to human health. Increases in Earth's ambient temperatures would result in more intense heat waves, causing more heat-related deaths. Scientists also purport that higher ambient temperatures would increase disease survival rates and result in more widespread disease. Climate change will likely cause shifts in weather patterns, potentially resulting in devastating droughts and food shortages in some areas (22). Exhibit 2-A presents the potential impacts of global warming (23).

EXHIBIT 2-A: SUMMARY OF PROJECTED GLOBAL WARMING IMPACT, 2070-2099 (AS COMPARED WITH 1961-1990)



Source: Barbara H. Allen-Diaz. "Climate change affects us all." *University of California, Agriculture and Natural Resources*, 2009.

2.4 GLOBAL WARMING POTENTIAL

GHGs have varying GWP values. GWP of a GHG indicates the amount of warming a gas causes over a given period of time and represents the potential of a gas to trap heat in the atmosphere. CO_2 is utilized as the reference gas for GWP, and thus has a GWP of 1. CO_2 equivalent (CO_2e) is a term used for describing the difference GHGs in a common unit. CO_2e signifies the amount of CO_2 which would have the equivalent GWP.

The atmospheric lifetime and GWP of selected GHGs are summarized at Table 2-2. As shown in the table below, GWP for the 2nd Assessment Report, the Intergovernmental Panel on Climate Change (IPCC)'s scientific and socio-economic assessment on climate change, range from 1 for CO_2 to 23,900 for SF_6 and GWP for the IPCC's 5th Assessment Report range from 1 for CO_2 to 23,500 for SF_6 (24).

TABLE 2-2: GWP AND ATMOSPHERIC LIFETIME OF SELECT GHGS

Gas	Atmospheric Lifetime (years)	GWP (100-year time horizon)	
		2nd Assessment Report	5th Assessment Report
CO_2	See*	1	1
CH_4	12 .4	21	28
N_2O	121	310	265
HFC-23	222	11,700	12,400
HFC-134a	13.4	1,300	1,300
HFC-152a	1.5	140	138
SF_6	3,200	23,900	23,500

*As per Appendix 8.A. of IPCC's 5th Assessment Report, no single lifetime can be given.
Source: Table 2.14 of the IPCC Fourth Assessment Report, 2007

2.5 GHG EMISSIONS INVENTORIES

2.5.1 GLOBAL

Worldwide anthropogenic GHG emissions are tracked by the IPCC for industrialized nations (referred to as Annex I) and developing nations (referred to as Non-Annex I). Human GHG emissions data for Annex I nations are available through 2017. Based on the latest available data, the sum of these emissions totaled approximately 29,216,501 gigagram (Gg) CO_2e[1] (25) (26) as summarized on Table 2-3.

[1] The global emissions are the sum of Annex I and non-Annex I countries, without counting Land-Use, Land-Use Change and Forestry (LULUCF). For countries without 2017 data, the United Nations' Framework Convention on Climate Change (UNFCCC) data for the most recent year were used U.N. Framework Convention on Climate Change, "Annex I Parties – GHG total without LULUCF," The most recent GHG emissions for China and India are from 2014.

2.5.2 UNITED STATES

As noted in Table 2-3, the United States, as a single country, was the number two producer of GHG emissions in 2017.

TABLE 2-3: TOP GHG PRODUCING COUNTRIES AND THE EUROPEAN UNION [2]

Emitting Countries	GHG Emissions (Gg CO_2e)
China	11,911,710
United States	6,456,718
European Union (28-member countries)	4,323,163
India	3,079,810
Russian Federation	2,155,470
Japan	1,289,630
Total	**29,216,501**

2.5.3 STATE OF CALIFORNIA

California has significantly slowed the rate of growth of GHG emissions due to the implementation of energy efficiency programs as well as adoption of strict emission controls, but is still a substantial contributor to the United States (U.S.) emissions inventory total (27). The California Air Resource Board (CARB) compiles GHG inventories for the State of California. Based upon the 2019 GHG inventory data (i.e., the latest year for which data are available) for the 2000-2017 GHG emissions period, California emitted an average 424.1 million metric tons of CO_2e per year ($MMTCO_2e/yr$) (28).

2.6 EFFECTS OF CLIMATE CHANGE IN CALIFORNIA

2.6.1 PUBLIC HEALTH

Higher temperatures may increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to ozone formation could increase from 25 to 35% under the lower warming range to 75 to 85% under the medium warming range. In addition, if global background ozone levels increase as predicted in some scenarios, it may become impossible to meet local air quality standards. Air quality could be further compromised by increases in wildfires, which emit fine particulate matter that can travel long distances, depending on wind conditions. The Climate Scenarios report indicates that large wildfires could become up to 55% more frequent if GHG emissions are not significantly reduced.

In addition, under the higher warming range scenario, there could be up to 100 more days per year with temperatures above 90°F in Los Angeles and 95°F in Sacramento by 2100. This is a large increase over historical patterns and approximately twice the increase projected if temperatures remain within or below the lower warming range. Rising temperatures could increase the risk of

[2] Used http://unfccc.int data for Annex I countries. Consulted the CAIT Climate Data Explorer in https://www.climatewatchdata.org site to reference Non-Annex I countries of China and India.

death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

2.6.2 WATER RESOURCES

A vast network of man-made reservoirs and aqueducts captures and transports water throughout the state from northern California rivers and the Colorado River. The current distribution system relies on the Sierra Nevada snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages.

If temperatures continue to increase, more precipitation could fall as rain instead of snow, and the snow that does fall could melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90%. Under the lower warming range scenario, snowpack losses could be only half as large as those possible if temperatures were to rise to the higher warming range. How much snowpack could be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under the wetter climate projections, the loss of snowpack could pose challenges to water managers and hamper hydropower generation. Winter tourism could be adversely affected, under the lower warming range, the ski season at lower elevations could be reduced by as much as a month. If temperatures reach the higher warming range and precipitation declines, there might be many years with insufficient snow for skiing and snowboarding.

The State's water supplies are also at risk from rising sea levels. An influx of saltwater could degrade California's estuaries, wetlands, and groundwater aquifers. Saltwater intrusion caused by rising sea levels is a major threat to the quality and reliability of water within the southern edge of the Sacramento/San Joaquin River Delta – a major fresh water supply.

2.6.3 AGRICULTURE

Increased temperatures could cause widespread changes to the agriculture industry reducing the quantity and quality of agricultural products statewide. First, California farmers could possibly lose as much as 25% of the water supply needed. Although higher CO_2 levels can stimulate plant production and increase plant water-use efficiency, California's farmers could face greater water demand for crops and a less reliable water supply as temperatures rise. Crop growth and development could change, as could the intensity and frequency of pest and disease outbreaks. Rising temperatures could aggravate ozone pollution, which makes plants more susceptible to disease and pests and interferes with plant growth.

Plant growth tends to be slow at low temperatures, increasing with rising temperatures up to a threshold. However, faster growth can result in less-than-optimal development for many crops, so rising temperatures could worsen the quantity and quality of yield for a number of California's agricultural products. Products likely to be most affected include wine grapes, fruits and nuts.

In addition, continued GCC could shift the ranges of existing invasive plants and weeds and alter competition patterns with native plants. Range expansion could occur in many species while range contractions may be less likely in rapidly evolving species with significant populations already established. Should range contractions occur, new or different weed species could fill the emerging gaps. Continued GCC could alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates.

2.6.4 FORESTS AND LANDSCAPES

GCC has the potential to intensify the current threat to forests and landscapes by increasing the risk of wildfire and altering the distribution and character of natural vegetation. If temperatures rise into the medium warming range, the risk of large wildfires in California could increase by as much as 55%, which is almost twice the increase expected if temperatures stay in the lower warming range. However, since wildfire risk is determined by a combination of factors, including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout the state. In contrast, wildfires in northern California could increase by up to 90% due to decreased precipitation.

Moreover, continued GCC has the potential to alter natural ecosystems and biological diversity within the state. For example, alpine and subalpine ecosystems could decline by as much as 60 to 80% by the end of the century as a result of increasing temperatures. The productivity of the state's forests has the potential to decrease as a result of GCC.

2.6.5 RISING SEA LEVELS

Rising sea levels, more intense coastal storms, and warmer water temperatures could increasingly threaten the state's coastal regions. Under the higher warming range scenario, sea level is anticipated to rise 22 to 35 inches by 2100. Elevations of this magnitude would inundate low-lying coastal areas with saltwater, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats. Under the lower warming range scenario, sea level could rise 12-14 inches.

2.7 REGULATORY SETTING

2.7.1 INTERNATIONAL

Climate change is a global issue involving GHG emissions from all around the world; therefore, countries such as the ones discussed below have made an effort to reduce GHGs.

IPCC

In 1988, the United Nations (U.N.) and the World Meteorological Organization established the IPCC to assess the scientific, technical and socioeconomic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation.

UNITED NATION'S FRAMEWORK CONVENTION ON CLIMATE CHANGE (CONVENTION)

On March 21, 1994, the U.S. joined a number of countries around the world in signing the Convention. Under the Convention, governments gather and share information on GHG emissions, national policies, and best practices; launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

INTERNATIONAL CLIMATE CHANGE TREATIES

The Kyoto Protocol is an international agreement linked to the Convention. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing GHG emissions at an average of 5% against 1990 levels over the five-year period 2008–2012. The Convention (as discussed above) encouraged industrialized countries to stabilize emissions; however, the Protocol commits them to do so. Developed countries have contributed more emissions over the last 150 years; therefore, the Protocol places a heavier burden on developed nations under the principle of “common but differentiated responsibilities.”

In 2001, President George W. Bush indicated that he would not submit the treaty to the U.S. Senate for ratification, which effectively ended American involvement in the Kyoto Protocol. In December 2009, international leaders met in Copenhagen to address the future of international climate change commitments post-Kyoto. No binding agreement was reached in Copenhagen; however, the Committee identified the long-term goal of limiting the maximum global average temperature increase to no more than 2 degrees Celsius (°C) above pre-industrial levels, subject to a review in 2015. The UN Climate Change Committee held additional meetings in Durban, South Africa in November 2011; Doha, Qatar in November 2012; and Warsaw, Poland in November 2013. The meetings are gradually gaining consensus among participants on individual climate change issues.

On September 23, 2014 more than 100 Heads of State and Government and leaders from the private sector and civil society met at the Climate Summit in New York hosted by the U.N. At the Summit, heads of government, business and civil society announced actions in areas that would have the greatest impact on reducing emissions, including climate finance, energy, transport, industry, agriculture, cities, forests, and building resilience.

Parties to the U.N. Framework Convention on Climate Change (UNFCCC) reached a landmark agreement on December 12, 2015 in Paris, charting a fundamentally new course in the two-decade-old global climate effort. Culminating a four-year negotiating round, the new treaty ends the strict differentiation between developed and developing countries that characterized earlier efforts, replacing it with a common framework that commits all countries to put forward their best efforts and to strengthen them in the years ahead. This includes, for the first time, requirements that all parties report regularly on their emissions and implementation efforts and undergo international review.

The agreement and a companion decision by parties were the key outcomes of the conference, known as the 21st session of the UNFCCC Conference of the Parties (COP) 21. Together, the Paris Agreement and the accompanying COP decision:

- Reaffirm the goal of limiting global temperature increase well below 2°C, while urging efforts to limit the increase to 1.5 degrees;

- Establish binding commitments by all parties to make "nationally determined contributions" (NDCs), and to pursue domestic measures aimed at achieving them;
- Commit all countries to report regularly on their emissions and "progress made in implementing and achieving" their NDCs, and to undergo international review;
- Commit all countries to submit new NDCs every five years, with the clear expectation that they will "represent a progression" beyond previous ones;
- Reaffirm the binding obligations of developed countries under the UNFCCC to support the efforts of developing countries, while for the first time encouraging voluntary contributions by developing countries too;
- Extend the current goal of mobilizing $100 billion a year in support by 2020 through 2025, with a new, higher goal to be set for the period after 2025;
- Extend a mechanism to address "loss and damage" resulting from climate change, which explicitly will not "involve or provide a basis for any liability or compensation;"
- Require parties engaging in international emissions trading to avoid "double counting;" and
- Call for a new mechanism, similar to the Clean Development Mechanism under the Kyoto Protocol, enabling emission reductions in one country to be counted toward another country's NDC (C2ES 2015a) (29).

On November 4, 2019, the Trump administration formally notified the U.N. that the U.S. would withdraw from the Paris Agreement. It should be noted that withdrawal would be effective one year after notification in 2020.

2.7.2 NATIONAL

Prior to the last decade, there have been no concrete federal regulations of GHGs or major planning for climate change adaptation. The following are actions regarding the federal government, GHGs, and fuel efficiency.

GHG ENDANGERMENT

In *Massachusetts v. Environmental Protection Agency* (EPA) 549 U.S. 497 (2007), decided on April 2, 2007, the U.S. Supreme Court (Supreme Court) found that four GHGs, including CO_2, are air pollutants subject to regulation under Section 202(a)(1) of the Federal Clean Air Act (CAA). The Court held that the EPA Administrator must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution, which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHGs under section 202(a) of the CAA:

- Endangerment Finding: The Administrator finds that the current and projected concentrations of the six key well-mixed GHGs— CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6—in the atmosphere threaten the public health and welfare of current and future generations.
- Cause or Contribute Finding: The Administrator finds that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution, which threatens public health and welfare.

These findings do not impose requirements on industry or other entities. However, this was a prerequisite for implementing GHG emissions standards for vehicles, as discussed in the section "Clean Vehicles" below. After a lengthy legal challenge, the Supreme Court declined to review an Appeals Court ruling that upheld the EPA Administrator's findings (30).

CLEAN VEHICLES

Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light duty trucks. The law has become more stringent over time. On May 19, 2009, President Obama put in motion a new national policy to increase fuel economy for all new cars and trucks sold in the U.S. On April 1, 2010, the EPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) announced a joint final rule establishing a national program that would reduce GHG emissions and improve fuel economy for new cars and trucks sold in the U.S.

The first phase of the national program applies to passenger cars, light-duty trucks, and medium-duty (MD) passenger vehicles, covering model years 2012 through 2016. They require these vehicles to meet an estimated combined average emissions level of 250 grams of CO_2 per mile, equivalent to 35.5 miles per gallon (mpg) if the automobile industry were to meet this CO_2 level solely through fuel economy improvements. Together, these standards would cut CO_2 emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012–2016). The EPA and the NHTSA issued final rules on a second-phase joint rulemaking establishing national standards for light-duty vehicles for model years 2017 through 2025 in August 2012. The new standards for model years 2017 through 2025 apply to passenger cars, light-duty trucks, and MD passenger vehicles. The final standards are projected to result in an average industry fleetwide level of 163 grams/mile of CO_2 in model year 2025, which is equivalent to 54.5 mpg if achieved exclusively through fuel economy improvements.

The EPA and the U.S. Department of Transportation issued final rules for the first national standards to reduce GHG emissions and improve fuel efficiency of heavy-duty trucks (HDT) and buses on September 15, 2011, effective November 14, 2011. For combination tractors, the agencies are proposing engine and vehicle standards that begin in the 2014 model year and achieve up to a 20% reduction in CO_2 emissions and fuel consumption by the 2018 model year. For HDT and vans, the agencies are proposing separate gasoline and diesel truck standards, which phase in starting in the 2014 model year and achieve up to a 10% reduction for gasoline vehicles and a 15% reduction for diesel vehicles by the 2018 model year (12 and 17% respectively if accounting for air conditioning leakage). Lastly, for vocational vehicles, the engine and vehicle standards would achieve up to a 10% reduction in fuel consumption and CO_2 emissions from the 2014 to 2018 model years.

On August 2,2018, the NHTSA in conjunction with the EPA, released a notice of proposed rulemaking, the *Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks* (SAFE Vehicles Rule). The SAFE Vehicles Rule was proposed to amend exiting CAFE and tailpipe CO_2 standards for passenger cars and light trucks and to establish new standards covering model years 2021 through 2026. As of March 31, 2020, the

NHTSA and EPA finalized the SAFE Vehicle Rule which increased stringency of CAFE and CO_2 emissions standards by 1.5% each year through model year 2026 (31).

MANDATORY REPORTING OF GHGS

The Consolidated Appropriations Act of 2008, passed in December 2007, requires the establishment of mandatory GHG reporting requirements. On September 22, 2009, the EPA issued the Final Mandatory Reporting of GHGs Rule, which became effective January 1, 2010. The rule requires reporting of GHG emissions from large sources and suppliers in the U.S. and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons per year (MT/yr) or more of GHG emissions are required to submit annual reports to the EPA.

NEW SOURCE REVIEW

The EPA issued a final rule on May 13, 2010, that establishes thresholds for GHGs that define when permits under the New Source Review Prevention of Significant Deterioration and Title V Operating Permit programs are required for new and existing industrial facilities. This final rule "tailors" the requirements of these CAA permitting programs to limit which facilities will be required to obtain Prevention of Significant Deterioration and Title V permits. In the preamble to the revisions to the Federal Code of Regulations, the EPA states:

> *"This rulemaking is necessary because without it the Prevention of Significant Deterioration and Title V requirements would apply, as of January 2, 2011, at the 100 or 250 tons per year levels provided under the CAA, greatly increasing the number of required permits, imposing undue costs on small sources, overwhelming the resources of permitting authorities, and severely impairing the functioning of the programs. EPA is relieving these resource burdens by phasing in the applicability of these programs to GHG sources, starting with the largest GHG emitters. This rule establishes two initial steps of the phase-in. The rule also commits the agency to take certain actions on future steps addressing smaller sources but excludes certain smaller sources from Prevention of Significant Deterioration and Title V permitting for GHG emissions until at least April 30, 2016."*

The EPA estimates that facilities responsible for nearly 70% of the national GHG emissions from stationary sources will be subject to permitting requirements under this rule. This includes the nation's largest GHG emitters—power plants, refineries, and cement production facilities.

STANDARDS OF PERFORMANCE FOR GHG EMISSIONS FOR NEW STATIONARY SOURCES: ELECTRIC UTILITY GENERATING UNITS

As required by a settlement agreement, the EPA proposed new performance standards for emissions of CO_2 for new, affected, fossil fuel-fired electric utility generating units on March 27, 2012. New sources greater than 25 megawatts (MW) would be required to meet an output-based standard of 1,000 pounds (lbs) of CO_2 per MW-hour (MWh), based on the performance of widely used natural gas combined cycle technology. It should be noted that on February 9, 2016 the Supreme Court issued a stay of this regulation pending litigation. Additionally, the current EPA Administrator has also signed a measure to repeal the Clean Power Plan, including the CO_2 standards. The Clean Power Plan was officially repealed on June 19, 2019, when the EPA issued the final Affordable Clean Energy rule (ACE). Under ACE, new state emission guidelines were established that provided existing coal-fired electric utility generating units with achievable standards.

CAP-AND-TRADE

Cap-and-trade refers to a policy tool where emissions are limited to a certain amount and can be traded or provides flexibility on how the emitter can comply. Successful examples in the U.S. include the Acid Rain Program and the N_2O Budget Trading Program and Clean Air Interstate Rule in the northeast. There is no federal GHG cap-and-trade program currently; however, some states have joined to create initiatives to provide a mechanism for cap-and-trade.

The Regional GHG Initiative is an effort to reduce GHGs among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. Each state caps CO_2 emissions from power plants, auctions CO_2 emission allowances, and invests the proceeds in strategic energy programs that further reduce emissions, save consumers money, create jobs, and build a clean energy economy. The Initiative began in 2008 and in 2020 has retained all participating states.

The Western Climate Initiative (WCI) partner jurisdictions have developed a comprehensive initiative to reduce regional GHG emissions to 15% below 2005 levels by 2020. The partners were originally California, British Columbia, Manitoba, Ontario, and Quebec. However, Manitoba and Ontario are not currently participating. California linked with Quebec's cap-and-trade system January 1, 2014, and joint offset auctions took place in 2015. While the WCI has yet to publish whether it has successfully reached the 2020 emissions goal initiative set in 2007, SB 32, requires that California, a major partner in the WCI, adopt the goal of reducing statewide GHG emissions to 40% below the 1990 level by 2030.

SMARTWAY PROGRAM

The SmartWay Program is a public-private initiative between the EPA, large and small trucking companies, rail carriers, logistics companies, commercial manufacturers, retailers, and other federal and state agencies. Its purpose is to improve fuel efficiency and the environmental performance (reduction of both GHG emissions and air pollution) of the goods movement supply chains. SmartWay is comprised of four components (32):

1. SmartWay Transport Partnership: A partnership in which freight carriers and shippers commit to benchmark operations, track fuel consumption, and improve performance annually.
2. SmartWay Technology Program: A testing, verification, and designation program to help freight companies identify equipment, technologies, and strategies that save fuel and lower emissions.
3. SmartWay Vehicles: A program that ranks light-duty cars and small trucks and identifies superior environmental performers with the SmartWay logo.

4. SmartWay International Interests: Guidance and resources for countries seeking to develop freight sustainability programs modeled after SmartWay.

SmartWay effectively refers to requirements geared towards reducing fuel consumption. Most large trucking fleets driving newer vehicles are compliant with SmartWay design requirements. Moreover, over time, all HDTs will have to comply with CARB GHG Regulation that is designed with the SmartWay Program in mind, to reduce GHG emissions by making them more fuel-efficient. For instance, in 2015, 53 foot or longer dry vans or refrigerated trailers equipped with a combination of SmartWay-verified low-rolling resistance tires and SmartWay-verified aerodynamic devices would obtain a total of 10% or more fuel savings over traditional trailers.

Through the SmartWay Technology Program, the EPA has evaluated the fuel saving benefits of various devices through grants, cooperative agreements, emissions and fuel economy testing, demonstration projects and technical literature review. As a result, the EPA has determined the following types of technologies provide fuel saving and/or emission reducing benefits when used properly in their designed applications, and has verified certain products:

- Idle reduction technologies – less idling of the engine when it is not needed would reduce fuel consumption.
- Aerodynamic technologies minimize drag and improve airflow over the entire tractor-trailer vehicle. Aerodynamic technologies include gap fairings that reduce turbulence between the tractor and trailer, side skirts that minimize wind under the trailer, and rear fairings that reduce turbulence and pressure drop at the rear of the trailer.
- Low rolling resistance tires can roll longer without slowing down, thereby reducing the amount of fuel used. Rolling resistance (or rolling friction or rolling drag) is the force resisting the motion when a tire rolls on a surface. The wheel will eventually slow down because of this resistance.
- Retrofit technologies include things such as diesel particulate filters, emissions upgrades (to a higher tier), etc., which would reduce emissions.
- Federal excise tax exemptions.

2.7.3 CALIFORNIA

2.7.3.1 LEGISLATIVE ACTIONS TO REDUCE GHGS

The State of California legislature has enacted a series of bills that constitute the most aggressive program to reduce GHGs of any state in the nation. Some legislation such as the landmark AB 32 was specifically enacted to address GHG emissions. Other legislation such as Title 24 and Title 20 energy standards were originally adopted for other purposes such as energy and water conservation, but also provide GHG reductions. This section describes the major provisions of the legislation.

EXECUTIVE ORDER S-3-05

Former California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, the following reduction targets for GHG emissions:

- By 2010, reduce GHG emissions to 2000 levels.

- By 2020, reduce GHG emissions to 1990 levels.
- By 2050, reduce GHG emissions to 80% below 1990 levels.

The 2050 reduction goal represents what some scientists believe is necessary to reach levels that will stabilize the climate. The 2020 goal was established to be a mid-term target. Because this is an executive order, the goals are not legally enforceable for local governments or the private sector.

AB 32

The California State Legislature enacted AB 32, which requires that GHGs emitted in California be reduced to 1990 levels by the year 2020. "GHGs" as defined under AB 32 include CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6. Since AB 32 was enacted, a seventh chemical, nitrogen trifluoride, has also been added to the list of GHGs. CARB is the state agency charged with monitoring and regulating sources of GHGs. Pursuant to AB 32, CARB adopted regulations to achieve the maximum technologically feasible and cost-effective GHG emission reductions. AB 32 states the following:

> *"Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems."*

CARB approved the 1990 GHG emissions level of 427 $MMTCO_2e$ on December 6, 2007 (33). Therefore, emissions generated in California in 2020 are required to be equal to or less than 427 $MMTCO_2e$. Emissions in 2020 in a "business as usual" (BAU) scenario were estimated to be 596 $MMTCO_2e$, which do not account for reductions from AB 32 regulations (34). At that level, a 28.4% reduction was required to achieve the 427 $MMTCO_2e$ 1990 inventory. In October 2010, CARB prepared an updated 2020 forecast to account for the recession and slower forecasted growth. The forecasted inventory without the benefits of adopted regulation is now estimated at 545 $MMTCO_2e$. Therefore, under the updated forecast, a 21.7% reduction from BAU is required to achieve 1990 levels (35) .

PROGRESS IN ACHIEVING AB 32 TARGETS AND REMAINING REDUCTIONS REQUIRED

The State has made steady progress in implementing AB 32 and achieving targets included in Executive Order S-3-05. The progress is shown in updated emission inventories prepared by CARB for 2000 through 2012 (36). The State has achieved the Executive Order S-3-05 target for 2010 of reducing GHG emissions to 2000 levels. As shown below, the 2010 emission inventory achieved this target.

- 1990: 427 $MMTCO_2e$ (AB 32 2020 target)
- 2000: 463 $MMTCO_2e$ (an average 8% reduction needed to achieve 1990 base)
- 2010: 450 $MMTCO_2e$ (an average 5% reduction needed to achieve 1990 base)

CARB has also made substantial progress in achieving its goal of achieving 1990 emissions levels by 2020. As described earlier in this section, CARB revised the 2020 BAU inventory forecast to account for new lower growth projections, which resulted in a new lower reduction from BAU to achieve the 1990 base. The previous reduction from 2020 BAU needed to achieve 1990 levels was 28.4% and the latest reduction from 2020 BAU is 21.7%.

- 2020: 545 $MMTCO_2e$ BAU (an average 21.7% reduction from BAU needed to achieve 1990 base)

SB 375 – THE SUSTAINABLE COMMUNITIES AND CLIMATE PROTECTION ACT OF 2008

Passing the Senate on August 30, 2008, Senate Bill (SB) 375 was signed by the Governor on September 30, 2008. According to SB 375, the transportation sector is the largest contributor of GHG emissions, which emits over 40% of the total GHG emissions in California. SB 375 states, "Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32." SB 375 does the following: it (1) requires metropolitan planning organizations to include sustainable community strategies in their regional transportation plans for reducing GHG emissions, (2) aligns planning for transportation and housing, and (3) creates specified incentives for the implementation of the strategies.

SB 375 also requires Metropolitan Planning Organizations (MPOs) to prepare a Sustainable Communities Strategy (SCS) within the Regional Transportation Plan (RTP) that guides growth while taking into account the transportation, housing, environmental, and economic needs of the region. SB 375 uses CEQA streamlining as an incentive to encourage residential projects, which help achieve AB 32 goals to reduce GHG emissions. Although SB 375 does not prevent CARB from adopting additional regulations, such actions are not anticipated in the foreseeable future.

Concerning CEQA, SB 375, as codified in Public Resources Code Section 21159.28, states that CEQA findings for certain projects are not required to reference, describe, or discuss (1) growth inducing impacts, or (2) any project-specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network, if the project:

1. Is in an area with an approved sustainable communities strategy or an alternative planning strategy that CARB accepts as achieving the GHG emission reduction targets.
2. Is consistent with that strategy (in designation, density, building intensity, and applicable policies).
3. Incorporates the mitigation measures required by an applicable prior environmental document.

AB 1493

California AB 1493, enacted on July 22, 2002, required CARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light duty trucks. Implementation of the regulation was delayed by lawsuits filed by automakers and by the EPA's denial of an implementation waiver. The EPA subsequently granted the requested waiver in 2009, which was upheld by the U.S. District Court for the District of Columbia in 2011.

The standards phase in during the 2009 through 2016 model years. When fully phased in, the near-term (2009–2012) standards will result in about a 22% reduction compared with the 2002 fleet, and the mid-term (2013–2016) standards will result in about a 30% reduction. Several technologies stand out as providing significant reductions in emissions at favorable costs. These include discrete variable valve lift or camless valve actuation to optimize valve operation rather than relying on fixed valve timing and lift as has historically been done; turbocharging to boost power and allow for engine downsizing; improved multi-speed transmissions; and improved air conditioning systems that operate optimally, leak less, and/or use an alternative refrigerant.

The second phase of the implementation for the Pavley bill was incorporated into Amendments to the Low-Emission Vehicle Program (LEV III) or the Advanced Clean Cars program. The Advanced Clean Car program combines the control of smog-causing pollutants and GHG emissions into a single coordinated package of requirements for model years 2017 through 2025. The regulation will reduce GHGs from new cars by 34% from 2016 levels by 2025. The new rules will clean up gasoline and diesel-powered cars, and deliver increasing numbers of zero-emission technologies, such as full battery electric cars, newly emerging plug-in hybrid electric vehicles and hydrogen fuel cell cars. The package will also ensure adequate fueling infrastructure is available for the increasing numbers of hydrogen fuel cell vehicles planned for deployment in California.

SB 350— Clean Energy and Pollution Reduction Act of 2015

In October 2015, the legislature approved, and the Governor signed SB 350, which reaffirms California's commitment to reducing its GHG emissions and addressing climate change. Key provisions include an increase in the RPS, higher energy efficiency requirements for buildings, initial strategies towards a regional electricity grid, and improved infrastructure for electric vehicle charging stations. Provisions for a 50% reduction in the use of petroleum statewide were removed from the Bill because of opposition and concern that it would prevent the Bill's passage. Specifically, SB 350 requires the following to reduce statewide GHG emissions:

- Increase the amount of electricity procured from renewable energy sources from 33% to 50% by 2030, with interim targets of 40% by 2024, and 25% by 2027.
- Double the energy efficiency in existing buildings by 2030. This target will be achieved through the California Public Utility Commission (CPUC), the California Energy Commission (CEC), and local publicly owned utilities.
- Reorganize the Independent System Operator to develop more regional electrify transmission markets and to improve accessibility in these markets, which will facilitate the growth of renewable energy markets in the western United States.

SB 32

On September 8, 2016, Governor Jerry Brown signed the Senate Bill (SB) 32 and its companion bill, AB 197. SB 32 requires the state to reduce statewide GHG emissions to 40% below 1990 levels by 2030, a reduction target that was first introduced in Executive Order B-30-15. The new legislation builds upon the AB 32 goal of 1990 levels by 2020 and provides an intermediate goal to achieving S-3-05, which sets a statewide GHG reduction target of 80% below 1990 levels by 2050. AB 197 creates a legislative committee to oversee regulators to ensure that CARB not only responds to the Governor, but also the Legislature (11).

CARB SCOPING PLAN

CARB's Climate Change Scoping Plan (Scoping Plan) contains measures designed to reduce the State's emissions to 1990 levels by the year 2020 to comply with AB 32 (34). The Scoping Plan identifies recommended measures for multiple GHG emission sectors and the associated emission reductions needed to achieve the year 2020 emissions target—each sector has a different emission reduction target. Most of the measures target the transportation and electricity sectors. As stated in the Scoping Plan, the key elements of the strategy for achieving the 2020 GHG target include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a statewide renewables energy mix of 33%;
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
- Establishing targets for transportation related GHG emissions for regions throughout California and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to existing State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard (LCFS); and
- Creating targeted fees, including a public goods charge on water use, fees on high GWP gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation.

CARB approved the First Scoping Plan Update on May 22, 2014. The First Scoping Plan Update identifies the next steps for California's climate change strategy. The First Scoping Plan Update shows how California continues on its path to meet the near-term 2020 GHG limit, but also sets a path toward long-term, deep GHG emission reductions. The report establishes a broad framework for continued emission reductions beyond 2020, on the path to 80% below 1990 levels by 2050. The First Scoping Plan Update identifies progress made to meet the near-term objectives of AB 32 and defines California's climate change priorities and activities for the next several years. The First Scoping Plan Update does not set new targets for the State but describes a path that would achieve the long term 2050 goal of Executive Order S-3-05 for emissions to decline to 80% below 1990 levels by 2050 (36).

Forecasting the amount of emissions that would occur in 2020 if no actions are taken was necessary to assess the amount of reductions California must achieve to return to the 1990 emissions level by 2020 as required by AB 32. The no-action scenario is known as "business-as-usual" or BAU. CARB originally defined the BAU scenario as emissions in the absence of any GHG emission reduction measures discussed in the Scoping Plan.

As part of CEQA compliance for the Scoping Plan, CARB prepared a Supplemental Functional Equivalent Document (FED) in 2011. The FED included an updated 2020 BAU emissions inventory projection based on current economic forecasts (i.e., as influenced by the economic downturn) and emission reduction measures already in place, replacing its prior 2020 BAU emissions inventory. CARB staff derived the updated emissions estimates by projecting emissions growth, by sector, from the state's average emissions from 2006–2008. The new BAU estimate includes emission reductions for the million-solar-roofs program, the AB 1493 motor vehicle GHG emission standards, and the LCFS. In addition, CARB factored into the 2020 BAU inventory emissions reductions associated with 33% RPS for electricity generation. The updated BAU estimate of 507 $MMTCO_2e$ by 2020 requires a reduction of 80 $MMTCO_2e$, or a 16% reduction below the estimated BAU levels to return to 1990 levels (i.e., 427 $MMTCO_2e$) by 2020.

In order to provide a BAU reduction that is consistent with the original definition in the Scoping Plan and with threshold definitions used in thresholds adopted by lead agencies for CEQA purposes and many CAPs, the updated inventory without regulations was also included in the Supplemental FED. CARB 2020 BAU projection for GHG emissions in California was originally estimated to be 596 $MMTCO_2e$. The updated CARB 2020 BAU projection in the Supplemental FED is 545 $MMTCO_2e$. Considering the updated BAU estimate of 545 $MMTCO_2e$ by 2020, CARB estimates a 21.7% reduction below the estimated statewide BAU levels is necessary to return to 1990 emission levels (i.e., 427 $MMTCO_2e$) by 2020, instead of the approximate 28.4% BAU reduction previously reported under the original Climate Change Scoping Plan (34).

2017 Climate Change Scoping Plan Update

In compliance with AB 32 and the 2008 Scoping Plan, the target year 2020 has been fulfilled and will look onward to the *2017 Scoping Plan* that should be in compliance by 2030.

In November 2017, CARB released the *2017 Scoping Plan* Update, which identifies the State's post-2020 reduction strategy. The *2017 Scoping Plan* Update reflects the 2030 target of a 40% reduction below 1990 levels, set by Executive Order B-30-15 and codified by SB 32. Key programs that the proposed Second Update builds upon include the Cap-and-Trade Regulation, the LCFS, and much cleaner cars, trucks and freight movement, utilizing cleaner, renewable energy, and strategies to reduce CH_4 emissions from agricultural and other wastes.

The *2017 Scoping Plan* Update establishes a new emissions limit of 260 $MMTCO_2e$ for the year 2030, which corresponds to a 40% decrease in 1990 levels by 2030.

California's climate strategy will require contributions from all sectors of the economy, including the land base, and will include enhanced focus on zero- and near-zero-emission (ZE/NZE) vehicle technologies; continued investment in renewables, including solar roofs, wind, and other distributed generation; greater use of low carbon fuels; integrated land conservation and development strategies; coordinated efforts to reduce emissions of short-lived climate pollutants (CH_4, black carbon, and fluorinated gases); and an increased focus on integrated land use planning to support livable, transit-connected communities and conservation of agricultural and other lands. Requirements for direct GHG reductions at refineries will further support air quality co-benefits in neighborhoods, including in disadvantaged communities historically located adjacent to these large stationary sources, as well as efforts with California's local air pollution control and air quality management districts (air districts) to tighten emission limits on a broad spectrum of industrial sources. Major elements of the *2017 Scoping Plan* framework include:

- Implementing and/or increasing the standards of the Mobile Source Strategy, which include increasing ZEV buses and trucks.
- LCFS, with an increased stringency (18% by 2030).
- Implementing SB 350, which expands the RPS to 50% RPS and doubles energy efficiency savings by 2030.
- California Sustainable Freight Action Plan, which improves freight system efficiency, utilizes near-zero emissions technology, and deployment of zero-emission vehicles (ZEV) trucks.
- Implementing the proposed Short-Lived Climate Pollutant Strategy (SLPS), which focuses on reducing CH_4 and hydroflurocarbon emissions by 40% and anthropogenic black carbon emissions by 50% by year 2030.
- Continued implementation of SB 375.
- Post-2020 Cap-and-Trade Program that includes declining caps.
- 20% reduction in GHG emissions from refineries by 2030.
- Development of a Natural and Working Lands Action Plan to secure California's land base as a net carbon sink.

Note, however, that the *2017 Scoping Plan* acknowledges that:

> *"[a]chieving net zero increases in GHG emissions, resulting in no contribution to GHG impacts, may not be feasible or appropriate for every project, however, and the inability of a project to mitigate its GHG emissions to net zero does not imply the project results in a substantial contribution to the cumulatively significant environmental impact of climate change under CEQA."*

In addition to the statewide strategies listed above, the *2017 Scoping Plan* Update also identifies local governments as essential partners in achieving the State's long-term GHG reduction goals and identifies local actions to reduce GHG emissions. As part of the recommended actions, CARB recommends that local governments achieve a community-wide goal to achieve emissions of no more than 6 metric tons of CO_2e ($MTCO_2e$) or less per capita by 2030 and 2 $MTCO_2e$ or less per capita by 2050. For CEQA projects, CARB states that lead agencies may develop evidenced-based bright-line numeric thresholds—consistent with the Scoping Plan and the State's long-term GHG goals—and projects with emissions over that amount may be required to incorporate on-site design features and mitigation measures that avoid or minimize project emissions to the degree feasible; or, a performance-based metric using a CAP or other plan to reduce GHG emissions is appropriate.

According to research conducted by the Lawrence Berkeley National Laboratory (LBNL) and supported by CARB, California, under its existing and proposed GHG reduction policies, is on track to meet the 2020 reduction targets under AB 32 and could achieve the 2030 goals under SB 32. The research utilized a new, validated model known as the California LBNL GHG Analysis of Policies Spreadsheet (CALGAPS), which simulates GHG and criteria pollutant emissions in California from 2010 to 2050 in accordance to existing and future GHG-reducing policies. The CALGAPS model showed that GHG emissions through 2020 could range from 317 to 415 $MTCO_2e$ per year ($MTCO_2e$/yr), "indicating that existing state policies will likely allow California to meet its target [of 2020 levels under AB 32].” CALGAPS also showed that by 2030, emissions could range from 211 to 428 $MTCO_2e$/yr, indicating that “even if all modeled policies are not implemented, reductions could be sufficient to reduce emissions 40% below the 1990 level [of SB 32].” CALGAPS analyzed emissions through 2050 even though it did not generally account for policies that might be put in place after 2030. Although the research indicated that the emissions would not meet the State’s 80% reduction goal by 2050, various combinations of policies could allow California’s cumulative emissions to remain very low through 2050 (37) (38).

CAP-AND-TRADE PROGRAM

The Scoping Plan identifies a Cap-and-Trade Program as one of the key strategies for California to reduce GHG emissions. According to CARB, a cap-and-trade program will help put California on the path to meet its goal of reducing GHG emissions to 1990 levels by the year 2020 and ultimately achieving an 80% reduction from 1990 levels by 2050. Under cap-and-trade, an overall limit on GHG emissions from capped sectors is established, and facilities subject to the cap will be able to trade permits to emit GHGs within the overall limit.

CARB adopted a California Cap-and-Trade Program pursuant to its authority under AB 32. See Title 17 of the CCR §§ 95800 to 96023). The Cap-and-Trade Program is designed to reduce GHG emissions from major sources (deemed “covered entities”) by setting a firm cap on statewide GHG emissions and employing market mechanisms to achieve AB 32’s emission-reduction mandate of returning to 1990 levels of emissions by 2020. The statewide cap for GHG emissions from the capped sectors (e.g., electricity generation, petroleum refining, and cement production) commenced in 2013 and will decline over time, achieving GHG emission reductions throughout the program’s duration.

Covered entities that emit more than 25.000 $MTCO_2e$/yr must comply with the Cap-and-Trade Program. Triggering of the 25.000 $MTCO_2e$/yr “inclusion threshold” is measured against a subset of emissions reported and verified under the California Regulation for the Mandatory Reporting of GHG Emissions (Mandatory Reporting Rule or “MRR”).

Under the Cap-and-Trade Program, CARB issues allowances equal to the total amount of allowable emissions over a given compliance period and distributes these to regulated entities. Covered entities are allocated free allowances in whole or part (if eligible), and may buy allowances at auction, purchase allowances from others, or purchase offset credits. Each covered entity with a compliance obligation is required to surrender “compliance instruments” (30) for each $MTCO_2e$ of GHG they emit. There also are requirements to surrender compliance instruments covering 30% of the prior year’s compliance obligation by November of each year. For example, in November 2014, a covered entity was required to submit compliance instruments to cover 30% of its 2013 GHG emissions.

The Cap-and-Trade Program provides a firm cap, ensuring that the 2020 statewide emission limit will not be exceeded. An inherent feature of the Cap-and-Trade program is that it does not guarantee GHG emissions reductions in any discrete location or by any particular source. Rather, GHG emissions reductions are only guaranteed on an accumulative basis. As summarized by CARB in the First Update:

> *"The Cap-and-Trade Regulation gives companies the flexibility to trade allowances with others or take steps to cost-effectively reduce emissions at their own facilities. Companies that emit more have to turn in more allowances or other compliance instruments. Companies that can cut their GHG emissions have to turn in fewer allowances. But as the cap declines, aggregate emissions must be reduced. In other words, a covered entity theoretically could increase its GHG emissions every year and still comply with the Cap-and-Trade Program if there is a reduction in GHG emissions from other covered entities. Such a focus on aggregate GHG emissions is considered appropriate because climate change is a global phenomenon, and the effects of GHG emissions are considered cumulative (CARB 2014)."*

The Cap-and-Trade Program works with other direct regulatory measures and provides an economic incentive to reduce emissions. If California's direct regulatory measures reduce GHG emissions more than expected, then the Cap-and-Trade Program will be responsible for relatively fewer emissions reductions. If California's direct regulatory measures reduce GHG emissions less than expected, then the Cap-and-Trade Program will be responsible for relatively more emissions reductions. Thus, the Cap-and-Trade Program assures that California will meet its 2020 GHG emissions reduction mandate:

> *"The Cap-and-Trade Program establishes an overall limit on GHG emissions from most of the California economy—the "capped sectors." Within the capped sectors, some of the reductions are being accomplished through direct regulations, such as improved building and appliance efficiency standards, the [Low Carbon Fuel Standard] LCFS, and the 33% [Renewables Portfolio Standard] RPS. Whatever additional reductions are needed to bring emissions within the cap is accomplished through price incentives posed by emissions allowance prices. Together, direct regulation and price incentives assure that emissions are brought down cost-effectively to the level of the overall cap. The Cap-and-Trade Regulation provides assurance that California's 2020 limit will be met because the regulation sets a firm limit on 85% of California's GHG emissions. In sum, the Cap-and-Trade Program will achieve aggregate, rather than site specific or project-level, GHG emissions reductions. Also, due to the regulatory architecture adopted by CARB in AB 32, the reductions attributed to the Cap-and-Trade Program can change over time depending on the State's emissions forecasts and the effectiveness of direct regulatory measures* (36).*"*

As of January 1, 2015, the Cap-and-Trade Program covered approximately 85% of California's GHG emissions. The Cap-and-Trade Program covers the GHG emissions associated with electricity consumed in California, whether generated in-state or imported. Accordingly, GHG emissions associated with CEQA projects' electricity usage are covered by the Cap-and-Trade Program.

The Cap-and-Trade Program also covers fuel suppliers (natural gas and propane fuel providers and transportation fuel providers) to address emissions from such fuels and from combustion of other fossil fuels not directly covered at large sources in the Program's first compliance period. While the Cap-and-Trade Program technically covered fuel suppliers as early as 2012, they did not have a compliance obligation (i.e., they were not fully regulated) until 2015. The Cap-and-Trade Program covers the GHG emissions associated with the combustion of transportation fuels in California, whether refined in-state or imported. The point of regulation for transportation fuels is when they are "supplied" (i.e., delivered into commerce). Accordingly, as with stationary source GHG emissions and GHG emissions attributable to electricity use, virtually all, if not all, of GHG emissions from CEQA projects associated with VMT are covered by the Cap-and-Trade Program (39). In addition, the Scoping Plan differentiates between "capped" and "uncapped" strategies. "Capped" strategies are subject to the proposed cap-and-trade program. The Scoping Plan states that the inclusion of these emissions within the Program will help ensure that the year 2020 emission targets are met despite some degree of uncertainty in the emission reduction estimates for any individual measure. Implementation of the capped strategies is calculated to achieve a sufficient amount of reductions by 2020 to achieve the emission target contained in AB 32. "Uncapped" strategies that will not be subject to the cap-and-trade emissions caps and requirements are provided as a margin of safety by accounting for additional GHG emission reductions.[3]

2.7.3.2 EXECUTIVE ORDERS RELATED TO GHG EMISSIONS

California's Executive Branch has taken several actions to reduce GHGs through the use of Executive Orders. Although not regulatory, they set the tone for the state and guide the actions of state agencies.

EXECUTIVE ORDER S-13-08

Executive Order S-13-08 states that "climate change in California during the next century is expected to shift precipitation patterns, accelerate sea level rise and increase temperatures, thereby posing a serious threat to California's economy, to the health and welfare of its population and to its natural resources." Pursuant to the requirements in the Order, the 2009 California Climate Adaptation Strategy (CNRA 2009) was adopted, which is the "…first statewide, multi-sector, region-specific, and information-based climate change adaptation strategy in the United States." Objectives include analyzing risks of climate change in California, identifying and exploring strategies to adapt to climate change, and specifying a direction for future research.

EXECUTIVE ORDER B-30-15

On April 29, 2015, Governor Edmund G. Brown Jr. issued an executive order to establish a California GHG reduction target of 40% below 1990 levels by 2030. The Governor's executive order aligns California's GHG reduction targets with those of leading international governments ahead of the United Nations Climate Change Conference in Paris late 2015. The Order sets a new interim statewide GHG emission reduction target to reduce GHG emissions to 40% below 1990

[3] On March 17, 2011, the San Francisco Superior Court issued a final decision in *Association of Irritated Residents v. California Air Resources Board* (Case No. CPF-09-509562). While the Court upheld the validity of CARB Scoping Plan for the implementation of AB 32, the Court enjoined CARB from further rulemaking under AB 32 until CARB amends its CEQA environmental review of the Scoping Plan to address the flaws identified by the Court. On May 23, 2011, CARB filed an appeal. On June 24, 2011, the Court of Appeal granted CARB's petition staying the trail court's order pending consideration of the appeal. In the interest of informed decision-making, on June 13, 2011, CARB released the expanded alternatives analysis in a draft Supplement to the AB 32 Scoping Plan Functional Equivalent Document. CARB Board approved the Scoping Plan and the CEQA document on August 24, 2011.

levels by 2030 in order to ensure California meets its target of reducing GHG emissions to 80% below 1990 levels by 2050 and directs CARB to update the Climate Change Scoping Plan to express the 2030 target in terms of $MMTCO_2e$. The Order also requires the state's climate adaptation plan to be updated every three years, and for the State to continue its climate change research program, among other provisions. As with Executive Order S-3-05, this Order is not legally enforceable for local governments and the private sector. Legislation that would update AB 32 to make post 2020 targets and requirements a mandate is in process in the State Legislature.

EXECUTIVE ORDER S-01-07 – LCFS

The Governor signed Executive Order S-01-07 on January 18, 2007. The order mandates that a statewide goal shall be established to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020. In particular, the Executive Order established a LCFS and directed the Secretary for Environmental Protection to coordinate the actions of the CEC, CARB, the University of California, and other agencies to develop and propose protocols for measuring the "life-cycle carbon intensity" of transportation fuels. This analysis supporting development of the protocols was included in the State Implementation Plan for alternative fuels (State Alternative Fuels Plan adopted by CEC on December 24, 2007) and was submitted to CARB for consideration as an "early action" item under AB 32. CARB adopted the LCFS on April 23, 2009.

The LCFS was challenged in the U.S. District Court in Fresno in 2011. The court's ruling issued on December 29, 2011, included a preliminary injunction against CARB's implementation of the rule. The Ninth Circuit Court of Appeals stayed the injunction on April 23, 2012, pending final ruling on appeal, allowing CARB to continue to implement and enforce the regulation. The Ninth Circuit Court's decision, filed September 18, 2013, vacated the preliminary injunction. In essence, the court held that LCFS adopted by CARB were not in conflict with federal law. On August 8, 2013, the Fifth District Court of Appeal (California) ruled CARB failed to comply with CEQA and the Administrative Procedure Act (APA) when adopting regulations for LCFS. In a partially published opinion, the Court of Appeal reversed the trial court's judgment and directed issuance of a writ of mandate setting aside Resolution 09-31 and two executive orders of CARB approving LCFS regulations promulgated to reduce GHG emissions. However, the court tailored its remedy to protect the public interest by allowing the LCFS regulations to remain operative while CARB complies with the procedural requirements it failed to satisfy.

To address the Court ruling, CARB was required to bring a new LCFS regulation to the Board for consideration in February 2015. The proposed LCFS regulation was required to contain revisions to the 2010 LCFS as well as new provisions designed to foster investments in the production of the low-carbon intensity fuels, offer additional flexibility to regulated parties, update critical technical information, simplify and streamline program operations, and enhance enforcement. On November 16, 2015 the Office of Administrative Law (OAL) approved the Final Rulemaking Package. The new LCFS regulation became effective on January 1, 2016.

EXECUTIVE ORDER B-55-18 AND SB 100

Executive Order B-55-18 and SB 100. SB 100 and Executive Order B-55-18 were signed by Governor Brown on September 10, 2018. Under the existing RPS, 25% of retail sales are required to be from renewable sources by December 31, 2016, 33% by December 31, 2020, 40% by December 31, 2024, 45% by December 31, 2027, and 50% by December 31, 2030. SB 100 raises California's RPS requirement to 50% renewable resources target by December 31, 2026, and to achieve a 60% target by December 31, 2030. SB 100 also requires that retail sellers and local publicly owned electric utilities procure a minimum quantity of electricity products from eligible renewable energy resources so that the total kilowatt hours of those products sold to their retail end-use customers achieve 44% of retail sales by December 31, 2024, 52% by December 31, 2027, and 60% by December 31, 2030. In addition to targets under AB 32 and SB 32, Executive Order B-55-18 establishes a carbon neutrality goal for the state of California by 2045; and sets a goal to maintain net negative emissions thereafter. The Executive Order directs the California Natural Resources Agency (CNRA), California Environmental Protection Agency (CalEPA), the Department of Food and Agriculture (CDFA), and CARB to include sequestration targets in the Natural and Working Lands Climate Change Implementation Plan consistent with the carbon neutrality goal.

2.7.3.3 CALIFORNIA REGULATIONS AND BUILDING CODES

California has a long history of adopting regulations to improve energy efficiency in new and remodeled buildings. These regulations have kept California's energy consumption relatively flat even with rapid population growth.

TITLE 20 CCR

CCR, Title 20: Division 2, Chapter 4, Article 4, Sections 1601-1608: Appliance Efficiency Regulations regulates the sale of appliances in California. The Appliance Efficiency Regulations include standards for both federally regulated appliances and non-federally regulated appliances. 23 categories of appliances are included in the scope of these regulations. The standards within these regulations apply to appliances that are sold or offered for sale in California, except those sold wholesale in California for final retail sale outside the state and those designed and sold exclusively for use in recreational vehicles or other mobile equipment (CEC 2012).

TITLE 24 CCR

California Code of Regulations (CCR) Title 24 Part 6: The California Energy Code was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption.

The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. CCR, Title 24, Part 11: California Green Building Standards Code (CALGreen) is a comprehensive and uniform regulatory code for all residential, commercial, and school buildings that went in effect on January 1, 2009, and is administered by the California Building Standards Commission.

CALGreen is updated on a regular basis, with the most recent approved update consisting of the 2019 California Green Building Code Standards that became effective January 1, 2020.

Local jurisdictions are permitted to adopt more stringent requirements, as state law provides methods for local enhancements. CALGreen recognizes that many jurisdictions have developed existing construction waste and demolition ordinances and defers to them as the ruling guidance provided they establish a minimum 65% diversion requirement.

The code also provides exemptions for areas not served by construction waste and demolition recycling infrastructure. The State Building Code provides the minimum standard that buildings must meet in order to be certified for occupancy, which is generally enforced by the local building official.

Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases greenhouse gas (GHG) emissions. The 2019 version of Title 24 was adopted by the California Energy Commission (CEC) and became effective on January 1, 2020.

The 2019 Title 24 standards will result in less energy use, thereby reducing air pollutant emissions associated with energy consumption in the SCAB and across the State of California. For example, the 2019 Title 24 standards will require solar photovoltaic systems for new homes, establish requirements for newly constructed healthcare facilities, encourage demand responsive technologies for residential buildings, and update indoor and outdoor lighting requirements for nonresidential buildings.

The CEC anticipates that single-family homes built with the 2019 standards will use approximately 7% less energy compared to the residential homes built under the 2016 standards. Additionally, after implementation of solar photovoltaic systems, homes built under the 2019 standards will use about 53% less energy than homes built under the 2016 standards. Nonresidential buildings (such as the Project) will use approximately 30% less energy due to lighting upgrade requirements (19).

Because the Project will be constructed after January 1, 2019, the 2019 CALGreen standards are applicable to the Project and require, among other items (20):

- Short-term bicycle parking. If the new project or an additional alteration is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5% of new visitor motorized vehicle parking spaces being added, with a minimum of one two-bike capacity rack (5.106.4.1.1).
- Long-term bicycle parking. For new buildings with tenant spaces that have 10 or more tenant-occupants, provide secure bicycle parking for 5% of the tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility (5.106.4.1.2).
- Designated parking for clean air vehicles. In new projects or additions to alterations that add 10 or more vehicular parking spaces, provide designated parking for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as shown in Table 5.106.5.2 (5.106.5.2).
- Electric vehicle charging stations. New construction shall facilitate the future installation of electric vehicle supply equipment. The compliance requires empty raceways for future conduit and documentation that the electrical system has adequate capacity for the future load. The number of spaces to be provided for is contained in Table 5.106. 5.3.3 (5.106.5.3).

- Outdoor light pollution reduction. Outdoor lighting systems shall be designed to meet the backlight, uplight and glare ratings per Table 5.106.8 (5.106.8)
- Construction waste management. Recycle and/or salvage for reuse a minimum of 65% of the nonhazardous construction and demolition waste in accordance with Section 5.408.1.1. 5.405.1.2, or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent (5.408.1).
- Excavated soil and land clearing debris. 100% of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed (5.408.3).
- Recycling by Occupants. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals or meet a lawfully enacted local recycling ordinance, if more restrictive (5.410.1).
- Water conserving plumbing fixtures and fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:
  - Water Closets. The effective flush volume of all water closets shall not exceed 1.28 gallons per flush (5.303.3.1)
  - Urinals. The effective flush volume of wall-mounted urinals shall not exceed 0.125 gallons per flush (5.303.3.2.1). The effective flush volume of floor-mounted or other urinals shall not exceed 0.5 gallons per flush (5.303.3.2.2).
  - Showerheads. Single showerheads shall have a minimum flow rate of not more than 1.8 gallons per minute and 80 psi (5.303.3.3.1). When a shower is served by more than one showerhead, the combine flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 1.8 gallons per minute at 80 psi (5.303.3.3.2).
  - Faucets and fountains. Nonresidential lavatory faucets shall have a maximum flow rate of not more than 0.5 gallons per minute at 60 psi (5.303.3.4.1). Kitchen faucets shall have a maximum flow rate of not more than 1.8 gallons per minute of 60 psi (5.303.3.4.2). Wash fountains shall have a maximum flow rate of not more than 1.8 gallons per minute (5.303.3.4.3). Metering faucets shall not deliver more than 0.20 gallons per cycle (5.303.3.4.4). Metering faucets for wash fountains shall have a maximum flow rate not more than 0.20 gallons per cycle (5.303.3.4.5).
- Outdoor portable water use in landscaped areas. Nonresidential developments shall comply with a local water efficient landscape ordinance or the current California Department of Water Resources' Model Water Efficient (MWELO), whichever is more stringent (5.304.1).
- Water meters. Separate submeters or metering devices shall be installed for new buildings or additions in excess of 50,000 sf or for excess consumption where any tenant within a new building or within an addition that is project to consume more than 1,000 gallons per day (5.303.1.1 and 5.303.1.2).
- Outdoor water use in rehabilitated landscape projects equal or greater than 2,500 sf. Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 2,500 sf requiring a building or landscape permit (5.304.3).

- Commissioning. For new buildings 10,000 sf and over, building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the owner's or owner representative's project requirements (5.410.2).

MWELO

The MWELO was required by AB 1881, the Water Conservation Act. The bill required local agencies to adopt a local landscape ordinance at least as effective in conserving water as the Model Ordinance by January 1, 2010. Reductions in water use of 20% consistent with (SBX-7-7) 2020 mandate are expected upon compliance with the ordinance. Governor Brown's Drought Executive Order of April 1, 2015 (Executive Order B-29-15) directed Department of Water Resources (DWR) to update the Ordinance through expedited regulation. The California Water Commission approved the revised Ordinance on July 15, 2015 effective December 15, 2015. New development projects that include landscape areas of 500 sf or more are subject to the Ordinance. The update requires:

- More efficient irrigation systems;
- Incentives for graywater usage;
- Improvements in on-site stormwater capture;
- Limiting the portion of landscapes that can be planted with high water use plants; and
- Reporting requirements for local agencies.

CARB REFRIGERANT MANAGEMENT PROGRAM

CARB adopted a regulation in 2009 to reduce refrigerant GHG emissions from stationary sources through refrigerant leak detection and monitoring, leak repair, system retirement and retrofitting, reporting and recordkeeping, and proper refrigerant cylinder use, sale, and disposal. The regulation is set forth in sections 95380 to 95398 of Title 17, CCR. The rules implementing the regulation establish a limit on statewide GHG emissions from stationary facilities with refrigeration systems with more than 50 pounds of a high GWP refrigerant. The refrigerant management program is designed to (1) reduce emissions of high-GWP GHG refrigerants from leaky stationary, non-residential refrigeration equipment; (2) reduce emissions from the installation and servicing of refrigeration and air-conditioning appliances using high-GWP refrigerants; and (3) verify GHG emission reductions.

TRACTOR-TRAILER GHG REGULATION

The tractors and trailers subject to this regulation must either use EPA SmartWay certified tractors and trailers or retrofit their existing fleet with SmartWay verified technologies. The regulation applies primarily to owners of 53-foot or longer box-type trailers, including both dry-van and refrigerated-van trailers, and owners of the HD tractors that pull them on California highways. These owners are responsible for replacing or retrofitting their affected vehicles with compliant aerodynamic technologies and low rolling resistance tires. Sleeper cab tractors model year 2011 and later must be SmartWay certified. All other tractors must use SmartWay verified low rolling resistance tires. There are also requirements for trailers to have low rolling resistance tires and aerodynamic devices.

PHASE I AND 2 HEAVY-DUTY VEHICLE GHG STANDARDS

CARB has adopted a new regulation for GHG emissions from HDTs and engines sold in California. It establishes GHG emission limits on truck and engine manufacturers and harmonizes with the EPA rule for new trucks and engines nationally. Existing HD vehicle regulations in California include engine criteria emission standards, tractor-trailer GHG requirements to implement SmartWay strategies (i.e., the Heavy-Duty Tractor-Trailer Greenhouse Gas Regulation), and in-use fleet retrofit requirements such as the Truck and Bus Regulation. In September 2011, the EPA adopted their new rule for HDTs and engines. The EPA rule has compliance requirements for new compression and spark ignition engines, as well as trucks from Class 2b through Class 8. Compliance requirements begin with model year 2014 with stringency levels increasing through model year 2018. The rule organizes truck compliance into three groupings, which include a) HD pickups and vans; b) vocational vehicles; and c) combination tractors. The EPA rule does not regulate trailers.

CARB staff has worked jointly with the EPA and the NHTSA on the next phase of federal GHG emission standards for medium-duty trucks (MDT) and HDT vehicles, called federal Phase 2. The federal Phase 2 standards were built on the improvements in engine and vehicle efficiency required by the Phase 1 emission standards and represent a significant opportunity to achieve further GHG reductions for 2018 and later model year HDT vehicles, including trailers. But as discussed above, the EPA and NHTSA have proposed to roll back GHG and fuel economy standards for cars and light-duty trucks, which suggests a similar rollback of Phase 2 standards for MDT and HDT vehicles may be pursued.

In February 2019, the OAL approved the Phase 2 Heavy-Duty Vehicle GHG Standards and became effective April 1, 2019. The Phase 2 GHG standards are needed to offset projected VMT growth and keep heavy-duty truck CO_2 emissions declining. The federal Phase 2 standards establish for the first time, federal emissions requirements for trailers hauled by heavy-duty tractors. The federal Phase 2 standards are more technology-forcing than the federal Phase 1 standards, requiring manufacturers to improve existing technologies or develop new technologies to meet the standards. The federal Phase 2 standards for tractors, vocational vehicles, and heavy-duty pick-up trucks and vans (PUVs) will be phased-in from 2021-2027, additionally for trailers, the standards are phased-in from 2018 (2020 in California) through 2027 (40).

SB 97 AND THE CEQA GUIDELINES UPDATE

Passed in August 2007, SB 97 added Section 21083.05 to the Public Resources Code. The code states "(a) On or before July 1, 2009, the Office of Planning and Research (OPR) shall prepare, develop, and transmit to the Resources Agency guidelines for the mitigation of GHG emissions or the effects of GHG emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption. (b) On or before January 1, 2010, the Resources Agency shall certify and adopt guidelines prepared and developed by the OPR pursuant to subdivision (a)." Section 21097 was also added to the Public Resources Code. It provided CEQA protection until January 1, 2010 for transportation projects funded by the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 or projects funded by the Disaster Preparedness and Flood Prevention Bond Act of 2006, in stating that the failure to analyze adequately the effects of GHGs would not violate CEQA.

On December 28, 2018, the Natural Resources Agency announced the OAL approved the amendments to the CEQA Guidelines for implementing the CEQA. The CEQA Amendments provide guidance to public agencies regarding the analysis and mitigation of the effects of GHG emissions in CEQA documents. The CEQA Amendments fit within the existing CEQA framework by amending existing CEQA Guidelines to reference climate change.

Section 1506.4 was amended to state that in determining the significance of a project's GHG emissions, the lead agency should focus its analysis on the reasonably foreseeable incremental contribution of the project's emissions to the effects of climate change. A project's incremental contribution may be cumulatively considerable even if it appears relatively small compared to statewide, national or global emissions. The agency's analysis should consider a timeframe that is appropriate for the project. The agency's analysis also must reasonably reflect evolving scientific knowledge and state regulatory schemes. Additionally, a lead agency may use a model or methodology to estimate GHG emissions resulting from a project. The lead agency has discretion to select the model or methodology it considers most appropriate to enable decision makers to intelligently take into account the project's incremental contribution to climate change. The lead agency must support its selection of a model or methodology with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use (41).

2.7.4 REGIONAL

The project is within the South Coast Air Basin (SCAB), which is under the jurisdiction of the SCAQMD.

SCAQMD

SCAQMD is the agency responsible for air quality planning and regulation in the SCAB. The SCAQMD addresses the impacts to climate change of projects subject to SCAQMD permit as a lead agency if they are the only agency having discretionary approval for the project and acts as a responsible agency when a land use agency must also approve discretionary permits for the project. The SCAQMD acts as an expert commenting agency for impacts to air quality. This expertise carries over to GHG emissions, so the agency helps local land use agencies through the development of models and emission thresholds that can be used to address GHG emissions.

In 2008, SCAQMD formed a Working Group to identify GHG emissions thresholds for land use projects that could be used by local lead agencies in the SCAB. The Working Group developed several different options that are contained in the SCAQMD Draft Guidance Document – Interim CEQA GHG Significance Threshold, that could be applied by lead agencies. The working group has not provided additional guidance since release of the interim guidance in 2008. The SCAQMD Board has not approved the thresholds; however, the Guidance Document provides substantial evidence supporting the approaches to significance of GHG emissions that can be considered by the lead agency in adopting its own threshold. The current interim thresholds consist of the following tiered approach:

- Tier 1 consists of evaluating whether or not the project qualifies for any applicable exemption under CEQA.
- Tier 2 consists of determining whether the project is consistent with a GHG reduction plan. If a project is consistent with a qualifying local GHG reduction plan, it does not have significant GHG emissions.
- Tier 3 consists of screening values, which the lead agency can choose, but must be consistent with all projects within its jurisdiction. A project's construction emissions are averaged over 30 years and are added to the project's operational emissions. If a project's emissions are below one of the following screening thresholds, then the project is less than significant:
  - Residential and commercial land use: 3,000 $MTCO_2e$/yr
  - Industrial land use: 10,000 $MTCO_2e$/yr
  - Based on land use type: residential: 3,500 $MTCO_2e$/yr; commercial: 1,400 $MTCO_2e$/yr; or mixed use: 3,000 $MTCO_2e$/yr
- Tier 4 has the following options:
  - Option 1: Reduce Business-as-Usual (BAU) emissions by a certain percentage; this percentage is currently undefined.
  - Option 2: Early implementation of applicable AB 32 Scoping Plan measures
  - Option 3: 2020 target for service populations, which includes residents and employees: 4.8 $MTCO_2e$ per service population per year for projects and 6.6 $MTCO_2e$ per service population per year for plans;
  - Option 3, 2035 target: 3.0 $MTCO_2e$ per service population per year for projects and 4.1 $MTCO_2e$ per service population per year for plans
- Tier 5 involves mitigation offsets to achieve target significance threshold.

The SCAQMD's interim thresholds used the Executive Order S-3-05-year 2050 goal as the basis for the Tier 3 screening level. Achieving the Executive Order's objective would contribute to worldwide efforts to cap CO_2 concentrations at 450 ppm, thus stabilizing global climate.

SCAQMD only has authority over GHG emissions from development projects that include air quality permits. At this time, it is unknown if the project would include stationary sources of emissions subject to SCAQMD permits. Notwithstanding, if the Project requires a stationary permit, it would be subject to the applicable SCAQMD regulations.

SCAQMD Regulation XXVII, adopted in 2009 includes the following rules:

- Rule 2700 defines terms and post global warming potentials.
- Rule 2701, SoCal Climate Solutions Exchange, establishes a voluntary program to encourage, quantify, and certify voluntary, high quality certified GHG emission reductions in the SCAQMD.

- Rule 2702, GHG Reduction Program created a program to produce GHG emission reductions within the SCAQMD. The SCAQMD will fund projects through contracts in response to requests for proposals or purchase reductions from other parties.

2.8 CITY OF MURRIETA

In order to aggressively address the threats of global climate change, the City has prepared a Climate Action Plan (CAP), which provides a framework for reducing GHG emissions and managing resources to best prepare for a changing climate (42). The CAP recommends GHG emissions targets that are consistent with the reduction targets of the State of California and presents a number of strategies that will make it possible for the City to meet the recommended targets. Projects that demonstrate consistency with the strategies, actions, and emission reduction targets contained in the CAP would have a less than significant impact on climate change.

The Project will be compliant with the goal and objectives set forth in the City of Murrieta's CAP (as shown on Table 3-7, presented later in the report). Therefore, Project consistency with the CAP would result in a less than significant impact with respect to GHG emissions.

2.9 DISCUSSION ON ESTABLISHMENT OF SIGNIFICANCE THRESHOLDS

The City of Murrieta has not adopted a threshold of significance for GHG emissions. As such, a screening threshold of 3,000 $MTCO_2e$/yr is applied herein, which is a widely accepted screening threshold used by the County of Riverside (43) and numerous cities in the South Coast Air Basin and is based on the South Coast Air Quality Management District (SCAQMD) staff's proposed GHG screening threshold for stationary source emissions for non-industrial projects, as described in the SCAQMD's *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans* ("SCAQMD Interim GHG Threshold"). The SCAQMD Interim GHG Threshold identifies a screening threshold to determine whether additional analysis is required (44). As noted by the SCAQMD:

> *"…the…screening level for stationary sources is based on an emission capture rate of 90 percent for all new or modified projects...the policy objective of [SCAQMD's] recommended interim GHG significance threshold proposal is to achieve an emission capture rate of 90 percent of all new or modified stationary source projects. A GHG significance threshold based on a 90 percent emission capture rate may be more appropriate to address the long-term adverse impacts associated with global climate change because most projects will be required to implement GHG reduction measures. Further, a 90 percent emission capture rate sets the emission threshold low enough to capture a substantial fraction of future stationary source projects that will be constructed to accommodate future statewide population and economic growth, while setting the emission threshold high enough to exclude small projects that will in aggregate contribute a relatively small fraction of the cumulative statewide GHG emissions. This assertion is based on the fact that [SCAQMD] staff estimates that these GHG emissions would account for slightly less than one percent of future 2050 statewide GHG emissions target (85 [$MMTCO_2e$/yr]). In addition, these small projects may be subject to future applicable GHG*

> *control regulations that would further reduce their overall future contribution to the statewide GHG inventory. Finally, these small sources are already subject to [Best Available Control Technology] (BACT) for criteria pollutants and are more likely to be single-permit facilities, so they are more likely to have few opportunities readily available to reduce GHG emissions from other parts of their facility."* (44)

Thus, and based on guidance from the SCAQMD, if a non-industrial project would emit stationary source GHGs less than 3,000 $MTCO_2e$/yr, the project is not considered a substantial GHG emitter and the GHG impact is less than significant, requiring no additional analysis and no mitigation. On the other hand, if a non-industrial project would emit stationary source GHGs in excess of 3,000 $MTCO_2e$/yr, then the project could be considered a substantial GHG emitter, requiring additional analysis and potential mitigation.

Additionally, the analysis in Section 4 evaluates the proposed Project's compliance with the City's adopted CAP, which the City prepared in response to State mandates and regional guidance on reducing GHG emissions. The CAP supports local economic development by providing streamlined environmental review for development projects consistent with the CAP.

This page intentionally left blank

3 PROJECT GHG IMPACT

3.1 INTRODUCTION

The Project has been evaluated to determine if it will result in a significant GHG impact. The significance of these potential impacts is described in the following section.

3.2 STANDARDS OF SIGNIFICANCE

The criteria used to determine the significance of potential Project-related GHG impacts are taken from the *CEQA Guidelines* (14 California Code of Regulations §§15000, et seq.). Based on these thresholds, a project would result in a significant impact related to GHG if it would (1):

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?
- Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs?

3.3 MODELS EMPLOYED TO ANALYZE GHGS

3.3.1 CALIFORNIA EMISSIONS ESTIMATOR MODEL (CALEEMOD)

On October 17, 2017, the SCAQMD, in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts, released the latest version of the CalEEMod Version 2016.3.2. The purpose of this model is to calculate construction-source and operational-source criteria pollutant and GHG emissions from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from MMs (45). Accordingly, the latest version of CalEEMod has been used for this Project to determine GHG emissions. Output from the model runs for construction and operational activity are provided in Appendix 3.1. CalEEMod includes GHG emissions from the following source categories: construction, area, energy, mobile, waste, water.

3.3.2 EMISSION FACTORS MODEL

On August 19, 2019, the EPA approved the 2017 version of the EMissions FACtor model (EMFAC) web database for use in State Implementation Plan and transportation conformity analyses. EMFAC2017 is a mathematical model that was developed to calculate emission rates, fuel consumption, vehicle miles traveled (VMT) from motor vehicles that operate on highways, freeways, and local roads in California and is commonly used by CARB to project changes in future emissions from on-road mobile sources (46). This GHGA utilizes annual EMFAC2017 emission factors in order to derive vehicle emissions associated with Project operational activities.

Because the EMFAC2017 emission rates are associated with vehicle fuel types while CalEEMod vehicle emission factors are aggregated to include all fuel types for each individual vehicle class, the EMFAC2017 emission rates for different fuel types of a vehicle class are averaged by activity or by population and activity to derive CalEEMod emission factors. The equations applied to obtain CalEEMod vehicle emission factors for each emission type are detailed in CalEEMod User's Guide *Appendix A: Calculation Details for CalEEMod* (47).

3.4 LIFE-CYCLE ANALYSIS NOT REQUIRED

A full life-cycle analysis (LCA) for construction and operational activity is not included in this analysis due to the lack of consensus guidance on LCA methodology at this time (48). Life-cycle analysis (i.e., assessing economy-wide GHG emissions from the processes in manufacturing and transporting all raw materials used in the project development, infrastructure and on-going operations) depends on emission factors or econometric factors that are not well established for all processes. At this time, an LCA would be extremely speculative and thus has not been prepared.

Additionally, the SCAQMD recommends analyzing direct and indirect project GHG emissions generated within California and not life-cycle emissions because the life-cycle effects from a project could occur outside of California, might not be very well understood or documented, and would be challenging to mitigate (49). Additionally, the science to calculate life cycle emissions is not yet established or well defined; therefore, SCAQMD has not recommended, and is not requiring, life-cycle emissions analysis.

3.5 CONSTRUCTION EMISSIONS

Project construction actvities would generate CO_2 and CH_4 emissions The report *Murrieta Canyon Academy Air Quality Impact Analysis Report* (AQIA) by Urban Crossroads, Inc., contains detailed information regarding Project construction activities (50). As discussed in the AQIA, Construction related emissions are expected from the following construction activities:

- Site Preparation
- Grading
- Building Construction
- Paving
- Architectural Coating
- Demolition

3.5.1 CONSTRUCTION DURATION

Construction is expected to commence in August 2022 and will last through August 2023. The construction schedule utilized in the analysis, shown in Table 3-1, represents a "worst-case" analysis scenario should construction occur any time after the respective dates since emission factors for construction decrease as time passes and the analysis year increases due to emission regulations becoming more stringent.[4] The duration of construction activity and associated equipment represents a reasonable approximation of the expected construction fleet as required

[4] As shown in the CalEEMod User's Guide Version 2016.3.2, Section 4.3 "OFFROAD Equipment" as the analysis year increases, emission factors for the same equipment pieces decrease due to the natural turnover of older equipment being replaced by newer less polluting equipment and new regulatory requirements.

per *CEQA Guidelines* (1). The duration of construction activity was based on CalEEMod defaults and a 2021 opening year.

TABLE 3-1: CONSTRUCTION DURATION

Phase Name	Start Date	End Date	Days
Site Preparation	08/01/2022	09/30/2022	45
Grading	08/01/2022	09/30/2022	45
Building Construction	10/01/2022	06/23/2023	190
Paving	05/28/2023	06/23/2023	20
Architectural Coating	05/28/2023	06/23/2023	20
Demolition	06/24/2023	08/04/2023	30

3.5.2 CONSTRUCTION EQUIPMENT

Site specific construction fleet may vary due to specific project needs at the time of construction. The associated construction equipment was generally based on CalEEMod defaults. A detailed summary of construction equipment assumptions by phase is provided at Table 3-2. Please refer to specific detailed modeling inputs/outputs contained in Appendix 3.1 of this GHGA.

TABLE 3-2: CONSTRUCTION EQUIPMENT ASSUMPTIONS (1 OF 2)

Phase Name	Equipment Type [A]	Quantity	Hours Per Day
Site Preparation	Crawler Tractors	4	8
	Rubber Tired Dozers	3	8
Grading	Crawler Tractors	3	8
	Excavators	1	8
	Graders	1	8
	Rubber Tired Dozers	1	8
Building Construction	Cranes	1	8
	Crawler Tractors	3	8
	Forklifts	3	8
	Generator Sets	1	8
	Welders	1	8
Paving	Cement and Mortar Mixers	2	8
	Crawler Tractors	1	8
	Pavers	1	8
	Paving Equipment	2	8
	Rollers	2	8
Architectural Coating	Air Compressors	1	8

TABLE 3-2: CONSTRUCTION EQUIPMENT ASSUMPTIONS (2 OF 2)

Phase Name	Equipment Type [A]	Quantity	Hours Per Day
Demolition	Concrete/Industrial Saws	1	8
	Excavators	3	8
	Rubber Tired Dozers	2	8

3.5.3 CONSTRUCTION EMISSIONS SUMMARY

For construction phase Project emissions, GHGs are quantified and amortized over the life of the Project. To amortize the emissions over the life of the Project, the SCAQMD recommends calculating the total GHG emissions for the construction activities, dividing it by a 30-year project life then adding that number to the annual operational phase GHG emissions (51). As such, construction emissions were amortized over a 30-year period and added to the annual operational phase GHG emissions. The amortized construction emissions are presented in Table 3-3.

TABLE 3-3: AMORTIZED ANNUAL CONSTRUCTION EMISSIONS

Year	Emissions (MT/yr)			
	CO_2	CH_4	N_2O	Total CO_2E
2022	401.68	0.10	0.00	404.21
2023	409.19	0.09	0.00	411.41
Total Annual Construction Emissions	810.87	0.19	0.00	815.62
Amortized Construction Emissions ($MTCO_2e$)	**27.03**	**0.01**	**0.00**	**27.19**

Source: CalEEMod outputs, See Appendix 3.1 detailed model outputs.

3.6 OPERATIONAL EMISSIONS

Operational activities associated with the proposed Project will result in emissions of CO_2, CH_4, and N_2O from the following primary sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions
- Water Supply, Treatment, and Distribution
- Solid Waste

3.6.1 AREA SOURCE EMISSIONS

LANDSCAPE MAINTENANCE EQUIPMENT

Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in CalEEMod.

3.6.2 ENERGY SOURCE EMISSIONS

COMBUSTION EMISSIONS ASSOCIATED WITH NATURAL GAS AND ELECTRICITY

GHGs are emitted from buildings as a result of activities for which electricity and natural gas are typically used as energy sources. Combustion of any type of fuel emits CO_2 and other GHGs directly into the atmosphere; these emissions are considered direct emissions associated with a building; the building energy use emissions do not include street lighting[5]. GHGs are also emitted during the generation of electricity from fossil fuels; these emissions are considered to be indirect emissions. Unless otherwise noted, CalEEMod default parameters were used.

TITLE 24 ENERGY EFFICIENCY STANDARDS

California's Energy Efficiency Standards for Residential and Nonresidential Buildings was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. Energy efficient buildings require less electricity.

The 2019 version of Title 24 was adopted by the CEC and became effective on January 1, 2020. The CEC estimates that nonresidential buildings will use approximately 30% less energy through compliance with the 2019 Title 24 standards, compared to the 2016 Title 24 standards they replace (19). As such, the CalEEMod defaults for Title 24 – Electricity and Lighting Energy (which are based on 2016 Title 24) were reduced by 30% in order to reflect consistency with 2019 Title 24 requirements.

3.6.3 MOBILE SOURCE EMISSIONS

The Project-related GHG impacts are derived primarily from vehicle trips generated by the Project. Trip characteristics available from the *Murrieta Canyon Academy Expansion Traffic Impact Study* (Traffic Study) prepared by RK Engineering Group, Inc. were utilized in this analysis (52).

3.6.4 WATER SUPPLY, TREATMENT AND DISTRIBUTION

Indirect GHG emissions result from the production of electricity used to convey, treat and distribute water and wastewater. The amount of electricity required to convey, treat and distribute water depends on the volume of water as well as the sources of the water. CalEEMod default parameters were used to estimate GHG emissions associated with water supply, treatment and distribution for the Project scenario.

[5] The CalEEMod emissions inventory model does not include indirect emission related to street lighting. Indirect emissions related to street lighting are expected to be negligible and cannot be accurately quantified at this time as there is insufficient information as to the number and type of street lighting that would occur.

3.6.5 SOLID WASTE

Industrial land uses will result in the generation and disposal of solid waste. A large percentage of this waste will be diverted from landfills by a variety of means, such as reducing the amount of waste generated, recycling, and/or composting. The remainder of the waste not diverted will be disposed of at a landfill. GHG emissions from landfills are associated with the anaerobic breakdown of material. GHG emissions associated with the disposal of solid waste associated with the proposed Project were calculated by CalEEMod using default parameters.

3.7 EMISSIONS SUMMARY

The annual GHG emissions associated with the operation of the proposed Project are estimated to be 1,700.39 $MTCO_2e$ per year as summarized in Table 3-4.

TABLE 3-4: PROJECT GHG EMISSIONS

Emission Source	Emissions (MT/yr)			
	CO_2	CH_4	N_2O	Total CO_2e
Annual construction-related emissions amortized over 30 years	27.03	0.01	0.00	27.19
Area Source	2.30E-03	1.00E-05	0.00	2.45E-03
Energy Source	90.43	3.41E-03	9.20E-04	90.79
Mobile Source	1,533.76	0.05	0.00	1,535.08
Waste Source	10.95	0.65	0.00	27.13
Water Usage	18.70	0.05	1.22E-03	20.20
Total CO_2e (All Sources)	**1,700.39**			

Source: CalEEMod operational-source emissions outputs are presented in Appendix 3.1

3.8 GHG EMISSIONS FINDINGS AND RECOMMENDATIONS

3.8.1 GHG IMPACT 1

The Project would not generate direct or indirect GHG emission that would result in a significant impact on the environment.

The City of Murrieta has not adopted its own numeric threshold of significance for determining impacts with respect to GHG emissions. A screening threshold of 3,000 $MTCO_2e$/yr to determine if additional analysis is required is an acceptable approach for small projects. This approach is a widely accepted screening threshold used by the City and numerous cities in the SCAB and is based on the SCAQMD staff's proposed GHG screening threshold for stationary source emissions for non-industrial projects, as described in the SCAQMD's *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans* ("SCAQMD Interim GHG Threshold"). The SCAQMD Interim GHG Threshold identifies a screening threshold to determine whether additional analysis is required (53).

As shown on Table 3-4, the Project will result in approximately 1,700.39 $MTCO_2e/yr$; the proposed Project would not exceed the SCAQMD/City's screening threshold of 3,000 $MTCO_2e/yr$. Thus, project-related emissions would not have a significant direct or indirect impact on GHG and climate change and no mitigation or further analysis is required.

3.8.2 GHG IMPACT 2

The Project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs.

As previously stated, pursuant to 15604.4 of the *CEQA Guidelines*, a lead agency may rely on qualitative analysis or performance-based standards to determine the significance of impacts from GHG emissions (41). As such, the Project's consistency with AB 32, SB 32, and the SCAG's *2016-2040 RTP/SCS* are discussed below. It should be noted that the Project's consistency with the SB 32 (*2017 Scoping Plan*) also satisfies consistency with AB 32 since the *2017 Scoping Plan* is based on the overall targets established by AB 32. Consistency with the *2008 Scoping Plan* is not necessary, since the target year for the *2008 Scoping Plan* was 2020, and the Project's buildout year is 2021. As such the *2008 Scoping Plan* does not apply and consistency with the *2017 Scoping Plan* is relevant. Project consistency with SB 32 and *2016-2040 RTP/SCS* is evaluated in the following discussion.

SB 32/2017 SCOPING PLAN CONSISTENCY

The *2017 Scoping Plan* reflects the 2030 target of a 40% reduction below 1990 levels, set by Executive Order B-30-15 and codified by SB 32. Table 3-5 summarizes the Project's consistency with the *2017 Scoping Plan*. As summarized, the Project will not conflict with any of the provisions of the Scoping Plan and in fact supports seven of the action categories.

TABLE 3-5: *2017 SCOPING PLAN* CONSISTENCY SUMMARY[6]

Action	Responsible Parties	Consistency
Implement SB 350 by 2030		
Increase the Renewables Portfolio Standard to 50% of retail sales by 2030 and ensure grid reliability.	CPUC, CEC, CARB	Consistent. The Project would use energy from Southern California Edison (SCE). SCE has committed to diversify its portfolio of energy sources by increasing energy from wind and solar sources. The Project would not interfere with or obstruct SCE energy source diversification efforts.
Establish annual targets for statewide energy efficiency savings and demand reduction that will achieve a cumulative doubling of statewide energy efficiency savings in electricity and natural gas end uses by 2030.		Consistent. The Project would be designed and constructed to implement the energy efficiency measures for new commercial developments and would include several measures designed to reduce energy consumption. The Project would not interfere with or obstruct policies or

[6] Measures can be found at the following link: https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf

Action	Responsible Parties	Consistency
		strategies to establish annual targets for statewide energy efficiency savings and demand reduction.
Reduce GHG emissions in the electricity sector through the implementation of the above measures and other actions as modeled in Integrated Resource Planning (IRP) to meet GHG emissions reductions planning targets in the IRP process. Load-serving entities and publicly- owned utilities meet GHG emissions reductions planning targets through a combination of measures as described in IRPs.		Consistent. The proposed Project would be designed and constructed to implement the energy efficiency measures, where applicable by including several measures designed to reduce energy consumption. The proposed Project includes energy efficient field lighting and fixtures that meet the current Title 24 Standards throughout the Project Site and would be a modern development with energy efficient boilers, heaters, and air conditioning systems.
Implement Mobile Source Strategy (Cleaner Technology and Fuels)		
At least 1.5 million zero emission and plug-in hybrid light-duty EV by 2025.	CARB, California State Transportation Agency (CalSTA), Strategic Growth Council (SGC), California Department of Transportation (Caltrans), CEC, OPR, Local Agencies	Consistent. This is a CARB Mobile Source Strategy. The Project would not obstruct or interfere with CARB zero emission and plug-in hybrid light-duty EV 2025 targets.
At least 4.2 million zero emission and plug-in hybrid light-duty EV by 2030.		Consistent. This is a CARB Mobile Source Strategy. The Project would not obstruct or interfere with CARB zero emission and plug-in hybrid light-duty EV 2030 targets.
Further increase GHG stringency on all light-duty vehicles beyond existing Advanced Clean cars regulations.		Consistent. This is a CARB Mobile Source Strategy. The Project would not obstruct or interfere with CARB efforts to further increase GHG stringency on all light-duty vehicles beyond existing Advanced Clean cars regulations.
Medium- and Heavy-Duty GHG Phase 2.		Consistent. This is a CARB Mobile Source Strategy. The Project would not obstruct or interfere with CARB efforts to implement Medium- and Heavy-Duty GHG Phase 2
Innovative Clean Transit: Transition to a suite of to-be-determined innovative clean transit options. Assumed 20% of new urban buses purchased beginning in 2018 will be zero emission buses with the penetration of zero-emission technology ramped up to 100% of new sales in 2030. Also, new natural gas buses, starting in 2018, and diesel buses, starting in 2020, meet the optional heavy-duty low-NO_X standard.		Consistent. This is a CARB Mobile Source Strategy. The Project would not obstruct or interfere with CARB efforts improve transit-source emissions.

Action	Responsible Parties	Consistency
Last Mile Delivery: New regulation that would result in the use of low NO_X or cleaner engines and the deployment of increasing numbers of zero-emission trucks primarily for class 3-7 last mile delivery trucks in California. This measure assumes ZEVs comprise 2.5% of new Class 3–7 truck sales in local fleets starting in 2020, increasing to 10% in 2025 and remaining flat through 2030.		Consistent. This is a CARB Mobile Source Strategy. The Project would not obstruct or interfere with CARB efforts to improve last mile delivery emissions.
Further reduce vehicle miles traveled (VMT) through continued implementation of SB 375 and regional Sustainable Communities Strategies; forthcoming statewide implementation of SB 743; and potential additional VMT reduction strategies not specified in the Mobile Source Strategy but included in the document "Potential VMT Reduction Strategies for Discussion."		Consistent. This Project would not obstruct or interfere with implementation of SB 375 and would therefore not conflict with this measure.
Increase stringency of SB 375 Sustainable Communities Strategy (2035 targets).	CARB	Consistent. This is a CARB Mobile Source Strategy. The Project would not obstruct or interfere with CARB efforts to Increase stringency of SB 375 Sustainable Communities Strategy (2035 targets).
Harmonize project performance with emissions reductions and increase competitiveness of transit and active transportation modes (e.g. via guideline documents, funding programs, project selection, etc.).	CalSTA, SGC, OPR, CARB, Governor's Office of Business and Economic Development (GO-Biz), California Infrastructure and Economic Development Bank (IBank), Department of Finance (DOF), California Transportation Commission (CTC), Caltrans	Consistent. The Project would not obstruct or interfere with agency efforts to harmonize transportation facility project performance with emissions reductions and increase competitiveness of transit and active transportation modes.
	CalSTA,	Consistent. The Project would not obstruct or interfere with agency efforts

Action	Responsible Parties	Consistency
By 2019, develop pricing policies to support low-GHG transportation (e.g. low-emission vehicle zones for heavy duty, road user, parking pricing, transit discounts).	Caltrans, CTC, OPR, SGC, CARB	to develop pricing policies to support low-GHG transportation.
Implement California Sustainable Freight Action Plan		
Improve freight system efficiency.	CalSTA, CalEPA, CNRA, CARB, Caltrans, CEC, GO-Biz	Consistent. This measure would apply to all trucks accessing the Project site, this may include existing trucks or new trucks that are part of the statewide goods movement sector. The Project would not obstruct or interfere with agency efforts to Improve freight system efficiency.
Deploy over 100,000 freight vehicles and equipment capable of zero emission operation and maximize both zero and near-zero emission freight vehicles and equipment powered by renewable energy by 2030.		Consistent. The Project would not obstruct or interfere with agency efforts to deploy over 100,000 freight vehicles and equipment capable of zero emission operation and maximize both zero and near-zero emission freight vehicles and equipment powered by renewable energy by 2030.
Adopt a Low Carbon Fuel Standard with a Carbon Intensity reduction of 18%.	CARB	Consistent. When adopted, this measure would apply to all fuel purchased and used by the Project in the state. The Project would not obstruct or interfere with agency efforts to adopt a Low Carbon Fuel Standard with a Carbon Intensity reduction of 18%.
Implement the Short-Lived Climate Pollutant Strategy (SLPS) by 2030		
40% reduction in methane and hydrofluorocarbon emissions below 2013 levels.	CARB, CalRecycle, CDFA, SWRCB, Local Air Districts	Consistent. The Project would be required to comply with this measure and reduce any Project-source SLPS emissions accordingly. The Project would not obstruct or interfere agency efforts to reduce SLPS emissions.
50% reduction in black carbon emissions below 2013 levels.		
By 2019, develop regulations and programs to support organic waste landfill reduction goals in the SLCP and SB 1383.	CARB, CalRecycle, CDFA SWRCB, Local Air Districts	Consistent. The Project would implement waste reduction and recycling measures consistent with State and City requirements. The Project would not obstruct or interfere agency efforts to support organic waste landfill reduction goals in the SLCP and SB 1383.

Action	Responsible Parties	Consistency
Implement the post-2020 Cap-and-Trade Program with declining annual caps.	CARB	Consistent. The Project would be required to comply with any applicable Cap-and-Trade Program provisions. The Project would not obstruct or interfere agency efforts to implement the post-2020 Cap-and-Trade Program.
By 2018, develop Integrated Natural and Working Lands Implementation Plan to secure California's land base as a net carbon sink		
Protect land from conversion through conservation easements and other incentives.	CNRA, Departments Within CDFA, CalEPA, CARB	Consistent. The Project would not obstruct or interfere agency efforts to protect land from conversion through conservation easements and other incentives.
Increase the long-term resilience of carbon storage in the land base and enhance sequestration capacity		Consistent. The Project site is vacant disturbed property and does not comprise an area that would effectively provide for carbon sequestration. The Project would not obstruct or interfere agency efforts to increase the long-term resilience of carbon storage in the land base and enhance sequestration capacity.
Utilize wood and agricultural products to increase the amount of carbon stored in the natural and built environments		Consistent. Where appropriate, Project designs will incorporate wood or wood products. The Project would not obstruct or interfere agency efforts to encourage use of wood and agricultural products to increase the amount of carbon stored in the natural and built environments.
Establish scenario projections to serve as the foundation for the Implementation Plan		Consistent. The Project would not obstruct or interfere agency efforts to establish scenario projections to serve as the foundation for the Implementation Plan.
Establish a carbon accounting framework for natural and working lands as described in SB 859 by 2018	CARB	Consistent. The Project would not obstruct or interfere agency efforts to establish a carbon accounting framework for natural and working lands as described in SB 859 by 2018.
Implement Forest Carbon Plan	CNRA, California Department of	Consistent. The Project would not obstruct or interfere agency efforts to implement the Forest Carbon Plan.

Action	Responsible Parties	Consistency
	Forestry and Fire Protection (CAL FIRE), CalEPA and Departments Within	
Identify and expand funding and financing mechanisms to support GHG reductions across all sectors.	State Agencies & Local Agencies	Consistent. The Project would not obstruct or interfere agency efforts to identify and expand funding and financing mechanisms to support GHG reductions across all sectors.

As shown above, the Project would not conflict with any of the *2017 Scoping Plan* elements as any regulations adopted would apply directly or indirectly to the Project. Further, recent studies show that the State's existing and proposed regulatory framework will allow the State to reduce its GHG emissions level to 40% below 1990 levels by 2030 (37).

CITY OF MURRIETA CAP CONSISTENCY

The CAP recommends GHG emissions targets that are consistent with the reduction targets of the State of California and presents a number of strategies that will make it possible for the City to meet the recommended targets. The CAP also suggests best practices for implementation and makes recommendations for measuring progress (Murrieta, 2011b, p. 1-1). As indicated in Table 3-6, the proposed Project would be consistent with, or otherwise would not conflict with, the CAP's strategies, goals, and measures.

TABLE 3-6: PROJECT CONSISTENCY WITH THE CITY OF MURRIETA CAP

CAP Strategy	Analysis of Project Consistency
Strategy 1: Community Involvement Strategy	Not Applicable. The CAP's Community Involvement Strategy provides guidance to the City for conducting outreach programs to involve residents and businesses in GHG-reducing activities, assessments, and actions. The proposed Project would not affect the City's ability to conduct community outreach.
Strategy 2: Land Use and Community Vision Strategy	Consistent. The proposed Project would aid in creating a complementary balance of land uses throughout the community.
Strategy 3: Transportation and Mobility Strategy	Consistent. Any potential roadway improvements planned by the Project have been designed to City standards and would safely accommodate pedestrians and bicycles. The remaining goals and measures under the Transportation and Mobility Strategy are not applicable to the proposed Project.

CAP Strategy	Analysis of Project Consistency
Strategy 4: Energy Use and Conservation Strategy	Consistent. The Project would be required to comply with Title 24 California Code of Regulations (California Building Code), which establishes stringent energy efficiency requirements for new development. The remaining goals and measures under the Energy Use and Conservation Strategy are not applicable to the proposed Project.
Strategy 5: Water Use and Efficiency Strategy	Consistent. The Project would be required to comply with Murrieta Municipal Code Section 16.28 (Landscaping Standards and Water Efficient Landscaping), which would reduce the Project's energy demand associated with landscaping and water use. The remaining goals and measures under the Water Use and Efficiency Strategy are not applicable to the proposed Project.
Strategy 6: Waste Reduction and Recycling Strategy	Consistent. The Project has been designed to accommodate adequate infrastructure for water, sewer, storm water, and energy. The remaining goals and measures under the Waste Reduction and Recycling Strategy are not applicable to the proposed Project.
Strategy 7: Open Space Strategy	Consistent. The Project's incorporates a variety of trees, bushes, and groundcover.

This page intentionally left blank

4 REFERENCES

1. **State of California.** *2019 CEQA California Environmental Quality Act.* 2019.
2. **Air Resources Board.** Assembly Bill 32: Global Warming Solutions Act. [Online] 2006. http://www.arb.ca.gov/cc/ab32/ab32.htm.
3. —. Sustainable Communities. [Online] 2008. http://www.arb.ca.gov/cc/sb375/sb375.htm.
4. —. Clean Car Standards - Pavley, Assembly Bill 1493. [Online] September 24, 2009. http://www.arb.ca.gov/cc/ccms/ccms.htm.
5. **Building Standards Commission.** California Building Standards Code (Title 24, California Code of Regulations). [Online] http://www.bsc.ca.gov/codes.aspx.
6. **California Energy Commission.** California Code of Regulations, TITLE 20, Division 2. [Online] September 3, 2013. http://www.energy.ca.gov/reports/title20/index.html.
7. **Air Resources Board.** Title 17 - California Code of Regulation. [Online] 2010. http://www.arb.ca.gov/regs/regs-17.htm.
8. **Department of Water Resources.** Updated Model Water Efficient Landscape Ordinance AB 1881. [Online] 2006. [Cited: November 13, 2013.] http://www.water.ca.gov/wateruseefficiency/landscapeordinance/updatedOrd_history.cfm.
9. **California Energy Commission.** SB 1368 Emission Performance Standards. [Online] September 29, 2006. http://www.energy.ca.gov/emission_standards/.
10. —. Renewables Portfolio Standard (RPS). [Online] 2002. http://www.energy.ca.gov/portfolio/.
11. **California Legislative Information.** Senate Bill No. 32. [Online] September 8, 2016. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB32.
12. **National Oceanic and Atmospheric Administration.** Greenhouse Gases - Water Vapor. *NOAA National Centers For Environmental Information.* [Online] https://www.ncdc.noaa.gov/monitoring-references/faq/greenhouse-gases.php?section=watervapor.
13. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report.* **International Panel on Climate Change.** 4, 2007.
14. *The Carbon Cycle and Climate Change.* **Bennington, Bret J.** 1, s.l. : Brooks/Cole. ISBN 1 3: 978-0-495-73855-8.
15. **The National Institute for Occupational Safety and Health.** Carbon Dioxide. *Centers for Disease Control and Prevention.* [Online] https://www.cdc.gov/niosh/npg/npgd0103.html.
16. **National Oceanic and Atmospheric Administration.** Greenhouse Gases - Methane. *NOAA National Centers for Environmental Information.* [Online] https://www.ncdc.noaa.gov/monitoring-references/faq/greenhouse-gases.php?section=methane.
17. **World Resources Institute.** Climate Analysis Indicator Tool (CAIT). [Online] http://cait.wri.org.
18. **National Oceanic and Atmospheric Administration.** Greenhouse Gases - Chlorofluorocarbons. *NOAA National Centers For Environmental Information.* [Online] https://www.ncdc.noaa.gov/monitoring-references/faq/greenhouse-gases.php?section=chlorofluorocarbons.
19. **United States Environmental Protection Agency.** Regulation for Reducting Sulfur Hexafluoride Emissions from Gas Insulated Switchgear. *Environmental Protection Agency.* [Online] May 7, 2014. https://www.epa.gov/sites/production/files/2016-02/documents/mehl-arb-presentation-2014-wkshp.pdf.

20. **World Resources Institute.** Nitrogen Trifluoride Now Required in GHG Protocol Greenhouse Gas Emissions Inventory. [Online] May 22, 2013. https://www.wri.org/blog/2013/05/nitrogen-trifluoride-now-required-ghg-protocol-greenhouse-gas-emissions-inventories.
21. **National Center for Biotechnology Information.** Nitrogen Trifluoride. *PubChem Compound Database.* [Online] https://pubchem.ncbi.nlm.nih.gov/compound/24553 .
22. **American Lung Association.** Climate Change. [Online] http://www.lung.org/our-initiatives/healthy-air/outdoor/climate-change/.
23. **Barbara H. Allen-Diaz.** Climate change affects us all. *University of California Agriculture and Natural Resources.* [Online] April 1, 2009. http://calag.ucanr.edu/Archive/?article=ca.v063n02p51.
24. **Intergovernmental Panel on Climate Change.** Climate Change 2013 The Physical Science Basis - Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. *AR5 Climate Change 2013: The Physical Science Basis.* [Online] September 2013. https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_all_final.pdf.
25. **United Nations.** GHG Profiles - Annex I. [Online] http://di.unfccc.int/ghg_profile_annex1.
26. —. GHG Profiles - Non-Annex I. [Online] http://di.unfccc.int/ghg_profile_non_annex1.
27. **World Resources Institute.** Climate Analysis Indicator Tool (CAIT). [Online] http://cait.wri.org.
28. **Air Resources Board.** 2019 GHG Inventory. *California Greenhouse Gas Emission Inventory 2000-2017 Edition.* [Online] [Cited: September 19, 2019.] http://www.arb.ca.gov/cc/inventory/data/data.htm.
29. **Center for Climate and Energy Solutions (C2ES).** Outcomes of the U.N. Climate Change Conference. *Center for Climate and Energy Solutions (C2ES).* [Online] 2015. http://www.c2es.org/international/negotiations/cop21-paris/summary.
30. **Agency, United States Environmental Protection.** Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Section 202(a) of the Clean Air Act. *United States Environmental Protection Agency.* [Online] https://www.epa.gov/ghgemissions/endangerment-and-cause-or-contribute-findings-greenhouse-gases-under-section-202a-clean.
31. **National Highway Traffic Safety Administration.** SAFE: The Safer Affordable Fuel-Efficient 'SAFE' Vehicle Rule. *National Highway Traffic Safety Administration.* [Online] https://www.nhtsa.gov/corporate-average-fuel-economy/safe.
32. **United States Environmental Protection Agency.** SmartWay. [Online] https://www.epa.gov/smartway/learn-about-smartway.
33. **California Air Resources Board.** GHG 1990 Emissions Level & 2020 Limit. *California Air Resources Board.* [Online] https://ww2.arb.ca.gov/ghg-2020-limit.
34. —. *Climate Change Draft Scoping Plan.* 2008.
35. —. STATUS OF SCOPING PLAN RECOMMENDED MEASURES. [Online] [Cited: September 19, 2019.] https://ww3.arb.ca.gov/cc/scopingplan/status_of_scoping_plan_measures.pdf.
36. —. *First Update to the Climate Change Scoping Plan.* 2014.
37. **Lawrence Berkeley National Laboratory.** California's Policies Can Significantly Cut Greenhouse Gas Emissions through 2030. *Lawrence Berkeley National Laboratory.* [Online] January 22, 2015. http://newscenter.lbl.gov/2015/01/22/californias-policies-can-significantly-cut-greenhouse-gas-emissions-2030/.
38. **Ernest Orlando Lawrence Berkeley National Laboratory.** Modeling California policy impacts on greenhouse gas emissions. [Online] 2015. https://eaei.lbl.gov/sites/all/files/lbnl-7008e.pdf.

39. **California Air Resources Board (CARB).** Cap and Trade Overview. *California Air Resources Board.* [Online] [Cited: May 10, 2016.] http://www.arb.ca.gov/cc/capandtrade/guidance/cap_trade_overview.pdf..
40. **California Air Resources Board.** Greenhouse Gas Standards for Medium- and Heavy-Duty Engines and Vehicles. [Online] https://ww2.arb.ca.gov/node/1594/about.
41. **Association of Environmental Professionals.** *2018 CEQA California Environmental Quality Act.* 2018.
42. **City of Murrieta.** *Climate Action Plan.* Murrieta : RBF Consulting, 2011.
43. **County of Riverside.** *Greenhouse Gas Emissions Screening Tables.* San Bernardino : Atkins, 2012.
44. **South Coast Air Quality Management District.** Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans. [Online] http://www.aqmd.gov/hb/2008/December/081231a.htm.
45. **California Air Pollution Control Officers Association (CAPCOA).** California Emissions Estimator Model (CalEEMod). [Online] September 2016. www.caleemod.com.
46. **California Department of Transportation.** EMFAC Software. [Online] http://www.dot.ca.gov/hq/env/air/pages/emfac.htm.
47. **California Air Pollution Control Officers Association (CAPCOA).** Appendix A: Calculation Details for CalEEMod. *CalEEMod.* [Online] October 2017. http://www.aqmd.gov/docs/default-source/caleemod/02_appendix-a2016-3-2.pdf?sfvrsn=6.
48. **California Natural Resources Agency.** Final Statement of Reasons for Regulatory Action, Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB97. [Online] December 2009.
49. *Minutes for the GHG CEQA Significance.* **South Coast Air Quality Managment District.** 2008.
50. **Urban Crossroads, Inc.** *Murrieta Canyon Academy Air Quality Impact Analysis Report .* 2020.
51. **South Coast Air Quality Management District.** *Greenhouse Gas CEQA Significance Threshold Stakeholder Working Group #13.* [Powerpoint] Diamond Bar : s.n., 2009.
52. **RK Engineering Group, Inc.** *Murrieta Canyon Academy Expansion Traffic Impact Study.* 2020.
53. **South Coast Air Quality Management District.** Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans. [Online] http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/ghgboardsynopsis.pdf?sfvrsn=2.

This page intentionally left blank

5 CERTIFICATIONS

The contents of this GHG study report represent an accurate depiction of the GHG impacts associated with the proposed Murrieta Canyon Academy. The information contained in this GHG report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5987.

Haseeb Qureshi
Associate Principal
URBAN CROSSROADS, INC.
260 E. Baker St., Suite 200
Costa Mesa, CA 92626
(949) 336-5987a
hqureshi@urbanxroads.com

EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Planned Communities and Urban Infill – Urban Land Institute • June 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August 2007
AB2588 Regulatory Standards – Trinity Consultants • November 2006
Air Dispersion Modeling – Lakes Environmental • June 2006

This page intentionally left blank

APPENDIX 3.1:

CALEEMOD ANNUAL CONSTRUCTION EMISSIONS MODEL OUTPUTS

Murrieta Canyon Academy (Unmitigated)

Riverside-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
High School	41.50	1000sqft	0.95	41,500.00	0
Other Asphalt Surfaces	0.53	Acre	0.53	23,086.80	0
Other Non-Asphalt Surfaces	2.59	Acre	2.59	112,820.40	0
Parking Lot	48.00	Space	0.44	19,200.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Total Project Area analyzed is 4.51 acres. The existing parking area (approximately 0.49 acres) in the southern portion of the site will remain and has been excluded from this anlaysis.

Construction Phase - Constructure schedule based on 2023 Opening Year and information provided by the Project Applicant.

Off-road Equipment - Hours are based on an 8-hour workday.

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Off-road Equipment -

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Off-road Equipment - Crawler Tractors used in lieu of Tractors/Loaders/Backhoes.

Trips and VMT - Per information provided by the Project Applicant, demolition activities will result in 100 truck trips.

Demolition -

Grading - It is assumed that 5 acres can be graded per day

Architectural Coating - Rule 1113

Vehicle Trips - Based on information provided in the Murrieta Canyon Academy Expansion Traffic Impact Study by RK Engineering Grounp, Inc.

Vehicle Emission Factors - EMFAC2017

Vehicle Emission Factors - EMFAC2017

Vehicle Emission Factors - EMFAC2017

Energy Use - The Project will design building shells and building components to meet 2019 Title 24 Standards which expects 30% less energy for nonresidential uses

Construction Off-road Equipment Mitigation - Rule 403

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	100.00	50.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	50.00
tblConstructionPhase	NumDays	18.00	20.00
tblConstructionPhase	NumDays	230.00	190.00
tblConstructionPhase	NumDays	20.00	30.00

tblConstructionPhase	NumDays	8.00	45.00
tblConstructionPhase	NumDays	18.00	20.00
tblConstructionPhase	NumDays	5.00	45.00
tblEnergyUse	LightingElect	3.03	2.12
tblEnergyUse	T24E	2.78	1.95
tblEnergyUse	T24NG	6.97	4.88
tblGrading	AcresOfGrading	90.00	225.00
tblGrading	AcresOfGrading	90.00	225.00
tblGrading	MaterialExported	0.00	6,000.00
tblLandUse	LotAcreage	0.43	0.44
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblTripsAndVMT	HaulingTripNumber	102.00	100.00
tblVehicleEF	HHD	0.96	0.03
tblVehicleEF	HHD	0.03	0.02
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	2.07	8.39
tblVehicleEF	HHD	0.41	0.21
tblVehicleEF	HHD	1.44	2.6410e-003

tblVehicleEF	HHD	6,147.84	1,374.55
tblVehicleEF	HHD	1,399.88	1,256.69
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	17.43	6.82
tblVehicleEF	HHD	0.97	1.92
tblVehicleEF	HHD	5.1890e-003	2.7370e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	4.9650e-003	2.6180e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.8620e-003	8.8950e-003
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	7.3000e-005	1.0000e-006
tblVehicleEF	HHD	2.3430e-003	5.3000e-005
tblVehicleEF	HHD	0.55	0.57
tblVehicleEF	HHD	4.3000e-005	1.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.5400e-004	2.3900e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.06	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.1000e-005	0.00
tblVehicleEF	HHD	7.3000e-005	1.0000e-006
tblVehicleEF	HHD	2.3430e-003	5.3000e-005

tblVehicleEF	HHD	0.63	0.65
tblVehicleEF	HHD	4.3000e-005	1.0000e-006
tblVehicleEF	HHD	0.08	0.04
tblVehicleEF	HHD	1.5400e-004	2.3900e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.91	0.03
tblVehicleEF	HHD	0.03	0.02
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	1.50	8.28
tblVehicleEF	HHD	0.41	0.21
tblVehicleEF	HHD	1.38	2.5010e-003
tblVehicleEF	HHD	6,513.09	1,357.07
tblVehicleEF	HHD	1,399.88	1,256.69
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	17.99	6.49
tblVehicleEF	HHD	0.91	1.81
tblVehicleEF	HHD	4.3760e-003	2.4170e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	4.1860e-003	2.3130e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.8620e-003	8.8950e-003
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	1.4000e-004	3.0000e-006

tblVehicleEF	HHD	2.6540e-003	5.8000e-005
tblVehicleEF	HHD	0.51	0.60
tblVehicleEF	HHD	8.2000e-005	2.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.5700e-004	2.4200e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.06	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.0000e-005	0.00
tblVehicleEF	HHD	1.4000e-004	3.0000e-006
tblVehicleEF	HHD	2.6540e-003	5.8000e-005
tblVehicleEF	HHD	0.59	0.69
tblVehicleEF	HHD	8.2000e-005	2.0000e-006
tblVehicleEF	HHD	0.08	0.04
tblVehicleEF	HHD	1.5700e-004	2.4200e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	1.04	0.02
tblVehicleEF	HHD	0.03	8.7800e-004
tblVehicleEF	HHD	0.08	0.00
tblVehicleEF	HHD	2.85	8.52
tblVehicleEF	HHD	0.41	0.16
tblVehicleEF	HHD	1.46	2.6330e-003
tblVehicleEF	HHD	5,643.45	1,394.57
tblVehicleEF	HHD	1,399.88	1,245.20
tblVehicleEF	HHD	4.72	0.02
tblVehicleEF	HHD	16.66	7.25
tblVehicleEF	HHD	0.96	1.90

tblVehicleEF	HHD	6.3140e-003	3.1380e-003
tblVehicleEF	HHD	0.06	0.06
tblVehicleEF	HHD	0.04	0.04
tblVehicleEF	HHD	5.1440e-003	0.03
tblVehicleEF	HHD	3.9000e-005	0.00
tblVehicleEF	HHD	6.0400e-003	3.0020e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	4.9210e-003	0.03
tblVehicleEF	HHD	3.6000e-005	0.00
tblVehicleEF	HHD	5.5000e-005	1.0000e-006
tblVehicleEF	HHD	2.4340e-003	5.8000e-005
tblVehicleEF	HHD	0.59	0.52
tblVehicleEF	HHD	3.6000e-005	1.0000e-006
tblVehicleEF	HHD	0.04	0.02
tblVehicleEF	HHD	1.6500e-004	2.5400e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	HHD	0.05	0.01
tblVehicleEF	HHD	0.01	0.01
tblVehicleEF	HHD	7.1000e-005	0.00
tblVehicleEF	HHD	5.5000e-005	1.0000e-006
tblVehicleEF	HHD	2.4340e-003	5.8000e-005
tblVehicleEF	HHD	0.68	0.59
tblVehicleEF	HHD	3.6000e-005	1.0000e-006
tblVehicleEF	HHD	0.08	0.02
tblVehicleEF	HHD	1.6500e-004	2.5400e-004
tblVehicleEF	HHD	0.04	1.0000e-006
tblVehicleEF	LDA	3.3240e-003	1.9160e-003

tblVehicleEF	LDA	4.1920e-003	0.04
tblVehicleEF	LDA	0.51	0.57
tblVehicleEF	LDA	0.96	2.01
tblVehicleEF	LDA	235.32	250.08
tblVehicleEF	LDA	54.50	51.54
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.04	0.06
tblVehicleEF	LDA	0.09	0.09
tblVehicleEF	LDA	0.03	0.05
tblVehicleEF	LDA	8.3520e-003	7.0950e-003
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.06	0.19
tblVehicleEF	LDA	2.3560e-003	2.4740e-003
tblVehicleEF	LDA	5.6100e-004	5.1000e-004
tblVehicleEF	LDA	0.04	0.06
tblVehicleEF	LDA	0.09	0.09
tblVehicleEF	LDA	0.03	0.05
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.06	0.21
tblVehicleEF	LDA	3.7650e-003	2.1830e-003
tblVehicleEF	LDA	3.6350e-003	0.04
tblVehicleEF	LDA	0.62	0.70

tblVehicleEF	LDA	0.85	1.77
tblVehicleEF	LDA	256.22	271.87
tblVehicleEF	LDA	54.50	51.08
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.09	0.12
tblVehicleEF	LDA	0.10	0.11
tblVehicleEF	LDA	0.06	0.09
tblVehicleEF	LDA	9.4470e-003	8.0120e-003
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.05	0.17
tblVehicleEF	LDA	2.5670e-003	2.6900e-003
tblVehicleEF	LDA	5.5900e-004	5.0600e-004
tblVehicleEF	LDA	0.09	0.12
tblVehicleEF	LDA	0.10	0.11
tblVehicleEF	LDA	0.06	0.09
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.03	0.20
tblVehicleEF	LDA	0.05	0.18
tblVehicleEF	LDA	3.2080e-003	1.8500e-003
tblVehicleEF	LDA	4.3060e-003	0.05
tblVehicleEF	LDA	0.48	0.54
tblVehicleEF	LDA	0.98	2.05
tblVehicleEF	LDA	229.53	244.11

tblVehicleEF	LDA	54.50	51.61
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	1.5540e-003	1.3060e-003
tblVehicleEF	LDA	2.2370e-003	1.7590e-003
tblVehicleEF	LDA	1.4310e-003	1.2030e-003
tblVehicleEF	LDA	2.0570e-003	1.6170e-003
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.10	0.10
tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	8.0650e-003	6.8540e-003
tblVehicleEF	LDA	0.04	0.22
tblVehicleEF	LDA	0.06	0.19
tblVehicleEF	LDA	2.2980e-003	2.4150e-003
tblVehicleEF	LDA	5.6100e-004	5.1100e-004
tblVehicleEF	LDA	0.04	0.05
tblVehicleEF	LDA	0.10	0.10
tblVehicleEF	LDA	0.03	0.04
tblVehicleEF	LDA	0.01	9.9700e-003
tblVehicleEF	LDA	0.04	0.22
tblVehicleEF	LDA	0.06	0.21
tblVehicleEF	LDT1	9.2940e-003	5.9940e-003
tblVehicleEF	LDT1	0.01	0.07
tblVehicleEF	LDT1	1.18	1.28
tblVehicleEF	LDT1	2.73	2.25
tblVehicleEF	LDT1	295.40	299.04
tblVehicleEF	LDT1	68.37	62.77
tblVehicleEF	LDT1	0.11	0.11

tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.18	0.19
tblVehicleEF	LDT1	0.30	0.23
tblVehicleEF	LDT1	0.12	0.13
tblVehicleEF	LDT1	0.02	0.03
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.19	0.35
tblVehicleEF	LDT1	2.9680e-003	2.9590e-003
tblVehicleEF	LDT1	7.3100e-004	6.2100e-004
tblVehicleEF	LDT1	0.18	0.19
tblVehicleEF	LDT1	0.30	0.23
tblVehicleEF	LDT1	0.12	0.13
tblVehicleEF	LDT1	0.03	0.04
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.21	0.39
tblVehicleEF	LDT1	0.01	6.7740e-003
tblVehicleEF	LDT1	0.01	0.06
tblVehicleEF	LDT1	1.43	1.55
tblVehicleEF	LDT1	2.40	1.99
tblVehicleEF	LDT1	320.93	322.22
tblVehicleEF	LDT1	68.37	62.22
tblVehicleEF	LDT1	0.11	0.10
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003

tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003
tblVehicleEF	LDT1	0.36	0.37
tblVehicleEF	LDT1	0.37	0.28
tblVehicleEF	LDT1	0.24	0.25
tblVehicleEF	LDT1	0.03	0.03
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.16	0.31
tblVehicleEF	LDT1	3.2270e-003	3.1890e-003
tblVehicleEF	LDT1	7.2500e-004	6.1600e-004
tblVehicleEF	LDT1	0.36	0.37
tblVehicleEF	LDT1	0.37	0.28
tblVehicleEF	LDT1	0.24	0.25
tblVehicleEF	LDT1	0.04	0.04
tblVehicleEF	LDT1	0.18	0.74
tblVehicleEF	LDT1	0.18	0.34
tblVehicleEF	LDT1	8.9360e-003	5.7650e-003
tblVehicleEF	LDT1	0.01	0.07
tblVehicleEF	LDT1	1.11	1.19
tblVehicleEF	LDT1	2.78	2.30
tblVehicleEF	LDT1	287.77	292.00
tblVehicleEF	LDT1	68.37	62.89
tblVehicleEF	LDT1	0.11	0.10
tblVehicleEF	LDT1	2.2770e-003	1.9220e-003
tblVehicleEF	LDT1	3.3510e-003	2.5350e-003
tblVehicleEF	LDT1	2.0960e-003	1.7690e-003
tblVehicleEF	LDT1	3.0820e-003	2.3310e-003

tblVehicleEF	LDT1	0.16	0.16
tblVehicleEF	LDT1	0.33	0.25
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.02	0.03
tblVehicleEF	LDT1	0.21	0.85
tblVehicleEF	LDT1	0.19	0.36
tblVehicleEF	LDT1	2.8910e-003	2.8900e-003
tblVehicleEF	LDT1	7.3200e-004	6.2200e-004
tblVehicleEF	LDT1	0.16	0.16
tblVehicleEF	LDT1	0.33	0.25
tblVehicleEF	LDT1	0.10	0.11
tblVehicleEF	LDT1	0.03	0.04
tblVehicleEF	LDT1	0.21	0.85
tblVehicleEF	LDT1	0.21	0.40
tblVehicleEF	LDT2	4.7540e-003	3.3780e-003
tblVehicleEF	LDT2	5.7630e-003	0.06
tblVehicleEF	LDT2	0.68	0.83
tblVehicleEF	LDT2	1.27	2.55
tblVehicleEF	LDT2	330.23	314.65
tblVehicleEF	LDT2	76.02	66.37
tblVehicleEF	LDT2	0.06	0.07
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.06	0.10
tblVehicleEF	LDT2	0.10	0.13

tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.08	0.28
tblVehicleEF	LDT2	3.3070e-003	3.1130e-003
tblVehicleEF	LDT2	7.8100e-004	6.5700e-004
tblVehicleEF	LDT2	0.06	0.10
tblVehicleEF	LDT2	0.10	0.13
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.09	0.31
tblVehicleEF	LDT2	5.3890e-003	3.8410e-003
tblVehicleEF	LDT2	5.0030e-003	0.05
tblVehicleEF	LDT2	0.83	1.02
tblVehicleEF	LDT2	1.13	2.26
tblVehicleEF	LDT2	359.32	336.75
tblVehicleEF	LDT2	76.02	65.79
tblVehicleEF	LDT2	0.06	0.06
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.12	0.20
tblVehicleEF	LDT2	0.12	0.15
tblVehicleEF	LDT2	0.10	0.15
tblVehicleEF	LDT2	0.01	0.02

tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.07	0.25
tblVehicleEF	LDT2	3.6000e-003	3.3320e-003
tblVehicleEF	LDT2	7.7900e-004	6.5100e-004
tblVehicleEF	LDT2	0.12	0.20
tblVehicleEF	LDT2	0.12	0.15
tblVehicleEF	LDT2	0.10	0.15
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.41
tblVehicleEF	LDT2	0.07	0.27
tblVehicleEF	LDT2	4.5710e-003	3.2420e-003
tblVehicleEF	LDT2	5.9350e-003	0.06
tblVehicleEF	LDT2	0.63	0.78
tblVehicleEF	LDT2	1.30	2.62
tblVehicleEF	LDT2	321.50	307.92
tblVehicleEF	LDT2	76.02	66.50
tblVehicleEF	LDT2	0.06	0.07
tblVehicleEF	LDT2	1.6020e-003	1.3640e-003
tblVehicleEF	LDT2	2.3660e-003	1.8030e-003
tblVehicleEF	LDT2	1.4730e-003	1.2560e-003
tblVehicleEF	LDT2	2.1760e-003	1.6580e-003
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.11	0.13
tblVehicleEF	LDT2	0.04	0.07
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.07	0.47
tblVehicleEF	LDT2	0.08	0.29

tblVehicleEF	LDT2	3.2190e-003	3.0460e-003
tblVehicleEF	LDT2	7.8200e-004	6.5800e-004
tblVehicleEF	LDT2	0.05	0.08
tblVehicleEF	LDT2	0.11	0.13
tblVehicleEF	LDT2	0.04	0.07
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.07	0.47
tblVehicleEF	LDT2	0.09	0.32
tblVehicleEF	LHD1	4.9950e-003	4.6360e-003
tblVehicleEF	LHD1	8.5970e-003	4.3560e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.81	0.59
tblVehicleEF	LHD1	2.14	0.90
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.59
tblVehicleEF	LHD1	29.33	10.19
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.91	1.31
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004

tblVehicleEF	LHD1	3.6750e-003	2.8510e-003
tblVehicleEF	LHD1	0.10	0.07
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.8430e-003	1.4280e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.31	0.45
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3400e-004	1.0100e-004
tblVehicleEF	LHD1	3.6750e-003	2.8510e-003
tblVehicleEF	LHD1	0.10	0.07
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.8430e-003	1.4280e-003
tblVehicleEF	LHD1	0.08	0.06
tblVehicleEF	LHD1	0.31	0.45
tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD1	4.9950e-003	4.6470e-003
tblVehicleEF	LHD1	8.7610e-003	4.4230e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.82	0.60
tblVehicleEF	LHD1	2.04	0.86
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.61
tblVehicleEF	LHD1	29.33	10.11
tblVehicleEF	LHD1	0.09	0.08

tblVehicleEF	LHD1	1.80	1.24
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	6.8550e-003	5.3200e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	3.4810e-003	2.7140e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.32	0.46
tblVehicleEF	LHD1	0.22	0.06
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003
tblVehicleEF	LHD1	3.3200e-004	1.0000e-004
tblVehicleEF	LHD1	6.8550e-003	5.3200e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	3.4810e-003	2.7140e-003
tblVehicleEF	LHD1	0.09	0.06
tblVehicleEF	LHD1	0.32	0.46
tblVehicleEF	LHD1	0.24	0.07
tblVehicleEF	LHD1	4.9950e-003	4.6350e-003

tblVehicleEF	LHD1	8.5850e-003	4.3480e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.14	0.17
tblVehicleEF	LHD1	0.81	0.59
tblVehicleEF	LHD1	2.14	0.90
tblVehicleEF	LHD1	9.25	9.30
tblVehicleEF	LHD1	596.36	623.59
tblVehicleEF	LHD1	29.33	10.19
tblVehicleEF	LHD1	0.09	0.08
tblVehicleEF	LHD1	1.89	1.30
tblVehicleEF	LHD1	9.6600e-004	9.8800e-004
tblVehicleEF	LHD1	0.01	0.01
tblVehicleEF	LHD1	0.01	9.8650e-003
tblVehicleEF	LHD1	7.9000e-004	2.1400e-004
tblVehicleEF	LHD1	9.2400e-004	9.4600e-004
tblVehicleEF	LHD1	2.5590e-003	2.5060e-003
tblVehicleEF	LHD1	0.01	9.4190e-003
tblVehicleEF	LHD1	7.2700e-004	1.9700e-004
tblVehicleEF	LHD1	3.2380e-003	2.5030e-003
tblVehicleEF	LHD1	0.11	0.08
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.6810e-003	1.2970e-003
tblVehicleEF	LHD1	0.07	0.05
tblVehicleEF	LHD1	0.33	0.49
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	9.2000e-005	9.0000e-005
tblVehicleEF	LHD1	5.8420e-003	6.0650e-003

tblVehicleEF	LHD1	3.3400e-004	1.0100e-004
tblVehicleEF	LHD1	3.2380e-003	2.5030e-003
tblVehicleEF	LHD1	0.11	0.08
tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.6810e-003	1.2970e-003
tblVehicleEF	LHD1	0.08	0.06
tblVehicleEF	LHD1	0.33	0.49
tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD2	3.3070e-003	3.0000e-003
tblVehicleEF	LHD2	3.5370e-003	3.2750e-003
tblVehicleEF	LHD2	6.6670e-003	7.9190e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.44
tblVehicleEF	LHD2	1.03	0.52
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.68
tblVehicleEF	LHD2	22.93	7.02
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.29	1.45
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005

tblVehicleEF	LHD2	1.3090e-003	1.5300e-003
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	7.0300e-004	7.9000e-004
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4800e-004	6.9000e-005
tblVehicleEF	LHD2	1.3090e-003	1.5300e-003
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	7.0300e-004	7.9000e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	LHD2	3.3070e-003	3.0070e-003
tblVehicleEF	LHD2	3.5730e-003	3.2970e-003
tblVehicleEF	LHD2	6.4430e-003	7.6530e-003
tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.45
tblVehicleEF	LHD2	0.98	0.50
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.69
tblVehicleEF	LHD2	22.93	6.98
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.22	1.37

tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005
tblVehicleEF	LHD2	2.4680e-003	2.8830e-003
tblVehicleEF	LHD2	0.04	0.05
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	1.3130e-003	1.4920e-003
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4700e-004	6.9000e-005
tblVehicleEF	LHD2	2.4680e-003	2.8830e-003
tblVehicleEF	LHD2	0.04	0.05
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	1.3130e-003	1.4920e-003
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.07	0.22
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	LHD2	3.3070e-003	2.9980e-003
tblVehicleEF	LHD2	3.5300e-003	3.2690e-003
tblVehicleEF	LHD2	6.7050e-003	7.9760e-003

tblVehicleEF	LHD2	0.12	0.13
tblVehicleEF	LHD2	0.40	0.44
tblVehicleEF	LHD2	1.03	0.52
tblVehicleEF	LHD2	14.34	14.66
tblVehicleEF	LHD2	592.89	622.68
tblVehicleEF	LHD2	22.93	7.03
tblVehicleEF	LHD2	0.11	0.12
tblVehicleEF	LHD2	1.28	1.44
tblVehicleEF	LHD2	1.2850e-003	1.4570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5700e-004	1.0600e-004
tblVehicleEF	LHD2	1.2290e-003	1.3940e-003
tblVehicleEF	LHD2	2.7020e-003	2.7150e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.2800e-004	9.7000e-005
tblVehicleEF	LHD2	1.0230e-003	1.1840e-003
tblVehicleEF	LHD2	0.04	0.04
tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	5.9800e-004	6.5900e-004
tblVehicleEF	LHD2	0.05	0.05
tblVehicleEF	LHD2	0.08	0.24
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	5.7620e-003	5.9990e-003
tblVehicleEF	LHD2	2.4800e-004	7.0000e-005
tblVehicleEF	LHD2	1.0230e-003	1.1840e-003
tblVehicleEF	LHD2	0.04	0.04

tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	5.9800e-004	6.5900e-004
tblVehicleEF	LHD2	0.06	0.06
tblVehicleEF	LHD2	0.08	0.24
tblVehicleEF	LHD2	0.10	0.04
tblVehicleEF	MCY	0.43	0.32
tblVehicleEF	MCY	0.15	0.24
tblVehicleEF	MCY	18.81	18.95
tblVehicleEF	MCY	9.70	8.59
tblVehicleEF	MCY	166.71	208.09
tblVehicleEF	MCY	45.36	60.09
tblVehicleEF	MCY	1.12	1.12
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	1.69	1.67
tblVehicleEF	MCY	0.83	0.84
tblVehicleEF	MCY	0.92	0.90
tblVehicleEF	MCY	2.11	2.12
tblVehicleEF	MCY	0.55	1.77
tblVehicleEF	MCY	2.05	1.81
tblVehicleEF	MCY	2.0360e-003	2.0590e-003
tblVehicleEF	MCY	6.7200e-004	5.9500e-004
tblVehicleEF	MCY	1.69	1.67
tblVehicleEF	MCY	0.83	0.84
tblVehicleEF	MCY	0.92	0.90

tblVehicleEF	MCY	2.61	2.62
tblVehicleEF	MCY	0.55	1.77
tblVehicleEF	MCY	2.23	1.97
tblVehicleEF	MCY	0.42	0.31
tblVehicleEF	MCY	0.13	0.22
tblVehicleEF	MCY	19.51	19.61
tblVehicleEF	MCY	9.10	8.00
tblVehicleEF	MCY	166.71	209.06
tblVehicleEF	MCY	45.36	58.52
tblVehicleEF	MCY	0.97	0.97
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	3.35	3.31
tblVehicleEF	MCY	1.23	1.24
tblVehicleEF	MCY	2.09	2.05
tblVehicleEF	MCY	2.09	2.10
tblVehicleEF	MCY	0.55	1.76
tblVehicleEF	MCY	1.84	1.62
tblVehicleEF	MCY	2.0460e-003	2.0690e-003
tblVehicleEF	MCY	6.5600e-004	5.7900e-004
tblVehicleEF	MCY	3.35	3.31
tblVehicleEF	MCY	1.23	1.24
tblVehicleEF	MCY	2.09	2.05
tblVehicleEF	MCY	2.59	2.60
tblVehicleEF	MCY	0.55	1.76

tblVehicleEF	MCY	2.00	1.76
tblVehicleEF	MCY	0.42	0.31
tblVehicleEF	MCY	0.15	0.24
tblVehicleEF	MCY	18.37	18.50
tblVehicleEF	MCY	9.67	8.54
tblVehicleEF	MCY	166.71	207.36
tblVehicleEF	MCY	45.36	60.03
tblVehicleEF	MCY	1.12	1.12
tblVehicleEF	MCY	1.8630e-003	1.8420e-003
tblVehicleEF	MCY	3.2830e-003	2.7900e-003
tblVehicleEF	MCY	1.7410e-003	1.7220e-003
tblVehicleEF	MCY	3.0870e-003	2.6220e-003
tblVehicleEF	MCY	1.59	1.59
tblVehicleEF	MCY	1.02	1.03
tblVehicleEF	MCY	0.73	0.73
tblVehicleEF	MCY	2.11	2.11
tblVehicleEF	MCY	0.63	2.01
tblVehicleEF	MCY	2.06	1.81
tblVehicleEF	MCY	2.0290e-003	2.0520e-003
tblVehicleEF	MCY	6.7200e-004	5.9400e-004
tblVehicleEF	MCY	1.59	1.59
tblVehicleEF	MCY	1.02	1.03
tblVehicleEF	MCY	0.73	0.73
tblVehicleEF	MCY	2.61	2.61
tblVehicleEF	MCY	0.63	2.01
tblVehicleEF	MCY	2.24	1.98
tblVehicleEF	MDV	9.8990e-003	4.3280e-003

tblVehicleEF	MDV	0.01	0.08
tblVehicleEF	MDV	1.15	0.95
tblVehicleEF	MDV	2.62	2.95
tblVehicleEF	MDV	458.82	394.25
tblVehicleEF	MDV	104.21	82.79
tblVehicleEF	MDV	0.13	0.09
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.11	0.12
tblVehicleEF	MDV	0.19	0.16
tblVehicleEF	MDV	0.09	0.11
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.20	0.37
tblVehicleEF	MDV	4.5960e-003	3.8980e-003
tblVehicleEF	MDV	1.0880e-003	8.1900e-004
tblVehicleEF	MDV	0.11	0.12
tblVehicleEF	MDV	0.19	0.16
tblVehicleEF	MDV	0.09	0.11
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.22	0.41
tblVehicleEF	MDV	0.01	4.9300e-003
tblVehicleEF	MDV	0.01	0.07
tblVehicleEF	MDV	1.41	1.16

tblVehicleEF	MDV	2.31	2.60
tblVehicleEF	MDV	498.05	417.67
tblVehicleEF	MDV	104.21	82.07
tblVehicleEF	MDV	0.13	0.08
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.21	0.24
tblVehicleEF	MDV	0.22	0.18
tblVehicleEF	MDV	0.16	0.20
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.17	0.32
tblVehicleEF	MDV	4.9910e-003	4.1290e-003
tblVehicleEF	MDV	1.0820e-003	8.1200e-004
tblVehicleEF	MDV	0.21	0.24
tblVehicleEF	MDV	0.22	0.18
tblVehicleEF	MDV	0.16	0.20
tblVehicleEF	MDV	0.04	0.03
tblVehicleEF	MDV	0.11	0.48
tblVehicleEF	MDV	0.19	0.35
tblVehicleEF	MDV	9.5100e-003	4.1550e-003
tblVehicleEF	MDV	0.02	0.08
tblVehicleEF	MDV	1.08	0.89
tblVehicleEF	MDV	2.68	3.02
tblVehicleEF	MDV	447.05	387.19

tblVehicleEF	MDV	104.21	82.93
tblVehicleEF	MDV	0.13	0.09
tblVehicleEF	MDV	1.6580e-003	1.4210e-003
tblVehicleEF	MDV	2.3780e-003	1.8580e-003
tblVehicleEF	MDV	1.5280e-003	1.3110e-003
tblVehicleEF	MDV	2.1870e-003	1.7090e-003
tblVehicleEF	MDV	0.08	0.10
tblVehicleEF	MDV	0.20	0.17
tblVehicleEF	MDV	0.08	0.09
tblVehicleEF	MDV	0.02	0.02
tblVehicleEF	MDV	0.13	0.54
tblVehicleEF	MDV	0.20	0.38
tblVehicleEF	MDV	4.4770e-003	3.8280e-003
tblVehicleEF	MDV	1.0890e-003	8.2100e-004
tblVehicleEF	MDV	0.08	0.10
tblVehicleEF	MDV	0.20	0.17
tblVehicleEF	MDV	0.08	0.09
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.13	0.54
tblVehicleEF	MDV	0.22	0.42
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	2.00	0.32
tblVehicleEF	MH	5.24	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.48	4.16

tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.08	0.00
tblVehicleEF	MH	0.49	0.00
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.31	0.00
tblVehicleEF	MH	9.8680e-003	8.7750e-003
tblVehicleEF	MH	6.6300e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.08	0.00
tblVehicleEF	MH	0.49	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.34	0.00
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	2.05	0.32
tblVehicleEF	MH	4.88	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.37	3.92

tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	2.52	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.94	0.00
tblVehicleEF	MH	0.08	0.07
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.30	0.00
tblVehicleEF	MH	9.8690e-003	8.7750e-003
tblVehicleEF	MH	6.5700e-004	0.00
tblVehicleEF	MH	2.52	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.94	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	0.32	0.00
tblVehicleEF	MH	0.02	3.2090e-003
tblVehicleEF	MH	0.02	0.00
tblVehicleEF	MH	1.99	0.32
tblVehicleEF	MH	5.28	0.00
tblVehicleEF	MH	995.46	928.22
tblVehicleEF	MH	57.13	0.00
tblVehicleEF	MH	1.46	4.12

tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	9.7800e-004	0.00
tblVehicleEF	MH	3.2460e-003	4.0000e-003
tblVehicleEF	MH	0.04	0.13
tblVehicleEF	MH	8.9900e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.47	0.00
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.03	0.00
tblVehicleEF	MH	0.31	0.00
tblVehicleEF	MH	9.8680e-003	8.7750e-003
tblVehicleEF	MH	6.6300e-004	0.00
tblVehicleEF	MH	1.38	0.00
tblVehicleEF	MH	0.09	0.00
tblVehicleEF	MH	0.47	0.00
tblVehicleEF	MH	0.10	0.08
tblVehicleEF	MH	0.03	0.00
tblVehicleEF	MH	0.34	0.00
tblVehicleEF	MHD	0.02	3.2310e-003
tblVehicleEF	MHD	2.5650e-003	1.3290e-003
tblVehicleEF	MHD	0.05	8.5180e-003
tblVehicleEF	MHD	0.32	0.36
tblVehicleEF	MHD	0.21	0.17
tblVehicleEF	MHD	5.07	0.97
tblVehicleEF	MHD	148.43	69.20

tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.50
tblVehicleEF	MHD	0.41	0.40
tblVehicleEF	MHD	0.47	0.90
tblVehicleEF	MHD	1.3500e-004	4.2800e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.2900e-004	4.0900e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	1.5020e-003	6.5600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	7.6500e-004	3.3500e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.31	0.04
tblVehicleEF	MHD	1.4270e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3400e-004	8.4000e-005
tblVehicleEF	MHD	1.5020e-003	6.5600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	7.6500e-004	3.3500e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.34	0.05

tblVehicleEF	MHD	0.02	3.0750e-003
tblVehicleEF	MHD	2.5980e-003	1.3500e-003
tblVehicleEF	MHD	0.05	8.2390e-003
tblVehicleEF	MHD	0.23	0.31
tblVehicleEF	MHD	0.21	0.18
tblVehicleEF	MHD	4.84	0.93
tblVehicleEF	MHD	157.22	69.18
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.42
tblVehicleEF	MHD	0.42	0.39
tblVehicleEF	MHD	0.44	0.85
tblVehicleEF	MHD	1.1400e-004	3.6400e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.0900e-004	3.4800e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	2.8970e-003	1.2520e-003
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	1.4710e-003	6.4800e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.30	0.04
tblVehicleEF	MHD	1.5100e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3000e-004	8.3000e-005

tblVehicleEF	MHD	2.8970e-003	1.2520e-003
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	1.4710e-003	6.4800e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.33	0.05
tblVehicleEF	MHD	0.02	3.4570e-003
tblVehicleEF	MHD	2.5410e-003	1.3140e-003
tblVehicleEF	MHD	0.05	8.5940e-003
tblVehicleEF	MHD	0.44	0.42
tblVehicleEF	MHD	0.21	0.17
tblVehicleEF	MHD	5.15	0.99
tblVehicleEF	MHD	136.28	69.22
tblVehicleEF	MHD	1,056.49	939.42
tblVehicleEF	MHD	54.56	8.52
tblVehicleEF	MHD	0.39	0.41
tblVehicleEF	MHD	0.46	0.89
tblVehicleEF	MHD	1.6400e-004	5.1700e-004
tblVehicleEF	MHD	2.6660e-003	9.3850e-003
tblVehicleEF	MHD	7.3000e-004	9.6000e-005
tblVehicleEF	MHD	1.5700e-004	4.9400e-004
tblVehicleEF	MHD	2.5470e-003	8.9760e-003
tblVehicleEF	MHD	6.7100e-004	8.9000e-005
tblVehicleEF	MHD	1.0970e-003	4.9200e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02

tblVehicleEF	MHD	5.9600e-004	2.6700e-004
tblVehicleEF	MHD	0.02	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.31	0.05
tblVehicleEF	MHD	1.3130e-003	6.5600e-004
tblVehicleEF	MHD	0.01	8.9480e-003
tblVehicleEF	MHD	6.3600e-004	8.4000e-005
tblVehicleEF	MHD	1.0970e-003	4.9200e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.02
tblVehicleEF	MHD	5.9600e-004	2.6700e-004
tblVehicleEF	MHD	0.03	0.01
tblVehicleEF	MHD	0.02	0.10
tblVehicleEF	MHD	0.34	0.05
tblVehicleEF	OBUS	0.01	8.5500e-003
tblVehicleEF	OBUS	5.6790e-003	4.7720e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.25	0.50
tblVehicleEF	OBUS	0.39	0.58
tblVehicleEF	OBUS	5.52	2.45
tblVehicleEF	OBUS	68.59	68.17
tblVehicleEF	OBUS	1,085.33	1,337.43
tblVehicleEF	OBUS	69.49	20.30
tblVehicleEF	OBUS	0.13	0.25
tblVehicleEF	OBUS	0.35	0.81
tblVehicleEF	OBUS	1.2000e-005	8.2000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003

tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.1000e-005	7.8000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	2.0910e-003	2.6360e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	9.0600e-004	1.1390e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.34	0.12
tblVehicleEF	OBUS	6.6700e-004	6.5100e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.9200e-004	2.0100e-004
tblVehicleEF	OBUS	2.0910e-003	2.6360e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.04	0.06
tblVehicleEF	OBUS	9.0600e-004	1.1390e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.38	0.13
tblVehicleEF	OBUS	0.01	8.6200e-003
tblVehicleEF	OBUS	5.7930e-003	4.8760e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.24	0.50
tblVehicleEF	OBUS	0.40	0.59
tblVehicleEF	OBUS	5.16	2.29

tblVehicleEF	OBUS	71.65	67.44
tblVehicleEF	OBUS	1,085.33	1,337.45
tblVehicleEF	OBUS	69.49	20.03
tblVehicleEF	OBUS	0.14	0.23
tblVehicleEF	OBUS	0.33	0.75
tblVehicleEF	OBUS	1.0000e-005	7.3000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.0000e-005	6.9000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	3.8840e-003	4.8010e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	1.7290e-003	2.1640e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.27
tblVehicleEF	OBUS	0.33	0.11
tblVehicleEF	OBUS	6.9600e-004	6.4400e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.8600e-004	1.9800e-004
tblVehicleEF	OBUS	3.8840e-003	4.8010e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.04	0.06
tblVehicleEF	OBUS	1.7290e-003	2.1640e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.27

tblVehicleEF	OBUS	0.36	0.12
tblVehicleEF	OBUS	0.01	8.4810e-003
tblVehicleEF	OBUS	5.6610e-003	4.7410e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.25	0.51
tblVehicleEF	OBUS	0.39	0.58
tblVehicleEF	OBUS	5.57	2.48
tblVehicleEF	OBUS	64.36	69.17
tblVehicleEF	OBUS	1,085.33	1,337.43
tblVehicleEF	OBUS	69.49	20.34
tblVehicleEF	OBUS	0.13	0.26
tblVehicleEF	OBUS	0.35	0.81
tblVehicleEF	OBUS	1.5000e-005	9.4000e-005
tblVehicleEF	OBUS	1.9500e-003	7.9710e-003
tblVehicleEF	OBUS	8.7100e-004	1.9800e-004
tblVehicleEF	OBUS	1.4000e-005	9.0000e-005
tblVehicleEF	OBUS	1.8490e-003	7.6120e-003
tblVehicleEF	OBUS	8.0000e-004	1.8200e-004
tblVehicleEF	OBUS	1.7990e-003	2.3770e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	8.3400e-004	1.0810e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.28
tblVehicleEF	OBUS	0.35	0.12
tblVehicleEF	OBUS	6.2600e-004	6.6000e-004
tblVehicleEF	OBUS	0.01	0.01

tblVehicleEF	OBUS	7.9300e-004	2.0100e-004
tblVehicleEF	OBUS	1.7990e-003	2.3770e-003
tblVehicleEF	OBUS	0.02	0.03
tblVehicleEF	OBUS	0.05	0.06
tblVehicleEF	OBUS	8.3400e-004	1.0810e-003
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.05	0.28
tblVehicleEF	OBUS	0.38	0.13
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.5650e-003	6.1380e-003
tblVehicleEF	SBUS	0.06	7.1540e-003
tblVehicleEF	SBUS	7.84	3.12
tblVehicleEF	SBUS	0.57	0.50
tblVehicleEF	SBUS	6.44	0.94
tblVehicleEF	SBUS	1,128.57	363.20
tblVehicleEF	SBUS	1,093.03	1,093.96
tblVehicleEF	SBUS	55.12	6.12
tblVehicleEF	SBUS	8.81	3.37
tblVehicleEF	SBUS	3.97	4.43
tblVehicleEF	SBUS	8.4250e-003	3.4460e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	8.0610e-003	3.2970e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005

tblVehicleEF	SBUS	5.0680e-003	1.5010e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.93	0.37
tblVehicleEF	SBUS	2.4310e-003	7.2500e-004
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.36	0.04
tblVehicleEF	SBUS	0.01	3.4700e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.6300e-004	6.1000e-005
tblVehicleEF	SBUS	5.0680e-003	1.5010e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	2.4310e-003	7.2500e-004
tblVehicleEF	SBUS	0.12	0.10
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.39	0.05
tblVehicleEF	SBUS	0.82	0.08
tblVehicleEF	SBUS	9.7050e-003	6.2090e-003
tblVehicleEF	SBUS	0.05	5.9970e-003
tblVehicleEF	SBUS	7.74	3.09
tblVehicleEF	SBUS	0.58	0.50
tblVehicleEF	SBUS	4.67	0.68
tblVehicleEF	SBUS	1,179.47	372.25
tblVehicleEF	SBUS	1,093.03	1,093.97
tblVehicleEF	SBUS	55.12	5.68
tblVehicleEF	SBUS	9.10	3.45

tblVehicleEF	SBUS	3.73	4.17
tblVehicleEF	SBUS	7.1020e-003	2.9130e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	6.7950e-003	2.7870e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	9.1290e-003	2.7020e-003
tblVehicleEF	SBUS	0.04	0.01
tblVehicleEF	SBUS	0.92	0.37
tblVehicleEF	SBUS	4.4980e-003	1.3370e-003
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.30	0.03
tblVehicleEF	SBUS	0.01	3.5550e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	6.3300e-004	5.6000e-005
tblVehicleEF	SBUS	9.1290e-003	2.7020e-003
tblVehicleEF	SBUS	0.04	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	4.4980e-003	1.3370e-003
tblVehicleEF	SBUS	0.12	0.11
tblVehicleEF	SBUS	0.02	0.06
tblVehicleEF	SBUS	0.33	0.04
tblVehicleEF	SBUS	0.82	0.08

tblVehicleEF	SBUS	9.5210e-003	6.1310e-003
tblVehicleEF	SBUS	0.06	7.4110e-003
tblVehicleEF	SBUS	8.00	3.17
tblVehicleEF	SBUS	0.57	0.50
tblVehicleEF	SBUS	6.79	0.98
tblVehicleEF	SBUS	1,058.28	350.71
tblVehicleEF	SBUS	1,093.03	1,093.96
tblVehicleEF	SBUS	55.12	6.19
tblVehicleEF	SBUS	8.43	3.26
tblVehicleEF	SBUS	3.93	4.40
tblVehicleEF	SBUS	0.01	4.1830e-003
tblVehicleEF	SBUS	0.01	0.01
tblVehicleEF	SBUS	0.02	0.03
tblVehicleEF	SBUS	5.0000e-004	4.4000e-005
tblVehicleEF	SBUS	9.8080e-003	4.0020e-003
tblVehicleEF	SBUS	2.6870e-003	2.6490e-003
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	4.6000e-004	4.1000e-005
tblVehicleEF	SBUS	4.3640e-003	1.2920e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.93	0.37
tblVehicleEF	SBUS	2.3310e-003	6.9700e-004
tblVehicleEF	SBUS	0.10	0.09
tblVehicleEF	SBUS	0.02	0.07
tblVehicleEF	SBUS	0.37	0.04
tblVehicleEF	SBUS	0.01	3.3520e-003
tblVehicleEF	SBUS	0.01	0.01

tblVehicleEF	SBUS	6.6900e-004	6.1000e-005
tblVehicleEF	SBUS	4.3640e-003	1.2920e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.34	0.53
tblVehicleEF	SBUS	2.3310e-003	6.9700e-004
tblVehicleEF	SBUS	0.12	0.10
tblVehicleEF	SBUS	0.02	0.07
tblVehicleEF	SBUS	0.40	0.05
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.08	0.02
tblVehicleEF	UBUS	7.52	26.09
tblVehicleEF	UBUS	13.83	1.44
tblVehicleEF	UBUS	1,788.21	1,610.65
tblVehicleEF	UBUS	153.17	17.72
tblVehicleEF	UBUS	3.79	0.32
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	9.0420e-003	1.9590e-003
tblVehicleEF	UBUS	0.10	0.01
tblVehicleEF	UBUS	4.5390e-003	8.8500e-004
tblVehicleEF	UBUS	0.42	0.05

tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.09	0.07
tblVehicleEF	UBUS	9.5090e-003	4.8150e-003
tblVehicleEF	UBUS	1.7820e-003	1.7500e-004
tblVehicleEF	UBUS	9.0420e-003	1.9590e-003
tblVehicleEF	UBUS	0.10	0.01
tblVehicleEF	UBUS	4.5390e-003	8.8500e-004
tblVehicleEF	UBUS	1.82	3.43
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.19	0.08
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.07	0.02
tblVehicleEF	UBUS	7.58	26.09
tblVehicleEF	UBUS	11.85	1.22
tblVehicleEF	UBUS	1,788.21	1,610.66
tblVehicleEF	UBUS	153.17	17.36
tblVehicleEF	UBUS	3.53	0.31
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004
tblVehicleEF	UBUS	0.02	3.4780e-003
tblVehicleEF	UBUS	0.13	0.01

tblVehicleEF	UBUS	9.0520e-003	1.7490e-003
tblVehicleEF	UBUS	0.43	0.05
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	0.99	0.07
tblVehicleEF	UBUS	9.5110e-003	4.8150e-003
tblVehicleEF	UBUS	1.7480e-003	1.7200e-004
tblVehicleEF	UBUS	0.02	3.4780e-003
tblVehicleEF	UBUS	0.13	0.01
tblVehicleEF	UBUS	9.0520e-003	1.7490e-003
tblVehicleEF	UBUS	1.83	3.43
tblVehicleEF	UBUS	0.02	0.06
tblVehicleEF	UBUS	1.09	0.07
tblVehicleEF	UBUS	1.36	3.35
tblVehicleEF	UBUS	0.08	0.02
tblVehicleEF	UBUS	7.51	26.09
tblVehicleEF	UBUS	14.02	1.42
tblVehicleEF	UBUS	1,788.21	1,610.65
tblVehicleEF	UBUS	153.17	17.70
tblVehicleEF	UBUS	3.75	0.31
tblVehicleEF	UBUS	0.49	0.09
tblVehicleEF	UBUS	0.01	0.02
tblVehicleEF	UBUS	0.04	2.7900e-003
tblVehicleEF	UBUS	1.4880e-003	1.7300e-004
tblVehicleEF	UBUS	0.21	0.04
tblVehicleEF	UBUS	3.0000e-003	5.4780e-003
tblVehicleEF	UBUS	0.04	2.6530e-003
tblVehicleEF	UBUS	1.3680e-003	1.5900e-004

tblVehicleEF	UBUS	8.1990e-003	1.9860e-003
tblVehicleEF	UBUS	0.12	0.01
tblVehicleEF	UBUS	4.1400e-003	9.2700e-004
tblVehicleEF	UBUS	0.42	0.05
tblVehicleEF	UBUS	0.03	0.07
tblVehicleEF	UBUS	1.10	0.07
tblVehicleEF	UBUS	9.5090e-003	4.8150e-003
tblVehicleEF	UBUS	1.7850e-003	1.7500e-004
tblVehicleEF	UBUS	8.1990e-003	1.9860e-003
tblVehicleEF	UBUS	0.12	0.01
tblVehicleEF	UBUS	4.1400e-003	9.2700e-004
tblVehicleEF	UBUS	1.82	3.43
tblVehicleEF	UBUS	0.03	0.07
tblVehicleEF	UBUS	1.20	0.08
tblVehicleTrips	WD_TR	12.89	30.10

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.2755	3.0393	1.5015	4.5300e-003	0.8318	0.1210	0.9528	0.3375	0.1119	0.4493	0.0000	401.6776	401.6776	0.1014	0.0000	404.2121
2023	0.3545	2.2704	1.7336	4.6400e-003	0.0882	0.0927	0.1809	0.0224	0.0865	0.1089	0.0000	409.1902	409.1902	0.0887	0.0000	411.4083
Maximum	**0.3545**	**3.0393**	**1.7336**	**4.6400e-003**	**0.8318**	**0.1210**	**0.9528**	**0.3375**	**0.1119**	**0.4493**	**0.0000**	**409.1902**	**409.1902**	**0.1014**	**0.0000**	**411.4083**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.2755	3.0393	1.5015	4.5300e-003	0.3554	0.1210	0.4764	0.1400	0.1119	0.2518	0.0000	401.6772	401.6772	0.1014	0.0000	404.2117
2023	0.3545	2.2704	1.7336	4.6400e-003	0.0814	0.0927	0.1741	0.0214	0.0865	0.1079	0.0000	409.1899	409.1899	0.0887	0.0000	411.4079
Maximum	**0.3545**	**3.0393**	**1.7336**	**4.6400e-003**	**0.3554**	**0.1210**	**0.4764**	**0.1400**	**0.1119**	**0.2518**	**0.0000**	**409.1899**	**409.1899**	**0.1014**	**0.0000**	**411.4079**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**52.52**	**0.00**	**42.62**	**55.16**	**0.00**	**35.56**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	8-1-2022	10-31-2022	2.4739	2.4739
2	11-1-2022	1-31-2023	1.1314	1.1314
3	2-1-2023	4-30-2023	0.9988	0.9988
4	5-1-2023	7-31-2023	1.2222	1.2222
5	8-1-2023	9-30-2023	0.0347	0.0347
		Highest	2.4739	2.4739

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1815	1.0000e-005	1.1800e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.3000e-003	2.3000e-003	1.0000e-005	0.0000	2.4500e-003
Energy	1.4900e-003	0.0136	0.0114	8.0000e-005		1.0300e-003	1.0300e-003		1.0300e-003	1.0300e-003	0.0000	90.4312	90.4312	3.4100e-003	9.2000e-004	90.7897
Mobile	0.3908	1.8585	4.3494	0.0164	1.5122	0.0166	1.5288	0.4048	0.0156	0.4204	0.0000	1,533.7605	1,533.7605	0.0528	0.0000	1,535.0792
Waste						0.0000	0.0000		0.0000	0.0000	10.9514	0.0000	10.9514	0.6472	0.0000	27.1315
Water						0.0000	0.0000		0.0000	0.0000	0.4372	18.2602	18.6974	0.0457	1.2200e-003	20.2012
Total	**0.5737**	**1.8720**	**4.3620**	**0.0165**	**1.5122**	**0.0176**	**1.5298**	**0.4048**	**0.0167**	**0.4215**	**11.3885**	**1,642.4542**	**1,653.8428**	**0.7490**	**2.1400e-003**	**1,673.2041**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1815	1.0000e-005	1.1800e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.3000e-003	2.3000e-003	1.0000e-005	0.0000	2.4500e-003
Energy	1.4900e-003	0.0136	0.0114	8.0000e-005		1.0300e-003	1.0300e-003		1.0300e-003	1.0300e-003	0.0000	90.4312	90.4312	3.4100e-003	9.2000e-004	90.7897
Mobile	0.3908	1.8585	4.3494	0.0164	1.5122	0.0166	1.5288	0.4048	0.0156	0.4204	0.0000	1,533.7605	1,533.7605	0.0528	0.0000	1,535.0792
Waste						0.0000	0.0000		0.0000	0.0000	10.9514	0.0000	10.9514	0.6472	0.0000	27.1315
Water						0.0000	0.0000		0.0000	0.0000	0.4372	18.2602	18.6974	0.0457	1.2200e-003	20.2012
Total	**0.5737**	**1.8720**	**4.3620**	**0.0165**	**1.5122**	**0.0176**	**1.5298**	**0.4048**	**0.0167**	**0.4215**	**11.3885**	**1,642.4542**	**1,653.8428**	**0.7490**	**2.1400e-003**	**1,673.2041**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/1/2022	9/30/2022	5	45	
2	Grading	Grading	8/1/2022	9/30/2022	5	45	
3	Building Construction	Building Construction	10/1/2022	6/23/2023	5	190	
4	Paving	Paving	5/28/2023	6/23/2023	5	20	
5	Architectural Coating	Architectural Coating	5/28/2023	6/23/2023	5	20	
6	Demolition	Demolition	6/24/2023	8/4/2023	5	30	

Acres of Grading (Site Preparation Phase): 225

Acres of Grading (Grading Phase): 225

Acres of Paving: 3.56

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 62,250; Non-Residential Outdoor: 20,750; Striped Parking Area: 9,306 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Crawler Tractors	4	8.00	212	0.43
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Grading	Crawler Tractors	3	8.00	212	0.43
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Crawler Tractors	3	8.00	212	0.43
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Cement and Mortar Mixers	2	8.00	9	0.56
Paving	Crawler Tractors	1	8.00	212	0.43
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	100.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	750.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	83.00	32.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	17.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5258	0.0000	0.5258	0.2363	0.0000	0.2363	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1008	1.1343	0.4501	1.2800e-003		0.0486	0.0486		0.0447	0.0447	0.0000	112.6159	112.6159	0.0364	0.0000	113.5265
Total	**0.1008**	**1.1343**	**0.4501**	**1.2800e-003**	**0.5258**	**0.0486**	**0.5744**	**0.2363**	**0.0447**	**0.2810**	**0.0000**	**112.6159**	**112.6159**	**0.0364**	**0.0000**	**113.5265**

3.2 Site Preparation - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.6300e-003	1.0500e-003	0.0117	4.0000e-005	4.4500e-003	3.0000e-005	4.4800e-003	1.1800e-003	2.0000e-005	1.2100e-003	0.0000	3.4685	3.4685	8.0000e-005	0.0000	3.4704
Total	**1.6300e-003**	**1.0500e-003**	**0.0117**	**4.0000e-005**	**4.4500e-003**	**3.0000e-005**	**4.4800e-003**	**1.1800e-003**	**2.0000e-005**	**1.2100e-003**	**0.0000**	**3.4685**	**3.4685**	**8.0000e-005**	**0.0000**	**3.4704**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2051	0.0000	0.2051	0.0922	0.0000	0.0922	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1008	1.1343	0.4501	1.2800e-003		0.0486	0.0486		0.0447	0.0447	0.0000	112.6158	112.6158	0.0364	0.0000	113.5263
Total	**0.1008**	**1.1343**	**0.4501**	**1.2800e-003**	**0.2051**	**0.0486**	**0.2536**	**0.0922**	**0.0447**	**0.1369**	**0.0000**	**112.6158**	**112.6158**	**0.0364**	**0.0000**	**113.5263**

3.2 Site Preparation - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.6300e-003	1.0500e-003	0.0117	4.0000e-005	4.4500e-003	3.0000e-005	4.4800e-003	1.1800e-003	2.0000e-005	1.2100e-003	0.0000	3.4685	3.4685	8.0000e-005	0.0000	3.4704
Total	**1.6300e-003**	**1.0500e-003**	**0.0117**	**4.0000e-005**	**4.4500e-003**	**3.0000e-005**	**4.4800e-003**	**1.1800e-003**	**2.0000e-005**	**1.2100e-003**	**0.0000**	**3.4685**	**3.4685**	**8.0000e-005**	**0.0000**	**3.4704**

3.3 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2552	0.0000	0.2552	0.0874	0.0000	0.0874	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0659	0.7617	0.3488	9.9000e-004		0.0304	0.0304		0.0280	0.0280	0.0000	86.6562	86.6562	0.0280	0.0000	87.3569
Total	**0.0659**	**0.7617**	**0.3488**	**9.9000e-004**	**0.2552**	**0.0304**	**0.2856**	**0.0874**	**0.0280**	**0.1154**	**0.0000**	**86.6562**	**86.6562**	**0.0280**	**0.0000**	**87.3569**

3.3 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.7500e-003	0.0758	0.0111	2.8000e-004	6.4600e-003	2.1000e-004	6.6700e-003	1.7700e-003	2.0000e-004	1.9700e-003	0.0000	26.5971	26.5971	1.5800e-003	0.0000	26.6365
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3600e-003	8.8000e-004	9.7900e-003	3.0000e-005	3.7100e-003	2.0000e-005	3.7300e-003	9.9000e-004	2.0000e-005	1.0000e-003	0.0000	2.8904	2.8904	6.0000e-005	0.0000	2.8920
Total	**3.1100e-003**	**0.0766**	**0.0209**	**3.1000e-004**	**0.0102**	**2.3000e-004**	**0.0104**	**2.7600e-003**	**2.2000e-004**	**2.9700e-003**	**0.0000**	**29.4875**	**29.4875**	**1.6400e-003**	**0.0000**	**29.5285**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0995	0.0000	0.0995	0.0341	0.0000	0.0341	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0659	0.7617	0.3488	9.9000e-004		0.0304	0.0304		0.0280	0.0280	0.0000	86.6561	86.6561	0.0280	0.0000	87.3568
Total	**0.0659**	**0.7617**	**0.3488**	**9.9000e-004**	**0.0995**	**0.0304**	**0.1299**	**0.0341**	**0.0280**	**0.0621**	**0.0000**	**86.6561**	**86.6561**	**0.0280**	**0.0000**	**87.3568**

3.3 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.7500e-003	0.0758	0.0111	2.8000e-004	6.4600e-003	2.1000e-004	6.6700e-003	1.7700e-003	2.0000e-004	1.9700e-003	0.0000	26.5971	26.5971	1.5800e-003	0.0000	26.6365
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3600e-003	8.8000e-004	9.7900e-003	3.0000e-005	3.7100e-003	2.0000e-005	3.7300e-003	9.9000e-004	2.0000e-005	1.0000e-003	0.0000	2.8904	2.8904	6.0000e-005	0.0000	2.8920
Total	**3.1100e-003**	**0.0766**	**0.0209**	**3.1000e-004**	**0.0102**	**2.3000e-004**	**0.0104**	**2.7600e-003**	**2.2000e-004**	**2.9700e-003**	**0.0000**	**29.4875**	**29.4875**	**1.6400e-003**	**0.0000**	**29.5285**

3.4 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0909	0.9673	0.5743	1.4000e-003		0.0414	0.0414		0.0387	0.0387	0.0000	121.1929	121.1929	0.0329	0.0000	122.0149
Total	**0.0909**	**0.9673**	**0.5743**	**1.4000e-003**		**0.0414**	**0.0414**		**0.0387**	**0.0387**	**0.0000**	**121.1929**	**121.1929**	**0.0329**	**0.0000**	**122.0149**

3.4 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3200e-003	0.0914	0.0174	2.6000e-004	6.5700e-003	1.6000e-004	6.7200e-003	1.8900e-003	1.5000e-004	2.0400e-003	0.0000	25.1550	25.1550	1.8300e-003	0.0000	25.2008
Worker	0.0108	7.0100e-003	0.0782	2.6000e-004	0.0297	1.7000e-004	0.0298	7.8700e-003	1.6000e-004	8.0300e-003	0.0000	23.1017	23.1017	5.0000e-004	0.0000	23.1142
Total	**0.0132**	**0.0984**	**0.0956**	**5.2000e-004**	**0.0362**	**3.3000e-004**	**0.0365**	**9.7600e-003**	**3.1000e-004**	**0.0101**	**0.0000**	**48.2566**	**48.2566**	**2.3300e-003**	**0.0000**	**48.3150**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0909	0.9673	0.5743	1.4000e-003		0.0414	0.0414		0.0387	0.0387	0.0000	121.1928	121.1928	0.0329	0.0000	122.0148
Total	**0.0909**	**0.9673**	**0.5743**	**1.4000e-003**		**0.0414**	**0.0414**		**0.0387**	**0.0387**	**0.0000**	**121.1928**	**121.1928**	**0.0329**	**0.0000**	**122.0148**

3.4 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3200e-003	0.0914	0.0174	2.6000e-004	6.5700e-003	1.6000e-004	6.7200e-003	1.8900e-003	1.5000e-004	2.0400e-003	0.0000	25.1550	25.1550	1.8300e-003	0.0000	25.2008
Worker	0.0108	7.0100e-003	0.0782	2.6000e-004	0.0297	1.7000e-004	0.0298	7.8700e-003	1.6000e-004	8.0300e-003	0.0000	23.1017	23.1017	5.0000e-004	0.0000	23.1142
Total	**0.0132**	**0.0984**	**0.0956**	**5.2000e-004**	**0.0362**	**3.3000e-004**	**0.0365**	**9.7600e-003**	**3.1000e-004**	**0.0101**	**0.0000**	**48.2566**	**48.2566**	**2.3300e-003**	**0.0000**	**48.3150**

3.4 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1595	1.6378	1.0842	2.6900e-003		0.0698	0.0698		0.0651	0.0651	0.0000	232.9333	232.9333	0.0629	0.0000	234.5068
Total	**0.1595**	**1.6378**	**1.0842**	**2.6900e-003**		**0.0698**	**0.0698**		**0.0651**	**0.0651**	**0.0000**	**232.9333**	**232.9333**	**0.0629**	**0.0000**	**234.5068**

3.4 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4100e-003	0.1314	0.0291	4.9000e-004	0.0126	1.3000e-004	0.0128	3.6400e-003	1.3000e-004	3.7700e-003	0.0000	47.1004	47.1004	2.7000e-003	0.0000	47.1679
Worker	0.0196	0.0122	0.1387	4.7000e-004	0.0570	3.2000e-004	0.0573	0.0151	3.0000e-004	0.0154	0.0000	42.7402	42.7402	8.7000e-004	0.0000	42.7619
Total	**0.0230**	**0.1435**	**0.1678**	**9.6000e-004**	**0.0697**	**4.5000e-004**	**0.0701**	**0.0188**	**4.3000e-004**	**0.0192**	**0.0000**	**89.8406**	**89.8406**	**3.5700e-003**	**0.0000**	**89.9298**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1595	1.6378	1.0842	2.6900e-003		0.0698	0.0698		0.0651	0.0651	0.0000	232.9330	232.9330	0.0629	0.0000	234.5066
Total	**0.1595**	**1.6378**	**1.0842**	**2.6900e-003**		**0.0698**	**0.0698**		**0.0651**	**0.0651**	**0.0000**	**232.9330**	**232.9330**	**0.0629**	**0.0000**	**234.5066**

3.4 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4100e-003	0.1314	0.0291	4.9000e-004	0.0126	1.3000e-004	0.0128	3.6400e-003	1.3000e-004	3.7700e-003	0.0000	47.1004	47.1004	2.7000e-003	0.0000	47.1679
Worker	0.0196	0.0122	0.1387	4.7000e-004	0.0570	3.2000e-004	0.0573	0.0151	3.0000e-004	0.0154	0.0000	42.7402	42.7402	8.7000e-004	0.0000	42.7619
Total	**0.0230**	**0.1435**	**0.1678**	**9.6000e-004**	**0.0697**	**4.5000e-004**	**0.0701**	**0.0188**	**4.3000e-004**	**0.0192**	**0.0000**	**89.8406**	**89.8406**	**3.5700e-003**	**0.0000**	**89.9298**

3.5 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0140	0.1417	0.1456	2.7000e-004		6.4900e-003	6.4900e-003		5.9900e-003	5.9900e-003	0.0000	23.6927	23.6927	7.4600e-003	0.0000	23.8792
Paving	1.2700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0153**	**0.1417**	**0.1456**	**2.7000e-004**		**6.4900e-003**	**6.4900e-003**		**5.9900e-003**	**5.9900e-003**	**0.0000**	**23.6927**	**23.6927**	**7.4600e-003**	**0.0000**	**23.8792**

3.5 Paving - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.5000e-004	4.7000e-004	5.3500e-003	2.0000e-005	2.2000e-003	1.0000e-005	2.2100e-003	5.8000e-004	1.0000e-005	6.0000e-004	0.0000	1.6478	1.6478	3.0000e-005	0.0000	1.6487
Total	**7.5000e-004**	**4.7000e-004**	**5.3500e-003**	**2.0000e-005**	**2.2000e-003**	**1.0000e-005**	**2.2100e-003**	**5.8000e-004**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**1.6478**	**1.6478**	**3.0000e-005**	**0.0000**	**1.6487**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0140	0.1417	0.1456	2.7000e-004		6.4900e-003	6.4900e-003		5.9900e-003	5.9900e-003	0.0000	23.6927	23.6927	7.4600e-003	0.0000	23.8792
Paving	1.2700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0153**	**0.1417**	**0.1456**	**2.7000e-004**		**6.4900e-003**	**6.4900e-003**		**5.9900e-003**	**5.9900e-003**	**0.0000**	**23.6927**	**23.6927**	**7.4600e-003**	**0.0000**	**23.8792**

3.5 Paving - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.5000e-004	4.7000e-004	5.3500e-003	2.0000e-005	2.2000e-003	1.0000e-005	2.2100e-003	5.8000e-004	1.0000e-005	6.0000e-004	0.0000	1.6478	1.6478	3.0000e-005	0.0000	1.6487
Total	**7.5000e-004**	**4.7000e-004**	**5.3500e-003**	**2.0000e-005**	**2.2000e-003**	**1.0000e-005**	**2.2100e-003**	**5.8000e-004**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**1.6478**	**1.6478**	**3.0000e-005**	**0.0000**	**1.6487**

3.6 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1177					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.5600e-003	0.0174	0.0242	4.0000e-005		9.4000e-004	9.4000e-004		9.4000e-004	9.4000e-004	0.0000	3.4043	3.4043	2.0000e-004	0.0000	3.4094
Total	**0.1203**	**0.0174**	**0.0242**	**4.0000e-005**		**9.4000e-004**	**9.4000e-004**		**9.4000e-004**	**9.4000e-004**	**0.0000**	**3.4043**	**3.4043**	**2.0000e-004**	**0.0000**	**3.4094**

3.6 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4000e-004	4.0000e-004	4.5400e-003	2.0000e-005	1.8700e-003	1.0000e-005	1.8800e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.4006	1.4006	3.0000e-005	0.0000	1.4014
Total	**6.4000e-004**	**4.0000e-004**	**4.5400e-003**	**2.0000e-005**	**1.8700e-003**	**1.0000e-005**	**1.8800e-003**	**5.0000e-004**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**1.4006**	**1.4006**	**3.0000e-005**	**0.0000**	**1.4014**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1177					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.5600e-003	0.0174	0.0242	4.0000e-005		9.4000e-004	9.4000e-004		9.4000e-004	9.4000e-004	0.0000	3.4043	3.4043	2.0000e-004	0.0000	3.4094
Total	**0.1203**	**0.0174**	**0.0242**	**4.0000e-005**		**9.4000e-004**	**9.4000e-004**		**9.4000e-004**	**9.4000e-004**	**0.0000**	**3.4043**	**3.4043**	**2.0000e-004**	**0.0000**	**3.4094**

3.6 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4000e-004	4.0000e-004	4.5400e-003	2.0000e-005	1.8700e-003	1.0000e-005	1.8800e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.4006	1.4006	3.0000e-005	0.0000	1.4014
Total	**6.4000e-004**	**4.0000e-004**	**4.5400e-003**	**2.0000e-005**	**1.8700e-003**	**1.0000e-005**	**1.8800e-003**	**5.0000e-004**	**1.0000e-005**	**5.1000e-004**	**0.0000**	**1.4006**	**1.4006**	**3.0000e-005**	**0.0000**	**1.4014**

3.7 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0111	0.0000	0.0111	1.6900e-003	0.0000	1.6900e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0340	0.3223	0.2947	5.8000e-004		0.0150	0.0150		0.0139	0.0139	0.0000	50.9881	50.9881	0.0143	0.0000	51.3451
Total	**0.0340**	**0.3223**	**0.2947**	**5.8000e-004**	**0.0111**	**0.0150**	**0.0261**	**1.6900e-003**	**0.0139**	**0.0156**	**0.0000**	**50.9881**	**50.9881**	**0.0143**	**0.0000**	**51.3451**

3.7 Demolition - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.6000e-004	6.3000e-003	1.2900e-003	4.0000e-005	8.6000e-004	1.0000e-005	8.7000e-004	2.4000e-004	1.0000e-005	2.5000e-004	0.0000	3.4290	3.4290	1.7000e-004	0.0000	3.4332
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.5000e-004	5.3000e-004	6.0100e-003	2.0000e-005	2.4700e-003	1.0000e-005	2.4900e-003	6.6000e-004	1.0000e-005	6.7000e-004	0.0000	1.8538	1.8538	4.0000e-005	0.0000	1.8547
Total	**1.0100e-003**	**6.8300e-003**	**7.3000e-003**	**6.0000e-005**	**3.3300e-003**	**2.0000e-005**	**3.3600e-003**	**9.0000e-004**	**2.0000e-005**	**9.2000e-004**	**0.0000**	**5.2828**	**5.2828**	**2.1000e-004**	**0.0000**	**5.2880**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.3500e-003	0.0000	4.3500e-003	6.6000e-004	0.0000	6.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0340	0.3223	0.2947	5.8000e-004		0.0150	0.0150		0.0139	0.0139	0.0000	50.9880	50.9880	0.0143	0.0000	51.3450
Total	**0.0340**	**0.3223**	**0.2947**	**5.8000e-004**	**4.3500e-003**	**0.0150**	**0.0193**	**6.6000e-004**	**0.0139**	**0.0146**	**0.0000**	**50.9880**	**50.9880**	**0.0143**	**0.0000**	**51.3450**

3.7 Demolition - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.6000e-004	6.3000e-003	1.2900e-003	4.0000e-005	8.6000e-004	1.0000e-005	8.7000e-004	2.4000e-004	1.0000e-005	2.5000e-004	0.0000	3.4290	3.4290	1.7000e-004	0.0000	3.4332
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.5000e-004	5.3000e-004	6.0100e-003	2.0000e-005	2.4700e-003	1.0000e-005	2.4900e-003	6.6000e-004	1.0000e-005	6.7000e-004	0.0000	1.8538	1.8538	4.0000e-005	0.0000	1.8547
Total	**1.0100e-003**	**6.8300e-003**	**7.3000e-003**	**6.0000e-005**	**3.3300e-003**	**2.0000e-005**	**3.3600e-003**	**9.0000e-004**	**2.0000e-005**	**9.2000e-004**	**0.0000**	**5.2828**	**5.2828**	**2.1000e-004**	**0.0000**	**5.2880**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.3908	1.8585	4.3494	0.0164	1.5122	0.0166	1.5288	0.4048	0.0156	0.4204	0.0000	1,533.7605	1,533.7605	0.0528	0.0000	1,535.0792
Unmitigated	0.3908	1.8585	4.3494	0.0164	1.5122	0.0166	1.5288	0.4048	0.0156	0.4204	0.0000	1,533.7605	1,533.7605	0.0528	0.0000	1,535.0792

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
High School	1,249.00	181.36	74.29	3,966,119	3,966,119
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Total	1,249.00	181.36	74.29	3,966,119	3,966,119

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
High School	16.60	8.40	6.90	77.80	17.20	5.00	75	19	6
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
High School	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898
Other Asphalt Surfaces	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898
Other Non-Asphalt Surfaces	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898
Parking Lot	0.548600	0.036250	0.186898	0.112544	0.014284	0.004806	0.017604	0.070134	0.001409	0.001147	0.004508	0.000918	0.000898

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	75.6598	75.6598	3.1200e-003	6.5000e-004	75.9305
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	75.6598	75.6598	3.1200e-003	6.5000e-004	75.9305
NaturalGas Mitigated	1.4900e-003	0.0136	0.0114	8.0000e-005		1.0300e-003	1.0300e-003		1.0300e-003	1.0300e-003	0.0000	14.7714	14.7714	2.8000e-004	2.7000e-004	14.8592
NaturalGas Unmitigated	1.4900e-003	0.0136	0.0114	8.0000e-005		1.0300e-003	1.0300e-003		1.0300e-003	1.0300e-003	0.0000	14.7714	14.7714	2.8000e-004	2.7000e-004	14.8592

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
High School	276805	1.4900e-003	0.0136	0.0114	8.0000e-005		1.0300e-003	1.0300e-003		1.0300e-003	1.0300e-003	0.0000	14.7714	14.7714	2.8000e-004	2.7000e-004	14.8592
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**1.4900e-003**	**0.0136**	**0.0114**	**8.0000e-005**		**1.0300e-003**	**1.0300e-003**		**1.0300e-003**	**1.0300e-003**	**0.0000**	**14.7714**	**14.7714**	**2.8000e-004**	**2.7000e-004**	**14.8592**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
High School	276805	1.4900e-003	0.0136	0.0114	8.0000e-005		1.0300e-003	1.0300e-003		1.0300e-003	1.0300e-003	0.0000	14.7714	14.7714	2.8000e-004	2.7000e-004	14.8592
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**1.4900e-003**	**0.0136**	**0.0114**	**8.0000e-005**		**1.0300e-003**	**1.0300e-003**		**1.0300e-003**	**1.0300e-003**	**0.0000**	**14.7714**	**14.7714**	**2.8000e-004**	**2.7000e-004**	**14.8592**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
High School	230740	73.5187	3.0400e-003	6.3000e-004	73.7817
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	6720	2.1411	9.0000e-005	2.0000e-005	2.1488
Total		**75.6599**	**3.1300e-003**	**6.5000e-004**	**75.9305**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
High School	230740	73.5187	3.0400e-003	6.3000e-004	73.7817
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	6720	2.1411	9.0000e-005	2.0000e-005	2.1488
Total		**75.6599**	**3.1300e-003**	**6.5000e-004**	**75.9305**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1815	1.0000e-005	1.1800e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.3000e-003	2.3000e-003	1.0000e-005	0.0000	2.4500e-003
Unmitigated	0.1815	1.0000e-005	1.1800e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.3000e-003	2.3000e-003	1.0000e-005	0.0000	2.4500e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0214					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1600					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.1000e-004	1.0000e-005	1.1800e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.3000e-003	2.3000e-003	1.0000e-005	0.0000	2.4500e-003
Total	**0.1815**	**1.0000e-005**	**1.1800e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.3000e-003**	**2.3000e-003**	**1.0000e-005**	**0.0000**	**2.4500e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0214					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1600					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.1000e-004	1.0000e-005	1.1800e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.3000e-003	2.3000e-003	1.0000e-005	0.0000	2.4500e-003
Total	**0.1815**	**1.0000e-005**	**1.1800e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.3000e-003**	**2.3000e-003**	**1.0000e-005**	**0.0000**	**2.4500e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	18.6974	0.0457	1.2200e-003	20.2012
Unmitigated	18.6974	0.0457	1.2200e-003	20.2012

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
High School	1.37799 / 3.54341	18.6974	0.0457	1.2200e-003	20.2012
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**18.6974**	**0.0457**	**1.2200e-003**	**20.2012**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
High School	1.37799 / 3.54341	18.6974	0.0457	1.2200e-003	20.2012
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**18.6974**	**0.0457**	**1.2200e-003**	**20.2012**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	10.9514	0.6472	0.0000	27.1315
Unmitigated	10.9514	0.6472	0.0000	27.1315

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
High School	53.95	10.9514	0.6472	0.0000	27.1315
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**10.9514**	**0.6472**	**0.0000**	**27.1315**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
High School	53.95	10.9514	0.6472	0.0000	27.1315
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**10.9514**	**0.6472**	**0.0000**	**27.1315**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

This page intentionally left blank

APPENDIX 3.2:

EMFAC2017

EMFAC2017 Derived CalEEMod Annual Emission Rates: Year 2023[1,2]

Season	Pollutant	LDA	LDT1	LDT2	MDV	LHDT1	LHDT2	MHDT	HHDT	OBUS	UBUS	MCY	SBUS	MH
Annual	CH4_IDLEX	0	0	0	0	0.0046356	0.002999526	0.003230939	0.027740108	0.0085496	0	0	0.079007	0
Annual	CH4_RUNEX	0.0019163	0.0059943	0.0033783	0.0043277	0.0043563	0.003274591	0.001329339	0.017322056	0.0047718	3.3547912	0.3153406	0.0061384	0.0032094
Annual	CH4_STREX	0.0442403	0.0712522	0.0620225	0.0767662	0.0135632	0.007918788	0.008517892	1.52814E-07	0.0229437	0.0190019	0.2397483	0.0071545	0
Annual	CO_IDLEX	0	0	0	0	0.169996	0.131743978	0.355199556	8.39351502	0.500343	0	0	3.1233453	0
Annual	CO_RUNEX	0.573082	1.2751366	0.831585	0.9535035	0.5905513	0.444273692	0.173630239	0.207434337	0.5819416	26.090557	18.950169	0.4963029	0.3229537
Annual	CO_STREX	2.0073289	2.2499571	2.5518178	2.9483671	0.8983902	0.519207497	0.972628944	0.002640508	2.4507967	1.4372318	8.5871474	0.9356866	0
Annual	CO2_NBIO_IDLEX	0	0	0	0	9.3045762	14.65842635	69.20069752	1374.551275	68.169764	0	0	363.1996	0
Annual	CO2_NBIO_RUNEX	250.07731	299.04075	314.64518	394.24515	623.59389	622.6808149	939.4193442	1256.692232	1337.4325	1610.6544	208.08507	1093.9593	928.21789
Annual	CO2_NBIO_STREX	51.535684	62.773333	66.373318	82.785584	10.188153	7.021377375	8.496109106	0.020938228	20.296596	17.720545	60.087552	6.1154977	0
Annual	NOX_IDLEX	0	0	0	0	0.0796023	0.115540227	0.402748634	6.817629236	0.2461754	0	0	3.3683988	0
Annual	NOX_RUNEX	0.0311637	0.1074282	0.0680303	0.0893031	1.313437	1.454591969	0.901787171	1.919070399	0.8103709	0.3157011	1.121071	4.4344095	4.1574641
Annual	NOX_STREX[3]	0.1657632	0.2575263	0.2548267	0.3266326	0.2865557	0.176995993	1.739571737	2.397560349	0.7346161	0.1730414	0.2613976	0.8094688	0
Annual	PM10_IDLEX	0	0	0	0	0.0009883	0.001457487	0.000427902	0.002736546	8.16E-05	0	0	0.0034463	0
Annual	PM10_PMBW	0.03675	0.03675	0.03675	0.03675	0.07644	0.089180026	0.130340037	0.061022824	0.13034	0.0878825	0.01176	0.7448002	0.13034
Annual	PM10_PMTW	0.008	0.008	0.008	0.008	0.0100253	0.010859291	0.012000003	0.035578997	0.012	0.0219127	0.004	0.0105979	0.016
Annual	PM10_RUNEX	0.0013056	0.0019221	0.0013642	0.0014211	0.0098648	0.013062472	0.009385206	0.027079393	0.007971	0.0027897	0.0018422	0.0256866	0.1342111
Annual	PM10_STREX	0.0017588	0.002535	0.0018033	0.001858	0.0002138	0.000105774	9.63819E-05	2.74149E-07	0.0001982	0.0001728	0.0027899	4.417E-05	0
Annual	PM25_IDLEX	0	0	0	0	0.0009455	0.001394437	0.000409391	0.002618164	7.807E-05	0	0	0.0032972	0
Annual	PM25_PMBW	0.01575	0.01575	0.01575	0.01575	0.03276	0.038220011	0.055860016	0.026152639	0.05586	0.0376639	0.00504	0.3192001	0.05586
Annual	PM25_PMTW	0.002	0.002	0.002	0.002	0.0025063	0.002714823	0.003000001	0.008894749	0.003	0.0054782	0.001	0.0026495	0.004
Annual	PM25_RUNEX	0.0012026	0.0017688	0.0012557	0.0013106	0.009419	0.012487832	0.008975681	0.025907944	0.0076122	0.0026534	0.0017215	0.0245649	0.1284052
Annual	PM25_STREX	0.0016172	0.0023309	0.0016581	0.0017085	0.0001966	9.72552E-05	8.86196E-05	2.5207E-07	0.0001823	0.0001589	0.0026224	4.061E-05	0
Annual	ROG_DIURN	0.0607176	0.1888797	0.1019724	0.1248519	0.0028508	0.001530384	0.000655616	1.47603E-06	0.0026358	0.0019587	1.6709455	0.0015008	0
Annual	ROG_HTSK	0.090832	0.2306942	0.1262362	0.1579093	0.0729153	0.039128445	0.019583527	5.2503E-05	0.0240541	0.0123252	0.836107	0.0100133	0
Annual	ROG_IDLEX	0	0	0	0	0.0198325	0.015499791	0.016824003	0.568145316	0.0458879	0	0	0.3657628	0
Annual	ROG_RESTL	0.0471141	0.12998	0.0832176	0.1071978	0.0014285	0.000789991	0.000335114	8.94398E-07	0.0011393	0.000885	0.9042829	0.0007247	0
Annual	ROG_RUNEX	0.0070949	0.026006	0.0134428	0.0177878	0.05203	0.053696936	0.01158284	0.01941832	0.0264123	0.053524	2.1184535	0.0885598	0.0690969
Annual	ROG_RUNLS	0.1977724	0.7389034	0.4126899	0.4752907	0.4528549	0.219451316	0.096468492	0.000239216	0.2660202	0.058846	1.7664295	0.0614826	0
Annual	ROG_STREX	0.1898353	0.3530928	0.2802421	0.3702553	0.0670106	0.038629003	0.044819125	7.83291E-07	0.1184199	0.0733938	1.8103431	0.0412896	0
Annual	SO2_IDLEX	0	0	0	0	8.991E-05	0.000139935	0.000656457	0.012947424	0.0006506	0	0	0.0034697	0
Annual	SO2_RUNEX	0.0024739	0.0029592	0.0031129	0.0038976	0.0060648	0.005998989	0.008948287	0.011764181	0.0129975	0.004815	0.0020592	0.0104736	0.008775
Annual	SO2_STREX	0.00051	0.0006212	0.0006568	0.0008192	0.0001008	6.94822E-05	8.40759E-05	2.07201E-07	0.0002009	0.0001754	0.0005946	6.052E-05	0
Annual	TOG_DIURN	0.060754	0.188993	0.1020335	0.1249267	0.0028508	0.001530384	0.000655616	1.47603E-06	0.0026358	0.0019587	1.6709455	0.0015008	0
Annual	TOG_HTSK	0.0908865	0.2308326	0.1263119	0.158004	0.0729153	0.039128445	0.019583527	5.2503E-05	0.0240541	0.0123252	0.836107	0.0100133	0
Annual	TOG_IDLEX	0	0	0	0	0.0276606	0.020739906	0.022753958	0.648149519	0.0615467	0	0	0.5271864	0
Annual	TOG_RESTL	0.0471423	0.130058	0.0832675	0.1072621	0.0014285	0.000789991	0.000335114	8.94398E-07	0.0011393	0.000885	0.9042829	0.0007247	0
Annual	TOG_RUNEX	0.0103214	0.0379501	0.0195952	0.0258663	0.0629404	0.062460597	0.014718067	0.038641592	0.0368941	3.4300275	2.6208738	0.1049108	0.0786623
Annual	TOG_RUNLS	0.1978911	0.7393468	0.4129375	0.4755759	0.4528549	0.219451316	0.096468492	0.000239216	0.2660202	0.058846	1.7664295	0.0614826	0
Annual	TOG_STREX	0.2079907	0.3868622	0.3070443	0.4056641	0.0733682	0.042293896	0.049071301	8.57605E-07	0.1296548	0.0803569	1.9703107	0.045207	0
Summer	CH4_IDLEX	0	0	0	0	0.0046475	0.003006634	0.003074831	0.029363415	0.0086197	0	0	0.079108	0
Summer	CH4_RUNEX	0.0021833	0.0067742	0.0038413	0.0049301	0.004423	0.003297045	0.001349641	0.017322303	0.0048756	3.354825	0.3137043	0.0062087	0.0032094
Summer	CH4_STREX	0.0389828	0.0624716	0.054671	0.0675546	0.013088	0.00765304	0.008238898	1.46558E-07	0.021974	0.0172765	0.2151999	0.0059974	0
Summer	CO_IDLEX	0	0	0	0	0.169996	0.131743978	0.306579838	8.282439119	0.4967485	0	0	3.0866999	0
Summer	CO_RUNEX	0.7024683	1.5473739	1.0183223	1.1648442	0.5983437	0.446679647	0.175961775	0.207524367	0.593764	26.092224	19.608462	0.5038711	0.3229537
Summer	CO_STREX	1.7717936	1.9931601	2.2594973	2.5960636	0.8565413	0.49614692	0.927756769	0.002501395	2.2910242	1.2222475	8.0040891	0.6771272	0
Summer	CO2_NBIO_IDLEX	0	0	0	0	9.3045762	14.65842635	69.18470799	1357.066967	67.444523	0	0	372.24708	0
Summer	CO2_NBIO_RUNEX	271.86894	322.21592	336.74533	417.66701	623.60769	622.6850373	939.423431	1256.692381	1337.4533	1610.6574	209.06126	1093.9727	928.21789
Summer	CO2_NBIO_STREX	51.082798	62.215399	65.793285	82.07127	10.113279	6.980109092	8.419501087	0.02071762	20.025412	17.357095	58.517039	5.6830323	0
Summer	NOX_IDLEX	0	0	0	0	0.0796023	0.115540227	0.394928987	6.487908734	0.2339582	0	0	3.4471853	0
Summer	NOX_RUNEX	0.0290579	0.0999545	0.0637691	0.0835013	1.2368581	1.373269402	0.84862175	1.811544989	0.7529932	0.309149	0.974419	4.1706075	3.9232025
Summer	NOX_STREX[3]	0.1594063	0.2480281	0.2460425	0.3144758	0.2765935	0.171180552	1.736771382	2.397557018	0.7255323	0.1645515	0.2475146	0.8045931	0
Summer	PM10_IDLEX	0	0	0	0	0.0009883	0.001457487	0.00036373	0.00241709	7.251E-05	0	0	0.0029125	0
Summer	PM10_PMBW	0.03675	0.03675	0.03675	0.03675	0.07644	0.089180026	0.130340037	0.061022824	0.13034	0.0878825	0.01176	0.7448002	0.13034
Summer	PM10_PMTW	0.008	0.008	0.008	0.008	0.0100253	0.010859291	0.012000003	0.035578997	0.012	0.0219127	0.004	0.0105979	0.016
Summer	PM10_RUNEX	0.0013056	0.0019221	0.0013642	0.0014211	0.0098648	0.013062472	0.009385206	0.027079393	0.007971	0.0027897	0.0018422	0.0256866	0.1342111
Summer	PM10_STREX	0.0017588	0.002535	0.0018033	0.001858	0.0002138	0.000105774	9.63819E-05	2.74149E-07	0.0001982	0.0001728	0.0027899	4.417E-05	0
Summer	PM25_IDLEX	0	0	0	0	0.0009455	0.001394437	0.000347995	0.002312528	6.937E-05	0	0	0.0027865	0
Summer	PM25_PMBW	0.01575	0.01575	0.01575	0.01575	0.03276	0.038220011	0.055860016	0.026152639	0.05586	0.0376639	0.00504	0.3192001	0.05586
Summer	PM25_PMTW	0.002	0.002	0.002	0.002	0.0025063	0.002714823	0.003000001	0.008894749	0.003	0.0054782	0.001	0.0026495	0.004
Summer	PM25_RUNEX	0.0012026	0.0017688	0.0012557	0.0013106	0.009419	0.012487832	0.008975681	0.025907944	0.0076122	0.0026534	0.0017215	0.0245649	0.1284052
Summer	PM25_STREX	0.0016172	0.0023309	0.0016581	0.0017085	0.0001966	9.72552E-05	8.86196E-05	2.5207E-07	0.0001823	0.0001589	0.0026224	4.061E-05	0
Summer	ROG_DIURN	0.1174425	0.3666401	0.1975016	0.240509	0.0053198	0.002883007	0.001251678	2.79317E-06	0.0048008	0.0034783	3.3058148	0.0027018	0
Summer	ROG_HTSK	0.1055122	0.2823115	0.1483331	0.1813493	0.0851998	0.046256723	0.02338338	5.81948E-05	0.0264369	0.014296	1.2381959	0.0105352	0
Summer	ROG_IDLEX	0	0	0	0	0.0198325	0.015499791	0.016360574	0.601837524	0.0469008	0	0	0.3655239	0
Summer	ROG_RESTL	0.0881696	0.2471988	0.153373	0.1953594	0.0027137	0.001491789	0.000647791	1.84436E-06	0.0021636	0.0017486	2.050086	0.0013371	0
Summer	ROG_RUNEX	0.0080118	0.0293415	0.0152099	0.0201658	0.0523663	0.053791722	0.011673522	0.019419692	0.0269017	0.0536189	2.0991205	0.0889009	0.0690969
Summer	ROG_RUNLS	0.1973322	0.7415085	0.4138272	0.4763539	0.4575131	0.222614313	0.098503805	0.000242436	0.2673327	0.0571042	1.7641556	0.0567869	0
Summer	ROG_STREX	0.1658371	0.307812	0.2451078	0.3233644	0.0644662	0.037224137	0.043185849	7.53225E-07	0.1130774	0.0666357	1.6159125	0.0345479	0
Summer	SO2_IDLEX	0	0	0	0	8.991E-05	0.000139935	0.000656419	0.012782464	0.0006437	0	0	0.0035551	0
Summer	SO2_RUNEX	0.0026895	0.0031885	0.0033316	0.0041294	0.006065	0.005999031	0.008948328	0.011764182	0.0129977	0.004815	0.0020688	0.0104737	0.008775
Summer	SO2_STREX	0.0005055	0.0006157	0.0006511	0.0008122	0.0001001	6.90738E-05	8.33178E-05	2.05018E-07	0.0001982	0.0001718	0.0005791	5.624E-05	0
Summer	TOG_DIURN	0.1175128	0.36686	0.19762	0.2406532	0.0053198	0.002883007	0.001251678	2.79317E-06	0.0048008	0.0034783	3.3058148	0.0027018	0
Summer	TOG_HTSK	0.1055754	0.2824808	0.148422	0.1814581	0.0851998	0.046256723	0.02338338	5.81948E-05	0.0264369	0.014296	1.2381959	0.0105352	0
Summer	TOG_IDLEX	0	0	0	0	0.0276606	0.020739906	0.022010326	0.686564132	0.0626998	0	0	0.5269144	0
Summer	TOG_RESTL	0.0882224	0.2473471	0.1534649	0.1954766	0.0027137	0.001491789	0.000647791	1.84436E-06	0.0021636	0.0017486	2.050086	0.0013371	0
Summer	TOG_RUNEX	0.0116595	0.0428185	0.0221744	0.0293308	0.0634311	0.062598909	0.01485039	0.038643595	0.0376084	3.430166	2.5982787	0.1054085	0.0786623
Summer	TOG_RUNLS	0.1974506	0.7419534	0.4140755	0.4766397	0.4575131	0.222614313	0.098503805	0.000242436	0.2673327	0.0571042	1.7641556	0.0567869	0
Summer	TOG_STREX	0.1816974	0.3372507	0.2685497	0.3542888	0.0705823	0.040755744	0.047283069	8.24687E-07	0.1238055	0.0729577	1.7587457	0.0378256	0

Winter	CH4_IDLEX	0	0	0	0	0.0046349	0.00299807	0.003457003	0.024225508	0.0084813	0	0	0.0789961	0
Winter	CH4_RUNEX	0.0018496	0.0057653	0.0032422	0.0041546	0.0043477	0.003268732	0.001314344	0.000878011	0.0047409	3.3547943	0.3146514	0.0061306	0.0032094
Winter	CH4_STREX	0.0452537	0.0731587	0.0637228	0.0787233	0.0135875	0.007975946	0.008593962	1.53544E-07	0.0231128	0.0189067	0.2406081	0.0074108	0
Winter	CO_IDLEX	0	0	0	0	0.169996	0.131743978	0.423175775	8.522386502	0.5053067	0	0	3.1739507	0
Winter	CO_RUNEX	0.5375914	1.1927501	0.7751272	0.8903606	0.5895828	0.443637752	0.171965234	0.156662322	0.5788085	26.090703	18.501374	0.4957337	0.3229537
Winter	CO_STREX	2.0458535	2.3041136	2.6161192	3.0161196	0.9006736	0.523742986	0.986129236	0.002632673	2.4764456	1.4244412	8.5390969	0.9821296	0
Winter	CO2_NBIO_IDLEX	0	0	0	0	9.3045762	14.65842635	69.21798907	1394.572255	69.171287	0	0	350.70547	0
Winter	CO2_NBIO_RUNEX	244.10648	291.99823	307.92332	387.19227	623.59215	622.6796982	939.4164192	1245.199554	1337.4269	1610.6546	207.35577	1093.9582	928.21789
Winter	CO2_NBIO_STREX	51.612553	62.890499	66.501819	82.925352	10.192143	7.029574997	8.519173411	0.020925819	20.339942	17.698963	60.026782	6.1938765	0
Winter	NOX_IDLEX	0	0	0	0	0.0796023	0.115540227	0.413546522	7.248969607	0.2630469	0	0	3.2595984	0
Winter	NOX_RUNEX	0.0299927	0.1041585	0.065863	0.0863483	1.2982449	1.439969341	0.894347974	1.900263329	0.8056041	0.3141398	1.1152566	4.3998443	4.1151653
Winter	NOX_STREX[3]	0.1659923	0.2583178	0.2556154	0.3273398	0.2855643	0.177519177	1.740162077	2.3975611	0.7343715	0.1715373	0.2620959	0.8104009	0
Winter	PM10_IDLEX	0	0	0	0	0.0009883	0.001457487	0.000516521	0.003138257	9.416E-05	0	0	0.0041834	0
Winter	PM10_PMBW	0.03675	0.03675	0.03675	0.03675	0.07644	0.089180026	0.130340037	0.060799483	0.13034	0.0878825	0.01176	0.7448002	0.13034
Winter	PM10_PMTW	0.008	0.008	0.008	0.008	0.0100253	0.010859291	0.012000003	0.035448769	0.012	0.0219127	0.004	0.0105979	0.016
Winter	PM10_RUNEX	0.0013056	0.0019221	0.0013642	0.0014211	0.0098648	0.013062472	0.009385206	0.027061721	0.007971	0.0027897	0.0018422	0.0256866	0.1342111
Winter	PM10_STREX	0.0017588	0.002535	0.0018033	0.001858	0.0002138	0.000105774	9.63819E-05	2.74149E-07	0.0001982	0.0001728	0.0027899	4.417E-05	0
Winter	PM25_IDLEX	0	0	0	0	0.0009455	0.001394437	0.000494176	0.003002498	9.009E-05	0	0	0.0040025	0
Winter	PM25_PMBW	0.01575	0.01575	0.01575	0.01575	0.03276	0.038220011	0.055860016	0.026056921	0.05586	0.0376639	0.00504	0.3192001	0.05586
Winter	PM25_PMTW	0.002	0.002	0.002	0.002	0.0025063	0.002714823	0.003000001	0.008862192	0.003	0.0054782	0.001	0.0026495	0.004
Winter	PM25_RUNEX	0.0012026	0.0017688	0.0012557	0.0013106	0.009419	0.012487832	0.008975681	0.025891037	0.0076122	0.0026534	0.0017215	0.0245649	0.1284052
Winter	PM25_STREX	0.0016172	0.0023309	0.0016581	0.0017085	0.0001966	9.72552E-05	8.86196E-05	2.5207E-07	0.0001823	0.0001589	0.0026224	4.061E-05	0
Winter	ROG_DIURN	0.048961	0.157404	0.0794948	0.0965262	0.0025025	0.001184327	0.000491884	1.44728E-06	0.0023775	0.0019856	1.5917626	0.0012925	0
Winter	ROG_HTSK	0.0963696	0.252829	0.1341025	0.1661854	0.0820471	0.042112607	0.020315562	5.82088E-05	0.0253316	0.0137741	1.0263478	0.010199	0
Winter	ROG_IDLEX	0	0	0	0	0.0198325	0.015499791	0.017476806	0.52156854	0.0444891	0	0	0.3660926	0
Winter	ROG_RESTL	0.0399233	0.1090486	0.0699344	0.0915642	0.0012973	0.000658796	0.000266966	9.25804E-07	0.0010814	0.0009272	0.7304365	0.0006966	0
Winter	ROG_RUNEX	0.0068539	0.0250029	0.0129069	0.0170799	0.0519839	0.053671723	0.011516542	0.018681923	0.0262708	0.0535331	2.1135668	0.0885318	0.0690969
Winter	ROG_RUNLS	0.2224522	0.8544835	0.4732517	0.5418588	0.4853196	0.235559212	0.104061092	0.000254243	0.2825337	0.068696	2.0108874	0.0746199	0
Winter	ROG_STREX	0.1945927	0.3624938	0.2882424	0.3799866	0.0671209	0.038929468	0.045315261	7.86616E-07	0.1192214	0.073004	1.8149416	0.0427087	0
Winter	SO2_IDLEX	0	0	0	0	8.991E-05	0.000139935	0.000656463	0.013175227	0.00066	0	0	0.0033516	0
Winter	SO2_RUNEX	0.0024148	0.0028895	0.0030464	0.0038278	0.0060648	0.005998978	0.008948258	0.01176418	0.0129974	0.004815	0.002052	0.0104736	0.008775
Winter	SO2_STREX	0.0005107	0.0006224	0.0006581	0.0008206	0.0001009	6.95633E-05	8.43041E-05	2.07078E-07	0.0002013	0.0001751	0.000594	6.129E-05	0
Winter	TOG_DIURN	0.0489904	0.1574984	0.0795425	0.0965841	0.0025025	0.001184327	0.000491884	1.44728E-06	0.0023775	0.0019856	1.5917626	0.0012925	0
Winter	TOG_HTSK	0.0964274	0.2529807	0.1341829	0.1662851	0.0820471	0.042112607	0.020315562	5.82088E-05	0.0253316	0.0137741	1.0263478	0.010199	0
Winter	TOG_IDLEX	0	0	0	0	0.0276606	0.020739906	0.023799598	0.59376608	0.0599543	0	0	0.5275619	0
Winter	TOG_RESTL	0.0399473	0.109114	0.0699764	0.0916191	0.0012973	0.000658796	0.000266966	9.25804E-07	0.0010814	0.0009272	0.7304365	0.0006966	0
Winter	TOG_RUNEX	0.0099697	0.036486	0.0188129	0.0248357	0.0628731	0.062423807	0.014621325	0.021287868	0.0366877	3.4300408	2.6148401	0.1048699	0.0786623
Winter	TOG_RUNLS	0.2225857	0.8549962	0.4735356	0.5421839	0.4853196	0.235559212	0.104061092	0.000254243	0.2825337	0.068696	2.0108874	0.0746199	0
Winter	TOG_STREX	0.2132031	0.3971623	0.3158098	0.4163262	0.073489	0.042622868	0.049614507	8.61245E-07	0.1305324	0.0799302	1.9753367	0.0467606	0

1 Source: California Air Resources Board. EMFAC2017 Web Database. https://www.arb.ca.gov/emfac/2017/; California Air Pollution Control Officers Association (CAPCOA). 2017, November. California Emissions Estimator Model User's Guide, Version 2016.3.2, Appendix A.

2 Unless otherwise noted, per CalEEMod methodology, the calculated CalEEMod emission rates are derived from the emission rates obtained using the EMFAC2017 Web Database for the Riverside County region .

3 Because EMFAC2017 provides vehicle trips data for MHDT and HHDT diesel trucks, the formula provided in Appendix A of the CalEEMod User's Guide in calculating the NO_X STREX emission rates are utilized.

This page intentionally left blank

Appendix G: Phase I Environmental Site Assessment

PHASE I ENVIRONMENTAL SITE ASSESSMENT
MURRIETA VALLEY UNIFIED SCHOOL DISTRICT
MURRIETA CANYON ACADEMY
NEW CLASSROOM BUILDINGS
24150 HAYES AVENUE
MURRIETA, CALIFORNIA 92562

Prepared For:

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT
41870 McAlby Court
Murrieta, California 92562

Project No. 12393.002

January 31, 2020

Leighton Consulting, Inc.
A LEIGHTON GROUP COMPANY

Leighton Consulting, Inc.
A LEIGHTON GROUP COMPANY

January 31, 2020

Project No. 12393.002

Murrieta Valley Unified School District
41870 McAlby Court
Murrieta, California 92562

Subject: Phase I Environmental Site Assessment
Murrieta Valley Unified School District
Murrieta Canyon Academy New Classroom Buildings
24150 Hayes Avenue, Murrieta, California 92562

Leighton Consulting, Inc. (Leighton) is pleased to present this Phase I Environmental Site Assessment Report for the proposed Murrieta Canyon Academy New Classroom Buildings, located at 24150 Hayes Avenue, Murrieta, California (subject site). Leighton declares that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in §312.10 of 40 Code of Federal Regulations (CFR) 312, and the ASTM International (ASTM) Standard E1527-13.

Leighton has the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject site. Leighton has developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

If you have questions regarding this report, please contact us. We appreciate the opportunity to be of service to Murrieta Valley Unified School District.

Respectfully submitted,

LEIGHTON CONSULTING, INC.

PROFESSIONAL GEOLOGIST
ZACHARY A. FREEMAN
No. 9460
STATE OF CALIFORNIA

Zachary Freeman, PG 9460
(exp June 30, 2021)
Project Geologist

Distribution: (1 PDF) Addressee

41715 Enterprise Circle N., Suite 103 ▪ Temecula, CA 92590-5661
951.296.0530 ▪ Fax 951.296.0534

TABLE OF CONTENTS

Section Page

Leighton

Leighton

Figures

Appendices

1.0 INTRODUCTION

1.1 Authorization

Leighton Consulting, Inc. (Leighton) performed a Phase I Environmental Site Assessment (ESA) for the Murrieta Canyon Academy New Classroom Buildings, located at 24150 Hayes Avenue, Assessor Parcel Number (APN) 904-050-047, in the City of Murrieta, Riverside County, California (subject site – Figure 1) in accordance with the authorization of Murrieta Valley Unified School District (client).

1.2 Purpose

The purpose of the Phase I ESA was to identify, to the extent feasible and pursuant to the processes prescribed in ASTM International (ASTM) E1527-13, recognized environmental conditions (RECs), historical RECs (HRECs), or controlled RECs (CRECs) and in conformance with the Department of Toxic Substances Control (DTSC) Phase I Environmental Site Assessment Advisory: School Property Evaluators (Revised September 5, 2001) and the California Code of Regulations (CCR) Title 22, Division 4.5, Chapter 51.5 – Phase I Environmental Site Assessment (Schools), in connection with the subject site.

RECs are defined, according to ASTM E1527-13 as "*the presence or likely presence of hazardous substances or petroleum products in, on, or at a property: (1) due to release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. De minimis conditions are not RECs*."

HRECs are defined, according to ASTM E1527-13 as "*a past release of hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to required controls.*"

CRECs are defined, according to ASTM E1527-13 as "*a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls*" (ASTM, 2013).

Leighton

1.3 Scope of Work

The scope of work was performed in accordance with Leighton's proposal and included the following tasks:

- A reconnaissance-level visit of the subject site for evidence of release(s), or potential releases, of hazardous materials and petroleum products;
- Records review (including review of previous environmental reports, selected governmental databases, and historical review);
- Interviews; and
- Preparation of a report presenting our findings.

1.4 Significant Assumptions

Leighton Consulting assumes that the purpose of this Phase I ESA is to provide appropriate inquiry into the previous ownership and use of the subject site so that the Client may qualify for the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) landowner liability protections as defined in CERCLA, 42 USC §9601(35) (B) and meet the DTSC requirements for new school sites. Leighton Consulting also assumes that the information provided by the Client and its agents, regulatory database provider, and regulatory agencies is true and reliable.

1.5 Limitations and Exceptions

This Phase I ESA was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions.

The observations and conclusions presented in this report are professional opinions based on the scope of activities, work schedule, and information obtained through the Phase I ESA described herein. Opinions presented herein apply to property conditions existing at the time of our study and cannot necessarily be taken to apply to property conditions or changes of which we are not aware or have not had the opportunity to evaluate. It must be recognized that conclusions drawn from this data are limited to the amount, type, distribution, and integrity of the information collected at the time of the investigation, the methods utilized to collect and evaluate the data, and that a full and complete determination of environmental risks cannot be made. Although Leighton has taken steps to obtain true copies of available information, we make no representation or warranty with respect to the accuracy or completeness of the information.

This practice does not address whether requirements in addition to all appropriate inquiry have been met in order to qualify for the landowner liability protections including the continuing obligation not to impede the integrity and effectiveness of activity and use limitations, or the duty to take reasonable steps to prevent releases, or the duty to comply with legally required release reporting obligations. Users should also be aware that there are likely to be other legal obligations with regard to hazardous substances or petroleum products discovered on the subject site that are not addressed in this practice and that may pose risks of civil and/or criminal sanctions for non-compliance.

1.6 Special Terms and Conditions

The scope of work for this Phase I ESA did not include testing of electrical equipment for the presence of polychlorinated biphenyls (PCBs) or collection of other environmental samples such as soil, air, water, building materials, paint, or other media; assessment of natural hazards such as naturally occurring asbestos, radon gas or methane gas; assessment of the potential presence of radionuclides; or assessment of nonchemical hazards such as the potential for damage from earthquakes or floods, or the presence of endangered species or wildlife habitats. This Phase I ESA also did not include an extensive assessment of the environmental compliance status of the subject site or of businesses operating at the subject site or a health-based risk assessment.

1.7 User Reliance

This report is for the exclusive use of Murrieta Valley Unified School District. Use of this report by any other party shall be for informational purposes only at such party's sole risk. If other persons or entities wish to rely upon this report, Leighton will require that such parties agree in writing to Leighton's contract terms.

1.8 Important Information about Geoenvironmental Reports

Murrieta Valley Unified School District is referred to Appendix G regarding important information provided by GBA on geoenvironmental studies and reports.

2.0 SITE DESCRIPTION

2.1 Location and Legal Description

The subject site is located at 24150 Hayes Avenue, in the City of Murrieta, Riverside County, California (Figure 1). The subject site is currently occupied by the Thompson Middle School Field 2 and Murrieta Canyon Academy and is associated with Assessor Parcel Number (APN) 904-050-047.

2.2 Property and Vicinity General Characteristics

The subject site is currently occupied by a middle school field and a continuation high school. The surrounding areas are occupied by residential development, Thompson Middle School, and Murrieta Valley High School.

2.3 Current Use of the Subject Property

The proposed Murrieta Canyon Academy will be constructed on a portion of Thompson Middle School Field 2 and the current grounds of Murrieta Canyon Academy.

2.4 Descriptions of Structures, Roads and Other Improvements on the Property

The subject site is currently a baseball field and the Murrieta Canyon Academy campus. The campus consists of 15 classroom buildings, and an administration building, hard courts, and four modular structures.

We understand that the proposed Murrieta Canyon Academy modernization project will take place on a portion of the adjacent Thompson Middle School Field 2 and the Murrieta Canyon Academy (Figure 2). The project will consist of the removal of the majority of structures within the Murrieta Canyon Academy campus and the construction of two new classroom buildings, a student pavilion building, an administrative and cafeteria building on the current Thompson Middle School Field 2. The expansion of the existing parking lot, construction of new entry element, landscaping, water infiltration facilities and associated drainage, utility, hardscape and other improvements will take place on the current Murrieta Canyon Academy site.

The following utilities provide service to the subject site:

Natural Gas:	Southern California Gas Company
Source of Potable Water:	Western Municipal Water District
Electric:	Southern California Edison
Sewage Disposal:	Western Municipal Water District
Solid Waste Disposal:	Waste Management

2.5 Current Uses of Adjoining Properties

The surrounding areas are generally single-family residential developments to the west and south (across Hayes Avenue), and east across an unnamed street. The property adjacent to the northwest is occupied by Thompson Middle School. Murrieta Valley High School is located adjacent to the northeast.

3.0 USER PROVIDED INFORMATION

The user of this Phase I ESA is identified as Murrieta Valley Unified School District (MVUSD). As a part of the ASTM E1527-13 process, a user questionnaire was sent to and completed by Ms. Lori Noorigian, Director of Facilities Services for MVUSD, regarding the property. A copy of this questionnaire is provided in Appendix C.

3.1 Environmental Liens or Activity and Use Limitations

Ms. Noorigian stated environmental liens or activity and use limitations have not been filed or recorded for the subject site.

Leighton also conducted a search for records of environmental liens and activity and use limitations (AULs). No environmental liens or AULs were identified for the subject site. A copy of the environmental lien and AUL search is included in Appendix F.

3.2 Specialized Knowledge

Ms. Noorigian did not have specialized knowledge or experience related to the use of the subject site prior to the construction of Thompson Middle School.

3.3 Commonly Known or Reasonably Ascertainable Information

Ms. Noorigian was not aware of commonly known or reasonably ascertainable information related to the subject site aside from the current use of the subject site as Thompson Middle School and Murrieta Canyon Academy.

3.4 Valuation Reduction for Environmental Issues

Ms. Noorigian stated that the subject site is currently owned by MVUSD.

3.5 Owner, Property Manager, and Occupant Information

The subject site is currently owned by MVUSD. Refer to Section 6.0 for interview information.

3.6 Reason for Performing Phase I ESA

According to the user questionnaire, the reason for requesting this Phase I ESA is for California Code of Regulations Title 5 compliance pertaining to the construction of new classroom buildings at the proposed Murrieta Canyon Academy.

3.7 Other

Additional information was not provided by Murrieta Valley Unified School District.

4.0 RECORDS REVIEW

4.1 Physical Setting Source(s)

Leighton reviewed pertinent maps and readily available literature for information on the physiography and hydrogeology of the subject site. A summary of this information is presented in the following subsections.

4.1.1 Topography

The subject site is located in Township 7 South, Range 3 West, Section 18 of the San Bernardino Baseline and Meridian within the City of Murrieta. Coverage of the site vicinity is provided by the United States Geological Survey (USGS) "Murrieta" 7.5-Minute Quadrangle (2012). The elevation of the site is approximately 1,180 feet above mean sea level and slopes gently towards the southeast.

4.1.2 Surface Water

Surface water was not observed on the subject site. Murrieta Creek is located approximately 0.15 miles to the west.

4.1.3 Geology and Soils

The site is located within a prominent natural geomorphic province in southwestern California known as the Peninsular Ranges. This province is characterized by steep, elongated ranges and valleys that trend northwestward. More specifically, the site is situated within the southern portion of the Perris Block, an eroded mass of Cretaceous and older crystalline rock.

The Perris Block is approximately 20 miles by 50 miles in extent, is bounded by the San Jacinto Fault Zone to the northeast, the Elsinore Fault Zone to the southwest, the Cucamonga Fault Zone to the northwest, and the Temecula Basin to the south. The Perris Block has had a complex tectonic history, apparently undergoing relative vertical land-movements of several thousand feet in response to movement on the Elsinore and San Jacinto Fault Zones. Thin sedimentary and volcanic materials locally mantle crystalline bedrock. Young and older alluvial deposits fill the lower valley areas (CGS, 2006).

4.1.4 Hydrogeology

The Site is located in the western portion of the Temecula Valley Groundwater Basin.

The Temecula Valley basin underlies several valleys of southwestern Riverside County and northern San Diego County. Murrieta Valley is one of the largest valleys overlying the basin. The Temecula Valley basin is bounded by crystalline rock of the Peninsular Ranges (DWR, 2018). The valleys are drained by several creeks including Wilson, Temecula and Murrieta creeks.

Holocene and Pleistocene alluvial deposits of gravel, silt, and arkosic sand with some marl and tuff compose the water-bearing material in the Temecula Valley basin. The basin is estimated to reach depths of 2,500 feet (DWR, 2018). Groundwater is typically unconfined but confined conditions exist near the Pauba Valley and near local faults that intersect the basin (DWR 1956).

According to the Department of Water Resources, the depth to groundwater in the subject site vicinity is approximately 256 feet below ground surface when last measured in 2019 (DWR, 2019). Groundwater flow in the subject site vicinity is estimated to be to the southeast based on topography and groundwater elevation data (DWR, 2018).

4.1.5 Oil and Gas Fields

Leighton Consulting reviewed the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, Online Mapping System on December 13, 2019. Evidence of oil wells or oil field-related facilities was not indicated on the subject site or adjacent properties.

4.2 Standard Environmental Record Sources

A search of selected government databases was conducted by Leighton using an environmental database report. Details and descriptions of the database search are provided in the environmental database report. The report meets the government records search requirements of ASTM E1527-13 Standard Practice for Environmental Property Assessments: Phase I Environmental Property Assessment Process. The database listings were reviewed within the specified radii established by the ASTM E1527-13. A copy of this report is included in Appendix D.

4.2.1 Subject Property

The subject site was identified in the environmental database report on the Facilities Registry System (FRSCA). The database entry lists the subject site as being a school; no other information is listed for the subject site.

4.2.2 Offsite

The database search results for offsite properties, including those found within the "orphaned" unmapped listings, with potential to adversely impact the subject site are listed in the table below:

Table 1 - Databases Searched

Database	Search Distance (radius)	Properties Identified
Federal NPL List	1.0-mile	No
Delisted NPL List	.5-mile	No
FRSCA	**TP/AP**	**Yes (2)**
No Further Action	0.5-mile	No
CORRACTS	.5-mile	No
Federal RCRA TSDF List	0.5-mile	No
RCLUST	**0.5-mile**	**Yes (1)**
SWRCY	0.5-mile	No
Geotracker Cleanup Sites	**0.5-mile**	**Yes (1)**
Envirostor	**1.0-mile**	**Yes (2)**
LUST	**0.5-mile**	**Yes (1)**
SLIC	0.25-mile	No
HWTS	.5-mile	No
USTCUPA	0.25-mile	No
Historical UST	0.25-mile	No
AST2007	0.25-mile	No
SWEEPS UST	0.25-mile	No
DTSCHWT	0.25-mile	No
DTSC DEED	TP/AP	No
VCP	0.5-mile	No
Drycleaners	0.25-mile	No
Indian RESERV	1.0-mile	No
Indian LUST	0.5-mile	No
Indian UST	0.25-mile	No
RCRAGR09	0.125-mile	No

See Appendix D for list of acronyms and data sources

Information in the environmental database report was reviewed for facilities of potential environmental concern to the subject site. The State Water Resources Control Board (SWRCB) Geotracker website and the Department of Toxic Substance Control (DTSC) Envirostor website were used to supplement the information in the database report.

The listings in the database report were reviewed and not interpreted to represent an adverse effect to the subject site at the time this report was prepared based on one or more of the following:

- Nature of the database listing and not appearing on a database that reports unauthorized releases of hazardous substances;
- Reported regulatory agency status (example Case Closed);
- Reported nature of the case (soil contamination only);
- Distance of the facility to the subject site; and/or
- Location of the facility with respect to anticipated groundwater flow direction.

Unmapped Listings: Unmapped listings were not found.

4.2.3 Vapor Encroachment

Leighton reviewed the information contained in the environmental radius report in accordance with the practices of the ASTM Standard E2600-10 for Vapor Encroachment to evaluate the concern for potential vapor encroachment from onsite activities from adjacent properties.

After reviewing the environmental radius report, it was evaluated that a vapor encroachment condition does not exist at the subject site.

4.2.4 Regulatory Agency Contacts

Leighton requested regulatory records from the agencies listed below for the subject site address of 24150 Hayes Avenue, City of Murrieta, California. Copies of the regulatory responses are included in Appendix E.

Riverside County Department of Environmental Health (RCDEH)

On December 12, 2019, a file review request form was submitted to RCDEH via email. On December 31, 2019, Leighton received response from RCDEH stating that no records were found for the Site.

Department of Toxic Substance Control (DTSC)

On December 12, 2019, a file review request was submitted to the DTSC-Cypress Division and the DTSC-Chatsworth Division via email. A response from the DTSC-Cypress was received by electronic mail and dated December 16, 2019. According to Ms. Jone Barrio, no records were found for the subject site. A response from the DTSC-Chatsworth was received by mail on December 17, 2019. According to Mr. Glen Castillo, there are no records for the Site.

California Regional Water Quality Control Board (CRWQCB)

On December 12, 2019, Leighton forwarded a file review requests to the California Regional Water Quality Control Board (CRWQCB) via email. A response from the CRWQCB was received by e-mail on December 16, 2019. No records were found for the Site.

In addition, Leighton reviewed records posted on the State Water Resources Control Boards Geotracker online database. Searches were conducted by reviewing a map of the site vicinity. No records were found for the Site.

Building Permits

On December 20, 2019, a representative of Leighton visited the City of Murrieta to search for building permit records for the Site. No building permits were found.

Leighton also searched the Riverside County Department of Building and Safety on-line records archive for building permits related to the Site. No records were found.

Southern California Air Quality Management District (SCAQMD)

On December 17, 2019, Leighton reviewed SCAQMD's Facility Information Detail (FIND) website for listings pertinent to the Site or surrounding properties. No records were found for the Site address or surrounding properties.

State of California Radon Survey

The State of California Department of Public Health (CDPH) conducts ongoing radon monitoring in the state. The results of the survey indicate that of the 38 indoor air samples collected from zip code 92562, one of the samples contained radon concentrations greater than the U.S. EPA radon action level of 4 pCi/l of air (maximum of 17.1 pCi/l) (CDPH, 2016). Therefore, the potential for elevated radon levels at the subject site appears to be low.

Pipeline and Hazardous Materials Safety Administration

On December 16, 2019 Leighton reviewed the Pipeline and Hazardous Materials Safety Administrations National Pipeline Mapping System (NPMS) Public Map Viewer. Leighton reviewed records posted on the NPMS Public Map Viewer and no hazardous pipelines were shown on the Site or in surrounding areas (NPMS, 2019).

Copies of records requests and responses are provided in Appendix E.

4.2.5 Other Reports

South Coast Air Quality Management District (SCAQMD) performed a field investigation within a one-quarter mile radius of the proposed Thompson Middle School and Creekside High School in 1993. SCAQMD determined that no facilities were located which might be reasonably anticipated to host chemicals listed in Health and Safety Code Sections 25532 and 44321. The list of chemicals includes substances such as constituents of gasoline and household cleaning products.

Yvonne M. Neal Environmental Consultant Inc. performed an initial study beginning in 1993 and ending in 1994 to examine the significance of potential environmental impacts that would result if Thompson Middle School and Creekside High School were constructed. The initial study was completed with a CEQA checklist and signed by Roland Werner, CEQA Officer to indicate the District's Negative Declaration for the construction of both Thompson Middle School and Creekside High School. In accordance with CEQA Statutes Section 21064, a Negative Declaration is a written statement that briefly describes the reasons that a project will not have a significant effect on the environment and does not require the preparation of an environmental impact report. The initial study by Yvonne M. Neal Environmental Consultant Inc. conducted an environmental evaluation and provided mitigation measures where appropriate. The study concluded no significant impacts were expected from the construction and operation of Thompson Middle School and Creekside High School.

4.3 Historical Use Information on the Property

Following is a summary of our review of records regarding historical usage of the Site and adjoining properties, as this information pertains to the potential for environmental concerns.

Info Type	Years	Source	Summary of Results
Topo Maps	1901 1942 1943 1953 1982 2012	GeoSearch	• **1901:** The subject site and surrounding properties to the north, east and south are depicted as vacant. Hayes Avenue is depicted west of the subject site. The overall topography of the site is depicted as sloping gently towards the southeast. • **1942, 1943, and 1953:** The subject site is vacant. Two structures are depicted west of the subject site across Hayes Avenue. • **1982:** The subject site and surrounding adjacent properties are depicted as vacant. An additional road is depicted adjacent to the north of the subject site. • **2012:** The subject site is depicted as vacant. An additional paved road, Fullerton Road, is depicted adjacent to the south and west of the subject site.
Aerial Photos	1938 1953 1961 1967 1976 1979 1985 1989 1996 2002 2004 2005 2009 2010 2012 2014 2016	GeoSearch	• **1938 and 1983:** The subject site is vacant. There is a dirt road bordering the west side of the property that runs south. The western adjacent property appears to be a residential property with one large structure while the remaining adjacent properties appear to be used for agriculture. • **1961, 1967, and 1976:** The subject site is vacant except for a small dirt path that transects the center. • **1979, 1985 and 1989:** The subject site is vacant. The eastern adjacent property has been developed into residential lots with three structures. • **1996:** The subject site remains vacant. The northern adjacent parcel has been divided into two separate campuses. • **2002, 2004, 2005, 2009, 2010, 2012, 2014, and 2016:** The subject site has been developed into a school campus. The campus is comprised of one parking lot, one baseball field, and six structures.

Leighton

4.3.1 Fire Insurance Maps

Fire Insurance map coverage was not available for the subject site.

Fire Insurance Maps, are detailed city plans showing building footprints, construction details, use of structure, street address, etc. The maps were designed to assist fire insurance agents in determining the degree of hazard associated with a particular property. Fire Insurance Maps were produced from approximately 1867 to the present for commercial, industrial, and residential sections of approximately 12,000 cities and towns in the United States.

4.3.2 Historical City Directories

City directories were researched for Hayes Avenue and Nighthawk Way. The majority of the listings were residential in nature or related to the adjacent Thompson Middle School or Creekside High School. A listing for 23999 Hayes Avenue references various aviation related tenants including skydiving and ultralight flying from approximately 1974 until prior to 2014. Aerial photographs of the vicinity show an unimproved dirt airstrip and what appear to be the foundations of several structures. No historical information was found in the radius report indicating that an underground storage tank was present at the site. No evidence or reports of releases were found in the radius report.

City Directories have been published for cities and towns across the US since the 1700s. Originally, a list of residents, the City Directory developed into a tool for locating individuals and businesses in particular. For each street address listed, the directory recorded the name of the resident or business that operated from this addresses. While City Directory coverage is usually comprehensive for major cities, it may be sporadic for rural areas and small towns.

4.3.3 Other Historical Sources

Leighton did not review any additional historical sources.

4.3.4 Summary of Historical Land Use

Based on historical records, land usage for the subject site is summarized as follows:

Time Period	Land Usage	Reference
Prior to 1901	Unknown	None Available
Approximately 1901 to 2002	Vacant	Aerial Photographs and Topographic Maps
2002 to Present	Thompson Middle School	Aerial Photographs and Topographic Maps, Site Reconnaissance

5.0 SITE RECONNAISSANCE

5.1 Methodology and Limiting Conditions

On January 8, 2020, two representatives of Leighton conducted a reconnaissance–level assessment of the subject site. Leighton's representative was accompanied by Ms. Lori Noorigian, Director of Facilities Services for MVUSD. The site reconnaissance consisted of observing and documenting existing conditions of the subject site and nature of the neighboring development within 0.25-miles of the subject site. Items noted during the site reconnaissance are depicted on Figure 2.

5.2 General Property Setting

The Site is located south of Nighthawk Way and east of Hayes Avenue in the City of Murrieta, California (Figure 2). The subject site is occupied by Thompson Middle School Field 2 and Murrieta Canyon Academy. The Site consists of modular buildings, hard courts, a parking lot, and a field. The surrounding properties west, east, and south of the Site consist of single-family and residential development. The property adjacent to the north is occupied by a middle school and high school.

5.3 Site Observations

5.3.1 Hazardous Substances, Drums, and Other Chemical Containers

No hazardous substances, drums, or other chemical containers were observed on the subject site.

Common non-hazardous household cleansers and degreasers were observed in the custodial closets (Appendix B Photos 3 and 4), and cafeteria (Appendix B, Photo 9). There was no indication of spills or staining within the custodial closets or other locations where cleaning agents were stored.

5.3.2 Storage Tanks

Evidence of underground storage tanks (USTs) or aboveground storage tanks (ASTs) (such as vent lines, fill or overfill ports) was not observed on the subject site.

5.3.3 Polychlorinated Biphenyls (PCBs)

One pad-mounted electrical transformer and one circuit breaker box was observed on the subject site during the site reconnaissance (Appendix B, Photos 6 and 7). The transformer and the circuit breaker box were located near the southeastern subject site boundary. No staining was observed beneath or around either the transformer or the circuit breaker box and both appeared to be in good physical condition.

5.3.4 Waste Disposal

The City of Murrieta contracts with Waste Management of the Inland Empire for municipal waste removal services. No hazardous waste is produced on the Site.

5.3.5 Dumping

Evidence of dumping was not observed on the Site.

5.3.6 Pits, Ponds, Lagoons, Septic Systems, Wastewater, Drains, Cisterns, and Sumps

Evidence of pits, ponds, lagoons, cisterns, and sumps was not observed on the subject site. Floor drains were observed on the athletic field, sidewalks, and paved surfaces across the Site. According to Ms. Noorigian, the floor drains on the Site are plumbed to the municipal storm sewer system.

5.3.7 Pesticide Use

Evidence of pesticide use was not observed at the subject site.

5.3.8 Staining, Discolored Soils, Corrosion

No staining, corrosion, or discolored soils were observed on the Site.

5.3.9 Stressed Vegetation

Stressed vegetation was not observed on the subject site.

5.3.10 Unusual Odors

Unusual odors were not detected on the subject site.

5.3.11 Onsite Wells

Petroleum, gas, or groundwater wells were not observed on the subject property.

5.3.12 Other Observations

No other environmental concerns were observed or reported during the site reconnaissance.

6.0 INTERVIEWS

Leighton conducted interviews with persons having knowledge of current or past subject site usage. Interviews were conducted either orally or in the form of a written questionnaire. Written responses are included as Appendix C.

6.1 Interview with Owner

Leighton received a completed Owner/Site Contact Interview Form from Ms. Lori Noorigian, Director of Facilities Services for Murrieta Valley Unified School District (MVUSD). Based on the interview, Ms. Noorigian stated that the site was previously vacant land prior to the construction of Thompson Middle School. Ms. Noorigian did not have knowledge of hazardous environmental conditions. Ms. Noorigian stated that she was aware of a previous CEQA I ESA and PEA that were prepared for a modernization at the site in 1992 and 1993.

6.2 Interview with Site/Property Manager

Ms. Noorigian is the Director of Facilities Services for the MVUSD, which is responsible for the maintenance and physical operation of the school facilities within the MVUSD.

6.3 Interviews with Occupants

Leighton did not interview site occupants.

6.4 Interviews with Local Government Officials

Leighton did not interview employees with local government agencies to request information regarding historic and current uses of the subject site with the exception of those noted in Section 4.2.3.

6.5 Interviews with Others

Leighton did not conduct additional interviews for this Phase I ESA with the exception of the User interview discussed in Section 3.

7.0 FINDINGS

Leighton performed a Phase I ESA of the Murrieta Canyon Academy site located at 24150 Hayes Avenue, City of Murrieta, California, APN 904-050-047 (Figure 1).

7.1 Onsite

Historically, the subject site was vacant land prior to the construction of the Murrieta Canyon Academy. The subject site is currently occupied by Murrieta Canyon Academy.

Based on the date of construction, the onsite structures are unlikely to have been painted with lead based paint or to have been treated with organochlorine pesticide termiticides. The structures also post-date the ban on the use of PCBs in the United States; it is unlikely that PCB-bearing window and door caulking was used during construction of the school structures.

One oil-filled transformer was observed on the Site adjacent to the southeastern site boundary. Based on the date of construction of the Site, the potential for the transformer to contain PCBs is low.

Hazardous materials were not observed on the Site.

A search of selected government databases was conducted by Leighton using an environmental database report provider. Details of the database search along with descriptions of each database researched are provided in the environmental database report. The report meets the government records search requirements of ASTM E1527-13 Standard Practice for Environmental Property Assessments: Phase I Environmental Property Assessment Process. The database listings were reviewed within the specified radii established by the ASTM E1527-13. The subject site was identified in the environmental database report in the FRSCA database. The listing identified the site address as a school. No other database listings were found.

7.2 Offsite

Historically, the adjacent properties were vacant or utilized for agricultural purposes, with the exception of one residential property west of the site.

The site is currently bordered by a middle school (Thompson Middle School) to the north and single family residences to the west (across Hayes Avenue), east (across Fullerton Road Avenue), and south (across Hayes Avenue).

Surrounding properties of environmental concern were not identified on the environmental database report.

7.3 Data Gaps

Data gaps were not identified by Leighton.

8.0 OPINION

8.1 Onsite

Based on the historical aerial photography review, the subject site was vacant land until construction of Murrieta Canyon Academy sometime between 1996 and 2002.

The construction of the school buildings post-dates the ban on the use of lead-based paint and organochlorine pesticide termiticides (DTSC, 2006). Therefore, it is unlikely that the structures would have been painted with lead-based paint or treated with OCP termiticides. The buildings also post-date the ban on PCBs in the United States and therefor PCB-bearing door and window caulking is unlikely to have been used during construction (US EPA, 2015).

One oil-filled transformer and one large circuit breaker box were observed on the Site. No staining was observed beneath either the transformer or the circuit breaker box. The date of construction of the school post-dates the ban on PCBs in the United States (DTSC, 2006); therefor it is unlikely that either device contains PCB-bearing coolant.

8.2 Offsite

No offsite recognized environmental conditions were identified that would negatively affect the subject site.

9.0 CONCLUSIONS AND RECOMMENDATIONS

Leighton performed a Phase I ESA in conformance with the scope and limitations of ASTM E1527-13 and the Department of Toxic Substances Control (DTSC) Phase I Environmental Site Assessment Advisory: School Property Evaluations (Revised September 5, 2001) and the California Code of Regulators (CCR) Title 22, Division 4.5, Chapter 51.5 – Phase I Environmental Site Assessment (Schools) of Murrieta Canyon Academy, located at 24150 Hayes Avenue, Murrieta, California. Exceptions to, or deletions from, this practice are described in Section 1.5 of this report. This assessment has revealed no evidence of HRECs, CRECs or RECs in connection with the property

Based on the results of the Phase I ESA, Leighton recommends no further action for the subject site.

Should the MVUSD consider the proposed construction at the Murrieta Canyon Academy, the MVUSD would need to submit this Phase I ESA report with the Phase I ESA Review Application to Mr. Shahir Haddad, Phase I Coordinator Schools Team – Cypress, Department of Toxic Substances Control 5796 Corporate Avenue Cypress, California 90630. A report review fee in the amount of $1,500 should also be forwarded to the Department of Toxic Substances Control Accounting Office, 1001 I Street, 21st Floor, P.O. Box 806, Sacramento, California 95812-0806.

10.0 DEVIATIONS

Leighton did not deviate from or alter the scope of work, as defined in Section 1.3 of this report. Significant data gaps were not identified that affect the ability of Leighton to identify recognized environmental conditions at the subject site.

11.0 ADDITIONAL SERVICES

Leighton did not perform work outside the scope of work as defined in Section 1.3 and 1.6 of this report.

12.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

12.1 Corporate

Leighton is a California corporation, providing geotechnical and environmental consulting services throughout California. We are solely a consulting firm without interests in real property other than our office locations in Southern California. We provide professional environmental consulting services including application of science and engineering to environmental compliance, hazardous materials/waste assessment and cleanup, and management of hazardous, solid and industrial waste. Phase I Environmental Site Assessments are a part of this practice area and have been conducted by us.

12.2 Individual

The qualifications of the Project Manager and the other Leighton environmental professionals involved in this Phase I ESA meet the Leighton corporate requirements for performing Phase I ESAs as specified by ASTM E1527-13 and the Department of Toxic Substances Control (DTSC) Phase I Environmental Site Assessment Advisory: School Property Evaluators (Revised September 5, 2001) and the California Code of Regulators (CCR) Title 22, Division 4.5, Chapter 51.5 – Phase I Environmental Site Assessment (Schools).

12.3 Environmental Professional Statement

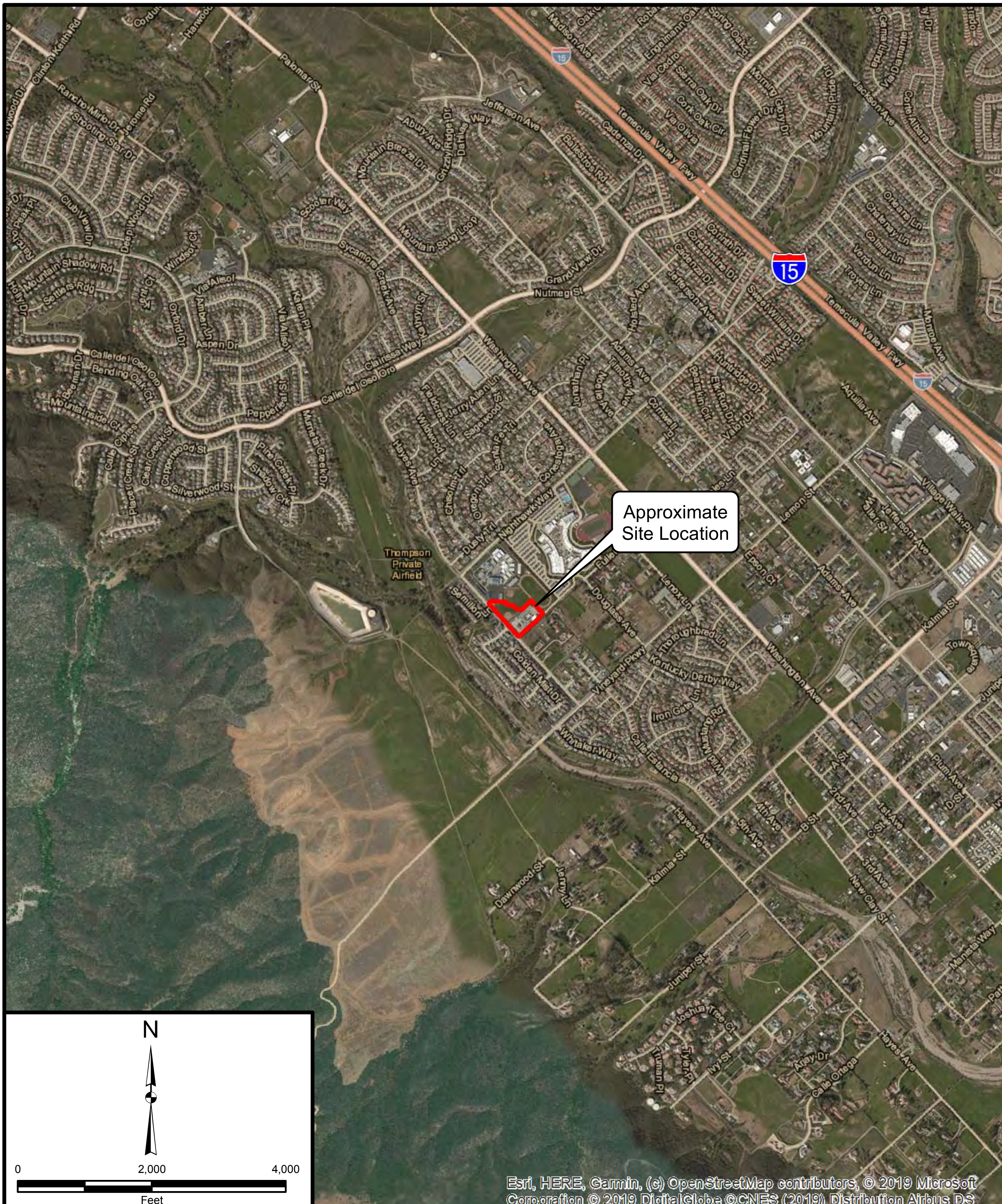
I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional, as defined by §312.10 of 40 CFR Part 312.

I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject site. I have developed and performed all the appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Zachary Freeman, PG
Project Geologist

PROFESSIONAL GEOLOGIST
ZACHARY A. FREEMAN
No. 9460
STATE OF CALIFORNIA

Leighton



Project: 12393.002	Eng/Geol: ZAF
Scale:1 " = 2,000 '	Date: January 2020

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton
Author: Leighton Geomatics (btran)

SITE LOCATION MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 1

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F01_SLM_2019-08-20.mxd on 8/20/2019 11:17:54 AM

Proj: 12393.002	Eng/Geol: ZAF
Scale: 1" = '	Date: January 2020
Drafted by: ZAF / Checked by: ZAF	

SITE PLAN

Murrieta Canyon Academy
24150 Hayes Avenue
Murrieta, California

FIGURE 2

Leighton

APPENDIX A

REFERENCES

APPENDIX A

References

ASTM National, 2013, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, Designation E1527-13, dated November 6, 2013.

CCR (California Code of Regulations) Title 22, Division 4.5, Article 1. Phase I Environmental Site Assessments (Proposed New and Expanding School Sites).

CDPH (California Department of Public Health), 2016, California Indoor Radon Test Results, https://www.cdph.ca.gov/Programs/CEH/DRSEM/Pages/EMB/Radon/Radon-Test-Results.aspx, dated February 2016.

DOGGR (California Department of Conservation, Division of Oil, Gas, and Geothermal Resources), Online Mapping System, accessed December 18, 2019.

DTSC (Department of Toxic Substances Control), 2001, Phase I Environmental Site Assessment Advisory: School Property Evaluations Revised September 5, 2001, https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/09/SMP_REP_Schools_Phase1Advisory.pdf, dated September 5, 2019.

DTSC, 2006, Interim Guidance Evaluation of School Sites with Potential Soil Contamination as a Result of Lead From Lead-Based Paint, Organochlorine Pesticides From Termiticides, and Polychlorinated Biphenyls from Electrical Transformers, https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/09/Guidance_Lead_Contamination_050118.pdf, dated, September 12, 2006.

DWR (California Department of Water Resources), 2018, Hydrologic Region South Coast, California's Groundwater, Bulletin 118: Temecula Valley Basin, updated January 17, 2018.

DWR, 2019, Hydrologic Region South Coast, California's Groundwater, Bulletin 118: Temecula Valley Basin, updated January 17, 2018.

California Geological Survey, (CGS), 2006, Geologic Map of the San Bernardino and Santa Ana 30' X 60' Quadrangle, Southern California, Version 1.0, Compiled by Douglas M. Morton and Fred K. Miller, Open File Report 06-1217.

GeoSearch, City Directory, dated December 16, 2019.

GeoSearch, Fire Insurance Map (FIM) Abstract, dated December 17, 2019.

GeoSearch, Historical Aerials Package, dated December 19, 2019.

GeoSearch, Historical Topographic Maps, dated December 19, 2019.

GeoSearch, Radius Report, dated December 13, 2019.

NETR, 2019, The NETR Environmental Lien and AUL Search Report, MVUSD Canyon Academy Phase I 24150 Hayes Avenue Also Known As 42200 Nighthawk Way Murrieta, California, dated December 16, 2019.

NPMS (National Pipeline Mapping System), 2019, NPMS Public Map Viewer, https://www.npms.phmsa.dot.gov/, accessed, December 17, 2019.

SCAQMD (South Coast Air Quality Management District), 2019, Facilities Inventory Database (FIND), https://www.aqmd.gov/nav/FIND/facility-information-detail, accessed December 15, 2019.

US EPA (US Environmental Protection Agency), 2015, Practical Actions for Reducing Exposure to PCBs in Schools and Other Buildings, https://www.epa.gov/sites/production/files/2016-03/documents/practical_actions_for_reducing_exposure to to_pcbs_in_schools_and_other_buildings.pdf, dated July 28, 2015.

APPENDIX B

SITE RECONNAISSANCE PHOTOGRAPHS

Leighton

Leighton Consulting, Inc.	**PHOTOGRAPHIC RECORD** **January 8, 2020**	
Client Name: **Murrieta Valley Unified School District**	**Site Location:** **Murrieta Canyon Academy** **24150 Hayes Avenue, Murrieta, California**	**Project No.** **12393.002**

Photo No. 1	
View of Direction of Photo: Northwest	
Description: View across the MCA campus "quad" area and lunch area shelter.	

Photo No. 2	
View of Direction of Photo: North	
Description: View across the MCA "quad" area.	

Leighton Consulting, Inc.	**PHOTOGRAPHIC RECORD** **January 8, 2020**	
Client Name: **Murrieta Valley Unified School District**	**Site Location:** **Murrieta Canyon Academy** **24150 Hayes Avenue, Murrieta, California**	**Project No.** **12393.002**

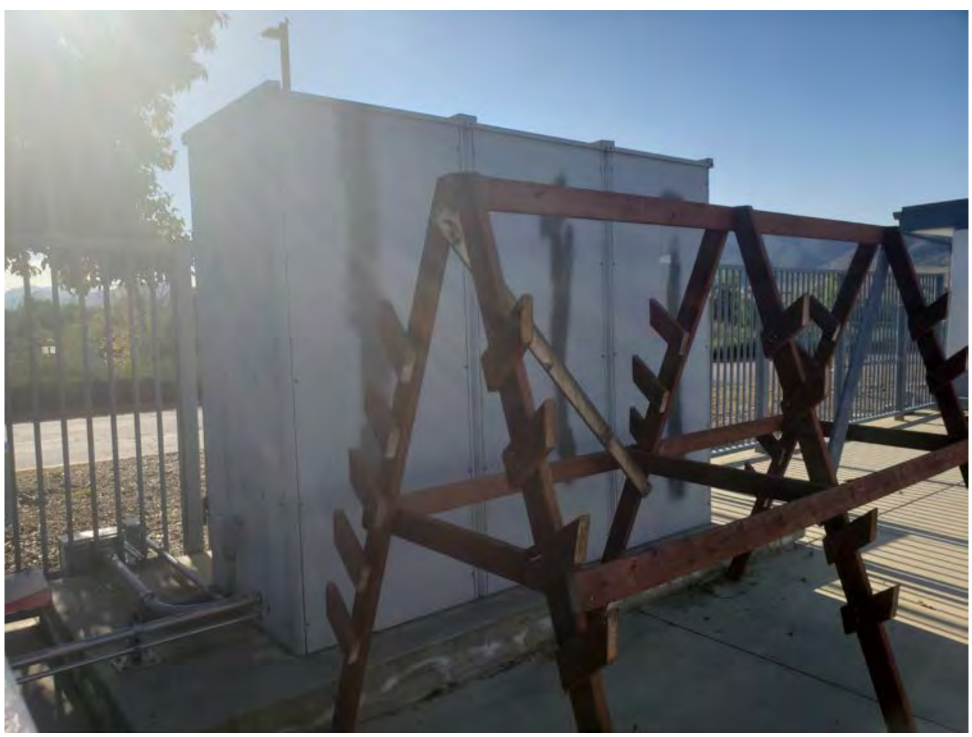
Photo No. 3	
View of Direction of Photo: South	
Description: Cleaning agents in the custodial closet on the southeast side of the subject site.	

Photo No. 4	
View of Direction of Photo: North	
Description: Mop sink and cleaning products in the custodial closet.	

Leighton Consulting, Inc.

PHOTOGRAPHIC RECORD **January 8, 2020**		
Client Name: **Murrieta Valley Unified School District**	**Site Location:** **Murrieta Canyon Academy** **24150 Hayes Avenue, Murrieta, California**	**Project No.** **12393.002**

Photo No. 5	
View of Direction of Photo: Southwest	
Description: Shed containing propane barbecue grills on the northeast side of the subject site.	

Photo No. 6	
View of Direction of Photo: South	
Description: Main electrical circuit breaker box on the northeast side of the subject site.	

Client Name:	Site Location:	Project No.
Murrieta Valley Unified School District	**Murrieta Canyon Academy 24150 Hayes Avenue, Murrieta, California**	**12393.002**

Photo No. 7

View of Direction of Photo:

Southeast

Description:

Pad-mounted transformer located near the northeastern boundary of the subject site.

Photo No. 8

View of Direction of Photo:

Southwest

Description:

Cafeteria room located near the center of the subject site.

Leighton Consulting, Inc.

PHOTOGRAPHIC RECORD
January 8, 2020

Client Name: Murrieta Valley Unified School District	Site Location: Murrieta Canyon Academy 24150 Hayes Avenue, Murrieta, California	Project No. 12393.002

Photo No. 9

View of Direction of Photo:

Northeast

Description:

Non-hazardous chemical storage in the science lab classroom on the northeast side of the subject site.

Photo No. 10

View of Direction of Photo:

Southeast

Description:

Science lab classroom on the northeast side of the subject site.

Leighton Consulting, Inc.	**PHOTOGRAPHIC RECORD** **January 8, 2020**	
Client Name: **Murrieta Valley Unified School District**	**Site Location:** **Murrieta Canyon Academy** **24150 Hayes Avenue, Murrieta, California**	**Project No.** **12393.002**

Photo No. 11	
View of Direction of Photo: South	
Description: View across the "quad" area of the subject site toward the administration building.	

Photo No. 12	
View of Direction of Photo: West	
Description: View across the athletic field looking back toward the softball diamond.	

Leighton Consulting, Inc.	**PHOTOGRAPHIC RECORD** **January 8, 2020**	
Client Name: **Murrieta Valley Unified School District**	**Site Location:** **Murrieta Canyon Academy** **24150 Hayes Avenue, Murrieta, California**	**Project No.** **12393.002**

Photo No. 13	
View of Direction of Photo: Northeast	
Description: View across the athletic field.	

Photo No. 14	
View of Direction of Photo: West	
Description: View across the athletic field from the northwestern corner of the MCA campus.	

Leighton Consulting, Inc.	**PHOTOGRAPHIC RECORD** **January 8, 2020**	
Client Name: **Murrieta Valley Unified School District**	**Site Location:** **Murrieta Canyon Academy** **24150 Hayes Avenue, Murrieta, California**	**Project No.** **12393.002**

Photo No. 15

View of Direction of Photo:

Northeast

Description:

View looking along the southwestern MCA classroom building.

Photo No. 16

View of Direction of Photo:

Southwest

Description:

View of residences adjacent to the southwest of the subject site.

Leighton Consulting, Inc.	**PHOTOGRAPHIC RECORD** **January 8, 2020**	
Client Name: **Murrieta Valley Unified School District**	**Site Location:** **Murrieta Canyon Academy** **24150 Hayes Avenue, Murrieta, California**	**Project No.** **12393.002**

Photo No. 17	
View of Direction of Photo: Northeast	
Description: View across the MCA parking lot on the southwest side of the subject site.	

Photo No. 18	
View of Direction of Photo: North	
Description: View across the MCA parking lot on the southwest side of the subject site.	

Leighton Consulting, Inc.

PHOTOGRAPHIC RECORD
January 8, 2020

Client Name:	Site Location:	Project No.
Murrieta Valley Unified School District	**Murrieta Canyon Academy 24150 Hayes Avenue, Murrieta, California**	**12393.002**

Photo No. 19

View of Direction of Photo:

Northwest

Description:

View long the northern subject site boundary. Containers are used to store sports equipment and emergency supplies.

Photo No. 20

View of Direction of Photo:

North

Description:

Emergency supplies container located on the southeast side of the subject site.

APPENDIX C

CLIENT SUPPLIED DOCUMENTATION

Leighton

Leighton

Phase I ESA Owner/Site Contact Interview Form

Interviewee Name: Lori Noorigian Title: Director, Facilities

Address: 41870 McAlby Court Phone: (951) 696-1600 ext. 1080

Relationship to Property: Employee

Name and Address of Owner of the Property: Murrieta Valley Unified School District, 41870 McAlby Court

Date of Ownership: November 1990 Site Name: Thompson Middle School

Property Address: 24040 Hayes Ave., Murrieta, CA

Previous Street Names/Numbers: Unknown

General Business Type/Present Property Use: School

Assessor Parcel Number: 904-050-001-03 Total # of Buildings: 9

Grand Total Square Footage: 116,691 Date Built: 1994

Past Property Uses (include dates): Vacant land

Source of Potable Water Supply (municipal/groundwater wells): municipal

Sewage Disposal (municipal/septic) (provide name of utility): Municipal/Rancho Water

Means of Heating/Cooling (gas, electric, heating oil, etc.): Gas

Fuel Source for Heating/Air Conditioning (provide name of utility): Gas Co.

Neighboring Property Types (commercial/industrial/residential): Residential

Current Uses of Adjoining Properties: North: Residential

South: School

East: School

West: Residential

ARE THERE NOW, OR HAVE THERE BEEN IN THE PAST, ANY OF THESE ITEMS ONSITE OR ON ADJACENT PROPERTIES:

ITEM	YES	NO	UNK	ADJACENT PROPERTY
• Hazardous Materials			✓	
• Hazardous Waste			✓	
• MSDS Sheets			✓	
• Underground Storage Tanks		✓		
• Aboveground Storage Tanks			✓	
• Vent Pipes, fill pipes, or access ways indicating a fill pipe to an underground storage area			✓	
• Odors			✓	
• Drums			✓	
• Electrical or hydraulic equipment known to contain PCBs			✓	
• Stained soil or surfaces			✓	
• Drains			✓	
• Sumps			✓	
• Clarifier			✓	
• Pits, ponds, or lagoons			✓	
• Stressed vegetation			✓	
• Areas for dumping solid waste (landfill)			✓	
• Wastewater			✓	
• Wells (oil or gas)			✓	
• Septic Systems			✓	
• Fill Material (if fill material is on site, please state source of fill)			✓	

ADDITIONAL QUESTIONS:	YES	NO	UNK	REMARKS
Has the Site been used as any of the following: gas station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard, or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility? If so, state which type of facility.			✓	
Are you aware of any regulatory compliance audit reports, geotechnical reports, Phase I Environmental Site Assessments, or Phase II Environmental Site Assessments, or soil sampling reports prepared for the Site?	✓			MVUSD did CEQA in 1992-93
Do you know of any notices or correspondence from any government agency relating to past or current violations of environmental laws with respect to the Site or relating to environmental liens encumbering the Site?		✓		
Do you know of any pending, threatened, or past litigation or administrative proceedings relevant to hazardous substances or petroleum products in, on or from the Site?		✓		
Do you know of any notices from any governmental entity regarding any possible violation of environmental laws or possible liability relating to hazardous substances or petroleum products?		✓		
Do you know of any environmental concerns associated with the Site? If so please state in remarks column.		✓		
Do you know of any environmental concerns associated with any adjacent or nearby properties? If so please state in remarks column.		✓		

Property Utilization During Ownership: School

Name and Address of Past Owners:

Additional Comments:

Preparer presents that to the best of the preparer's knowledge the above statements and facts are true and correct, and to the best of the preparer's actual knowledge no material facts have been suppressed or misstated.

Lori Noorigian
Signature

12/12/19
Date

Leighton

Leighton

Phase I ESA Users Questionnaire

Project Name: Murrieta Canyon Academy

Complete and Correct Address(es) of the Property and APN(s):

User Company Name: MVUSD	**User Name/Title:**

User Phone/Email:

Interviewee Name and Relationship to Project:

Site Owner:

Reason Phase I is required:
Building new classroom buildings

Type of property:

Type of property transaction (e.g., Sale, purchase, exchange):

Any scope of services beyond the ASTM Practice E 1527:

All Parties that will rely on the Phase I report:

Name and Contact Information for Site Contact:

Any special terms or conditions:

Any other pertinent knowledge or experience with the property (e.g., prior reports, documents, correspondence concerning the environmental conditions of the property):

(1). Environmental cleanup liens that are filed or recorded against the site (40 CFR 312.25).

Did a search of recorded land title records (or judicial records where appropriate identify any environmental liens filed or recorded against the property under federal, tribal, state or local law? ☐ Yes | ☑ No

If Yes, Describe:

(2). Activity and land use limitations (AULs) that are in place on the site or that have been filed or recorded in a registry (40 CFR 312.26).

Did a search of recorded land title records (or judicial records where appropriate) identify any AULs, such as engineering controls, land use restrictions or institutional controls that are in place at the property and/or have been filed or recorded against the property under federal, tribal, state or local law? ☐ Yes | ☑ No

If Yes, Describe:

(3). Specialized knowledge or experience of the person seeking to qualify for the Landowners Liability Protections (LLP) (40 CFR 312.28).

Do you have any specialized knowledge or experience related to the property or the property or nearby properties? For example, are you involved in the same line of business as the current or former occupants of the property or an adjoining property so that you would have specialized knowledge of the chemicals and processes used by this type of business?
☐ Yes | ☑ No

If Yes, Describe:

(4). Relationship of the purchase price to the fair market value of the property if it were not contaminated (40 DRF 312.29).

Does the purchase price being paid for this property reasonably reflect the fair market value of the property?

☐ Yes | ☐ No

If you conclude that there is a difference, have you considered whether the lower purchase price is because contamination is known or believed to be present at the property? ☐ Yes | ☐ No

If Yes, Describe:

(5). Commonly known or reasonable ascertainable information about the property (40 CFR 312.30).

Are you aware of commonly known or *reasonably ascertainable* information about the property that would help the *environmental professional* to identify conditions indicative of releases or threatened releases? For example, as user,

(a.) Do you know the past uses of the property? ☐ Yes | ☑ No

(b.) Do you know of specific chemicals that are present or once were present at the property? ☐ Yes | ☑ No

(c.) Do you know of spills or other chemical releases that have taken place at the property? ☐ Yes | ☑ No

(d.) Do you know of any environmental cleanups that have taken place at the property? ☐ Yes | ☑ No

If Yes, Describe:

(6). The degree of obviousness of the presence of likely presence of contamination at the property, and the ability to detect the contamination by appropriate investigation (40 CFR 312.31).

Based on your knowledge and experience related to the *property*, are there any *obvious* indicators that point to the presence or likely presence of contamination at the *property?* ☐ Yes | ☑ No

If Yes, Describe:

Signature: [signature] Date: 12/12/19

Leighton

APPENDIX D

ENVIRONMENTAL RADIUS REPORT

Leighton

Radius Report

GeoLens by GeoSearch

Target Property:

MVUSD Murrieta Canyon Academy
24150 Hayes Avenue
Murrieta, Riverside County, California 92562

Prepared For:

Leighton Consulting Inc.

Order #: 138113
Job #: 329082
Project #: 12393.002
PO #: 12393.002
Date: 12/13/2019

Table of Contents

Disclaimer

This report was designed by GeoSearch to meet or exceed the records search requirements of the All Appropriate Inquiries Rule (40 CFR Â§312.26) and the current version of the ASTM International E1527, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process or, if applicable, the custom requirements requested by the entity that ordered this report. The records and databases of records used to compile this report were collected from various federal,state and local governmental entities. It is the goal of GeoSearch to meet or exceed the 40 CFRÂ§312.26 and E1527 requirements for updating records by using the best available technology. GeoSearch contacts the appropriate governmental entities on a recurring basis. Depending on the frequency with which a record source or database of records is updated by the governmental entity, the data used to prepare this report may be updated monthly, quarterly, semi-annually, or annually.

The information provided in this report was obtained from a variety of public sources. GeoSearch cannot ensure and makes no warranty or representation as to the accuracy, reliability, quality, errors occurring from data conversion or the customer's interpretation of this report. This report was made by GeoSearch for exclusive use by its clients only. Therefore, this report may not contain sufficient information for other purposes or parties. GeoSearch and its partners, employees, officers And independent contractors cannot be held liable For actual, incidental, consequential, special or exemplary damages suffered by a customer resulting directly or indirectly from any information provided by GeoSearch.

Target Property Summary

Target Property Information

MVUSD Murrieta Canyon Academy
24150 Hayes Avenue
Murrieta, California 92562

Coordinates
Area centroid (-117.23248, 33.5605346)
1,136 feet above sea level

USGS Quadrangle
Murrieta, CA

Geographic Coverage Information

County/Parish: Riverside (CA)
ZipCode(s):
Murrieta CA: 92562

Database Summary

FEDERAL LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
EMERGENCY RESPONSE NOTIFICATION SYSTEM	ERNSCA	0	0	TP/AP
FEDERAL ENGINEERING INSTITUTIONAL CONTROL SITES	EC	0	0	TP/AP
LAND USE CONTROL INFORMATION SYSTEM	LUCIS	0	0	TP/AP
RCRA SITES WITH CONTROLS	RCRASC	0	0	TP/AP
RESOURCE CONSERVATION & RECOVERY ACT - GENERATOR	RCRAGR09	0	0	0.1250
RESOURCE CONSERVATION & RECOVERY ACT - NON-GENERATOR	RCRANGR09	0	0	0.1250
BROWNFIELDS MANAGEMENT SYSTEM	BF	0	0	0.5000
DELISTED NATIONAL PRIORITIES LIST	DNPL	0	0	0.5000
NO LONGER REGULATED RCRA NON-CORRACTS TSD FACILITIES	NLRRCRAT	0	0	0.5000
RESOURCE CONSERVATION & RECOVERY ACT - NON-CORRACTS TREATMENT, STORAGE & DISPOSAL FACILITIES	RCRAT	0	0	0.5000
SUPERFUND ENTERPRISE MANAGEMENT SYSTEM	SEMS	0	0	0.5000
SUPERFUND ENTERPRISE MANAGEMENT SYSTEM ARCHIVED SITE INVENTORY	SEMSARCH	0	0	0.5000
NATIONAL PRIORITIES LIST	NPL	0	0	1.0000
NO LONGER REGULATED RCRA CORRECTIVE ACTION FACILITIES	NLRRCRAC	0	0	1.0000
PROPOSED NATIONAL PRIORITIES LIST	PNPL	0	0	1.0000
RESOURCE CONSERVATION & RECOVERY ACT - CORRECTIVE ACTION FACILITIES	RCRAC	0	0	1.0000
RESOURCE CONSERVATION & RECOVERY ACT - SUBJECT TO CORRECTIVE ACTION FACILITIES	RCRASUBC	0	0	1.0000

SUB-TOTAL		0	0	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
AEROMETRIC INFORMATION RETRIEVAL SYSTEM / AIR FACILITY SUBSYSTEM	AIRSAFS	0	0	TP/AP
BIENNIAL REPORTING SYSTEM	BRS	0	0	TP/AP
CERCLIS LIENS	SFLIENS	0	0	TP/AP
CLANDESTINE DRUG LABORATORY LOCATIONS	CDL	0	0	TP/AP
EPA DOCKET DATA	DOCKETS	0	0	TP/AP
ENFORCEMENT AND COMPLIANCE HISTORY INFORMATION	ECHOR09	0	0	TP/AP
FACILITY REGISTRY SYSTEM	FRSCA	2	0	TP/AP

Database Summary

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
HAZARDOUS MATERIALS INCIDENT REPORTING SYSTEM	HMIRSR09	0	0	TP/AP
INTEGRATED COMPLIANCE INFORMATION SYSTEM (FORMERLY DOCKETS)	ICIS	0	0	TP/AP
INTEGRATED COMPLIANCE INFORMATION SYSTEM NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM	ICISNPDES	0	0	TP/AP
MATERIAL LICENSING TRACKING SYSTEM	MLTS	0	0	TP/AP
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM	NPDESR09	0	0	TP/AP
PCB ACTIVITY DATABASE SYSTEM	PADS	0	0	TP/AP
PERMIT COMPLIANCE SYSTEM	PCSR09	0	0	TP/AP
SEMS LIEN ON PROPERTY	SEMSLIENS	0	0	TP/AP
SECTION SEVEN TRACKING SYSTEM	SSTS	0	0	TP/AP
TOXIC SUBSTANCE CONTROL ACT INVENTORY	TSCA	0	0	TP/AP
TOXICS RELEASE INVENTORY	TRI	0	0	TP/AP
ALTERNATIVE FUELING STATIONS	ALTFUELS	0	0	0.2500
FEMA OWNED STORAGE TANKS	FEMAUST	0	0	0.2500
HISTORICAL GAS STATIONS	HISTPST	0	0	0.2500
INTEGRATED COMPLIANCE INFORMATION SYSTEM DRYCLEANERS	ICISCLEANERS	0	0	0.2500
MINE SAFETY AND HEALTH ADMINISTRATION MASTER INDEX FILE	MSHA	0	0	0.2500
MINERAL RESOURCE DATA SYSTEM	MRDS	0	0	0.2500
OPEN DUMP INVENTORY	ODI	0	0	0.5000
SURFACE MINING CONTROL AND RECLAMATION ACT SITES	SMCRA	0	0	0.5000
URANIUM MILL TAILINGS RADIATION CONTROL ACT SITES	USUMTRCA	0	0	0.5000
DEPARTMENT OF DEFENSE SITES	DOD	0	0	1.0000
FORMER MILITARY NIKE MISSILE SITES	NMS	0	0	1.0000
FORMERLY USED DEFENSE SITES	FUDS	0	0	1.0000
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM	FUSRAP	0	0	1.0000
RECORD OF DECISION SYSTEM	RODS	0	0	1.0000

SUB-TOTAL		2	0	

Database Summary

STATE (CA) LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
DTSC DEED RESTRICTIONS	DTSCDR	0	0	TP/AP
ABOVE GROUND STORAGE TANKS	ABST	0	0	0.2500
ABOVEGROUND STORAGE TANKS PRIOR TO JANUARY 2008	AST2007	0	0	0.2500
HISTORICAL UNDERGROUND STORAGE TANKS	HISTUST	0	0	0.2500
STATEWIDE ENVIRONMENTAL EVALUATION AND PLANNING SYSTEM	SWEEPS	0	0	0.2500
UNDERGROUND STORAGE TANKS	USTCUPA	0	0	0.2500
BROWNFIELD SITES	BF	0	0	0.5000
CALSITES DATABASE	CALSITES	0	0	0.5000
GEOTRACKER CLEANUP SITES	CLEANUPSITES	1	0	0.5000
LEAKING UNDERGROUND STORAGE TANKS	LUST	1	0	0.5000
SOLID WASTE INFORMATION SYSTEM SITES	SWIS	0	0	0.5000
VOLUNTARY CLEANUP PROGRAM	VCP	0	0	0.5000
ENVIROSTOR CLEANUP SITES	ENVIROSTOR	2	0	1.0000
ENVIROSTOR PERMITTED AND CORRECTIVE ACTION SITES	ENVIROSTORPCA	0	0	1.0000

SUB-TOTAL		4	0	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
CALIFORNIA HAZARDOUS MATERIAL INCIDENT REPORT SYSTEM	CHMIRS	0	0	TP/AP
CLANDESTINE DRUG LABS	CDL	0	0	TP/AP
EMISSIONS INVENTORY DATA	EMI	0	0	TP/AP
HAZARDOUS WASTE TANNER SUMMARY	HWTS	0	0	TP/AP
LAND DISPOSAL SITES	LDS	0	0	TP/AP
MILITARY CLEANUP SITES	MCS	0	0	TP/AP
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM FACILITIES	NPDES	0	0	TP/AP
RECORDED ENVIRONMENTAL CLEANUP LIENS	LIENS	0	0	TP/AP
CALIFORNIA MEDICAL WASTE MANAGEMENT PROGRAM FACILITY LIST	MWMP	0	0	0.2500
DTSC REGISTERED HAZARDOUS WASTE TRANSPORTERS	DTSCHWT	0	0	0.2500
DRY CLEANER FACILITIES	CLEANER	0	0	0.2500
MINES LISTING	MINES	0	0	0.2500

Database Summary

Database	*Acronym*	*Locatable*	*Unlocatable*	*Search Radius (miles)*
SPILLS, LEAKS, INVESTIGATION & CLEANUP RECOVERY LISTING	*SLIC*	*0*	*0*	*0.2500*
CORTESE LIST	*CORTESE*	*0*	*0*	*0.5000*
EXPEDITED REMOVAL ACTION PROGRAM SITES	*ERAP*	*0*	*0*	*0.5000*
HISTORICAL CORTESE LIST	*HISTCORTESE*	*0*	*0*	*0.5000*
LISTING OF CERTIFIED DROPOFF, COLLECTION, AND COMMUNITY SERVICE PROGRAMS	*DROP*	*0*	*0*	*0.5000*
LISTING OF CERTIFIED PROCESSORS	*PROC*	*0*	*0*	*0.5000*
NO FURTHER ACTION DETERMINATION	*NFA*	*0*	*0*	*0.5000*
RECYCLING CENTERS	*SWRCY*	*0*	*0*	*0.5000*
REFERRED TO ANOTHER LOCAL OR STATE AGENCY	*REF*	*0*	*0*	*0.5000*
SITES NEEDING FURTHER EVALUATION	*NFE*	*0*	*0*	*0.5000*
WASTE MANAGEMENT UNIT DATABASE	*WMUDS*	*0*	*0*	*0.5000*
TOXIC PITS CLEANUP ACT SITES	*TOXPITS*	*0*	*0*	*1.0000*

SUB-TOTAL		*0*	*0*	

LOCAL LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
RIVERSIDE COUNTY UNDERGROUND STORAGE TANK SITES	RCUST	0	0	0.2500
RIVERSIDE COUNTY UNDERGROUND STORAGE TANKS CLEANUP SITES	RCLUST	1	0	0.5000
SUB-TOTAL		1	0	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
RIVERSIDE COUNTY GENERATOR LIST	RCGL	0	0	0.1250
RIVERSIDE COUNTY DISCLOSURE LIST	RCDL	0	0	0.2500
RIVERSIDE COUNTY MEDICAL WASTE FACILITIES	RCMW	0	0	0.2500
SUB-TOTAL		0	0	

TRIBAL LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
UNDERGROUND STORAGE TANKS ON TRIBAL LANDS	USTR09	0	0	0.2500
ILLEGAL DUMP SITES ON THE TORRES MARTINEZ RESERVATION	TORRESDUMPSITES	0	0	0.5000
LEAKING UNDERGROUND STORAGE TANKS ON TRIBAL LANDS	LUSTR09	0	0	0.5000
OPEN DUMP INVENTORY ON TRIBAL LANDS	ODINDIAN	0	0	0.5000
SUB-TOTAL		0	0	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
INDIAN RESERVATIONS	INDIANRES	0	0	1.0000
SUB-TOTAL		0	0	

TOTAL		7	0	

FEDERAL LISTING

*Standard environmental records are displayed in **bold**.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
AIRSAFS	0.0200	0	NS	NS	NS	NS	NS	0
BRS	0.0200	0	NS	NS	NS	NS	NS	0
CDL	0.0200	0	NS	NS	NS	NS	NS	0
DOCKETS	0.0200	0	NS	NS	NS	NS	NS	0
EC	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
ECHOR09	0.0200	0	NS	NS	NS	NS	NS	0
ERNSCA	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
FRSCA	0.0200	2	NS	NS	NS	NS	NS	2
HMIRSR09	0.0200	0	NS	NS	NS	NS	NS	0
ICIS	0.0200	0	NS	NS	NS	NS	NS	0
ICISNPDES	0.0200	0	NS	NS	NS	NS	NS	0
LUCIS	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
MLTS	0.0200	0	NS	NS	NS	NS	NS	0
NPDESR09	0.0200	0	NS	NS	NS	NS	NS	0
PADS	0.0200	0	NS	NS	NS	NS	NS	0
PCSR09	0.0200	0	NS	NS	NS	NS	NS	0
RCRASC	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
SEMSLIENS	0.0200	0	NS	NS	NS	NS	NS	0
SFLIENS	0.0200	0	NS	NS	NS	NS	NS	0
SSTS	0.0200	0	NS	NS	NS	NS	NS	0
TRI	0.0200	0	NS	NS	NS	NS	NS	0
TSCA	0.0200	0	NS	NS	NS	NS	NS	0
RCRAGR09	**0.1250**	**0**	**0**	**NS**	**NS**	**NS**	**NS**	**0**
RCRANGR09	**0.1250**	**0**	**0**	**NS**	**NS**	**NS**	**NS**	**0**
ALTFUELS	0.2500	0	0	0	NS	NS	NS	0
FEMAUST	0.2500	0	0	0	NS	NS	NS	0
HISTPST	0.2500	0	0	0	NS	NS	NS	0
ICISCLEANERS	0.2500	0	0	0	NS	NS	NS	0
MRDS	0.2500	0	0	0	NS	NS	NS	0
MSHA	0.2500	0	0	0	NS	NS	NS	0
BF	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
DNPL	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
NLRRCRAT	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
ODI	0.5000	0	0	0	0	NS	NS	0
RCRAT	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**

Database Radius Summary

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
SEMS	***0.5000***	***0***	***0***	***0***	***0***	***NS***	***NS***	***0***
SEMSARCH	***0.5000***	***0***	***0***	***0***	***0***	***NS***	***NS***	***0***
SMCRA	*0.5000*	*0*	*0*	*0*	*0*	*NS*	*NS*	*0*
USUMTRCA	*0.5000*	*0*	*0*	*0*	*0*	*NS*	*NS*	*0*
DOD	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*
FUDS	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*
FUSRAP	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*
NLRRCRAC	***1.0000***	***0***	***0***	***0***	***0***	***0***	***NS***	***0***
NMS	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*
NPL	***1.0000***	***0***	***0***	***0***	***0***	***0***	***NS***	***0***
PNPL	***1.0000***	***0***	***0***	***0***	***0***	***0***	***NS***	***0***
RCRAC	***1.0000***	***0***	***0***	***0***	***0***	***0***	***NS***	***0***
RCRASUBC	***1.0000***	***0***	***0***	***0***	***0***	***0***	***NS***	***0***
RODS	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*

SUB-TOTAL		*2*	*0*	*0*	*0*	*0*	*0*	*2*

Database Radius Summary

STATE (CA) LISTING

*Standard environmental records are displayed in **bold**.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
CDL	0.0200	0	NS	NS	NS	NS	NS	0
CHMIRS	0.0200	0	NS	NS	NS	NS	NS	0
DTSCDR	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
EMI	0.0200	0	NS	NS	NS	NS	NS	0
HWTS	0.0200	0	NS	NS	NS	NS	NS	0
LDS	0.0200	0	NS	NS	NS	NS	NS	0
LIENS	0.0200	0	NS	NS	NS	NS	NS	0
MCS	0.0200	0	NS	NS	NS	NS	NS	0
NPDES	0.0200	0	NS	NS	NS	NS	NS	0
ABST	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
AST2007	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
CLEANER	0.2500	0	0	0	NS	NS	NS	0
DTSCHWT	0.2500	0	0	0	NS	NS	NS	0
HISTUST	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
MINES	0.2500	0	0	0	NS	NS	NS	0
MWMP	0.2500	0	0	0	NS	NS	NS	0
SLIC	0.2500	0	0	0	NS	NS	NS	0
SWEEPS	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
USTCUPA	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
BF	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
CALSITES	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
CLEANUPSITES	**0.5000**	**0**	**0**	**0**	**1**	**NS**	**NS**	**1**
CORTESE	0.5000	0	0	0	0	NS	NS	0
DROP	0.5000	0	0	0	0	NS	NS	0
ERAP	0.5000	0	0	0	0	NS	NS	0
HISTCORTESE	0.5000	0	0	0	0	NS	NS	0
LUST	**0.5000**	**0**	**0**	**0**	**1**	**NS**	**NS**	**1**
NFA	0.5000	0	0	0	0	NS	NS	0
NFE	0.5000	0	0	0	0	NS	NS	0
PROC	0.5000	0	0	0	0	NS	NS	0
REF	0.5000	0	0	0	0	NS	NS	0
SWIS	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
SWRCY	0.5000	0	0	0	0	NS	NS	0
VCP	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
WMUDS	0.5000	0	0	0	0	NS	NS	0

Database Radius Summary

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
ENVIROSTOR	**1.0000**	**0**	**0**	**0**	**1**	**1**	**NS**	**2**
ENVIROSTORPCA	**1.0000**	**0**	**0**	**0**	**0**	**0**	**NS**	**0**
TOXPITS	1.0000	0	0	0	0	0	NS	0
SUB-TOTAL		0	0	0	3	1	0	4

Database Radius Summary

LOCAL LISTING

*Standard environmental records are displayed in **bold**.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
RCGL	0.1250	0	0	NS	NS	NS	NS	0
RCDL	0.2500	0	0	0	NS	NS	NS	0
RCMW	0.2500	0	0	0	NS	NS	NS	0
RCUST	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
RCLUST	**0.5000**	**0**	**0**	**0**	**1**	**NS**	**NS**	**1**

SUB-TOTAL		0	0	0	1	0	0	1

TRIBAL LISTING

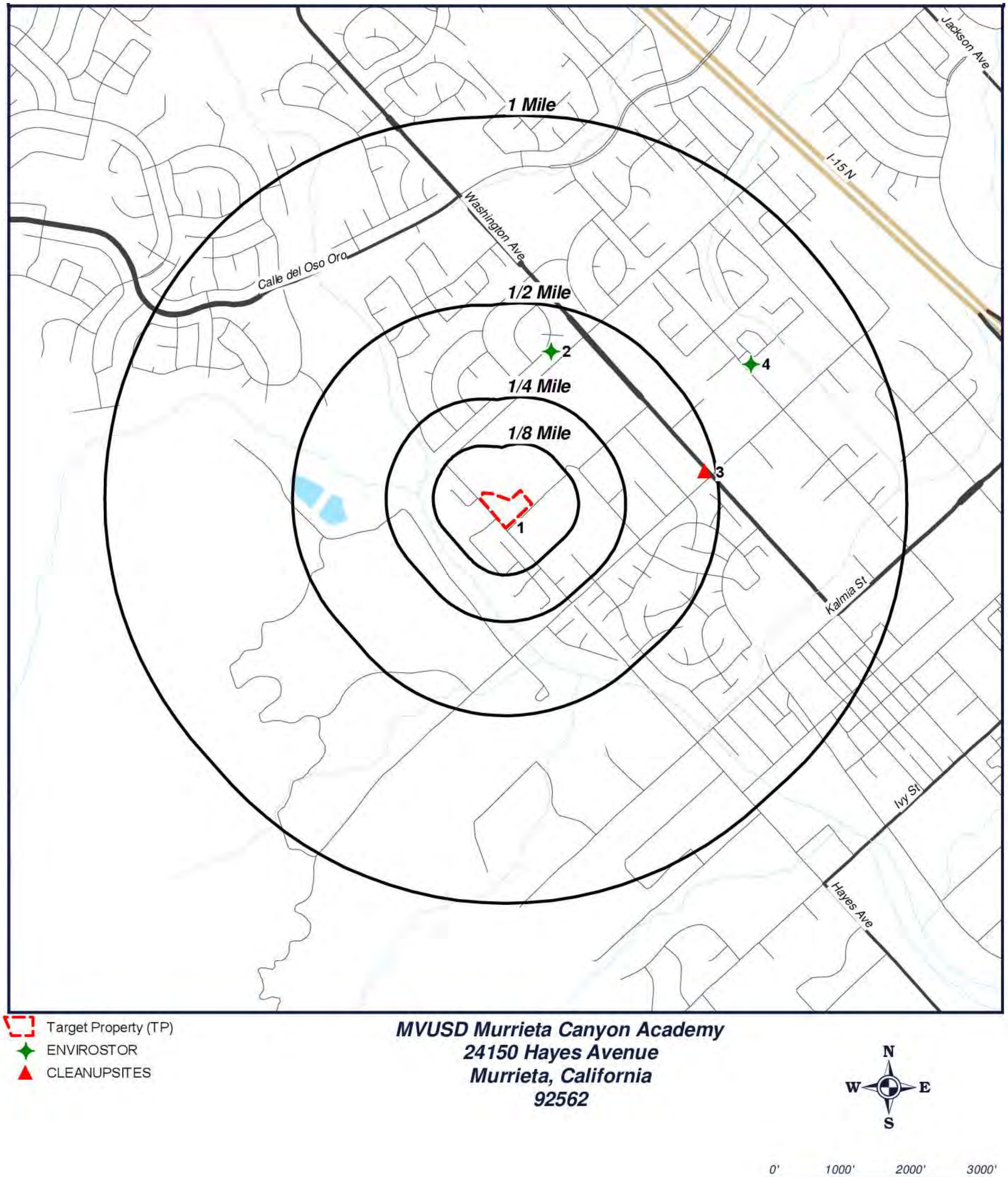
*Standard environmental records are displayed in **bold**.*

Acronym	*Search Radius (miles)*	*TP/AP (0 - 0.02)*	*1/8 Mile (> TP/AP)*	*1/4 Mile (> 1/8)*	*1/2 Mile (> 1/4)*	*1 Mile (> 1/2)*	*> 1 Mile*	*Total*
USTR09	***0.2500***	***0***	***0***	***0***	***NS***	***NS***	***NS***	***0***
LUSTR09	***0.5000***	***0***	***0***	***0***	***0***	***NS***	***NS***	***0***
ODINDIAN	***0.5000***	***0***	***0***	***0***	***0***	***NS***	***NS***	***0***
TORRESDUMPSITES	***0.5000***	***0***	***0***	***0***	***0***	***NS***	***NS***	***0***
INDIANRES	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*
SUB-TOTAL		*0*	*0*	*0*	*0*	*0*	*0*	*0*

TOTAL		*2*	*0*	*0*	*4*	*1*	*0*	*7*

NOTES:
NS = NOT SEARCHED
TP/AP = TARGET PROPERTY/ADJACENT PROPERTY

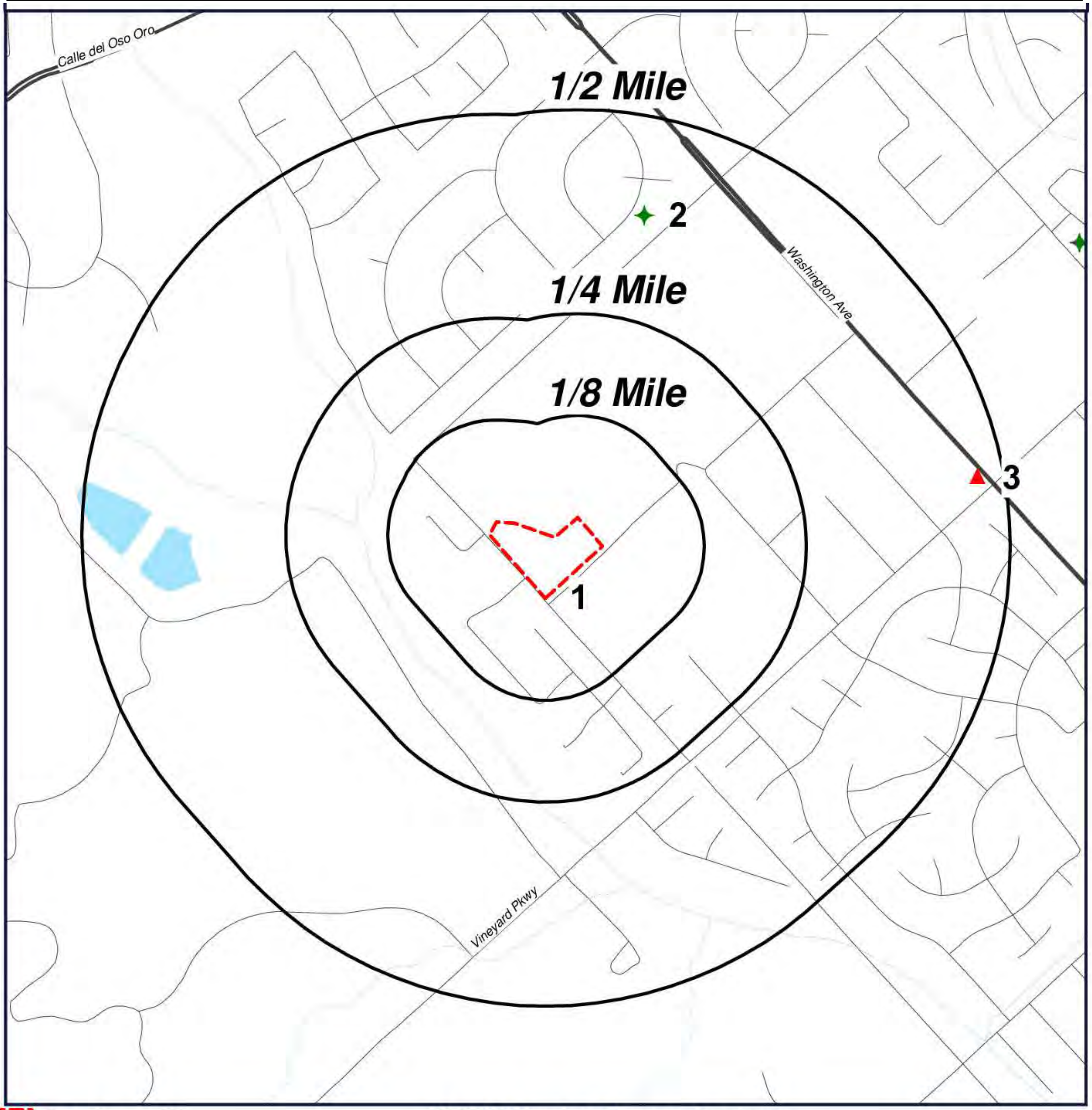
Radius Map 1



MVUSD Murrieta Canyon Academy
24150 Hayes Avenue
Murrieta, California
92562

[Click here to access Satellite view]

Radius Map 2



Target Property (TP)
ENVIROSTOR
CLEANUPSITES

MVUSD Murrieta Canyon Academy
24150 Hayes Avenue
Murrieta, California
92562

N W E S

0' 500' 1000' 1500'
SCALE: 1" = 1000'

Click here to access Satellite view

Ortho Map

Target Property (TP)
ENVIROSTOR
CLEANUPSITES

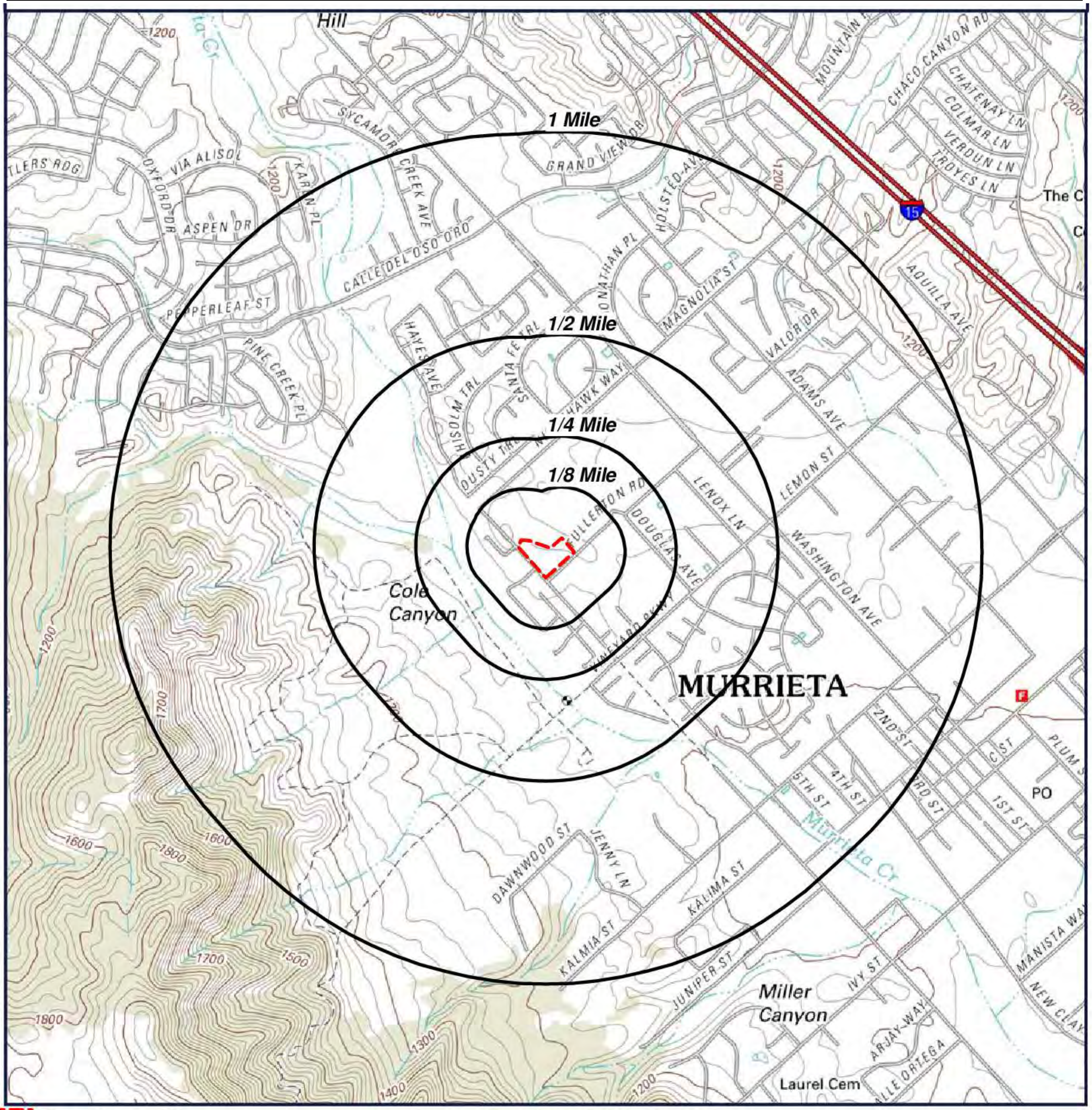
Quadrangle(s): Murrieta
MVUSD Murrieta Canyon Academy
24150 Hayes Avenue
Murrieta, California
92562

N W E S

0' 500' 1000' 1500'
SCALE: 1" = 1000'

[Click here to access Satellite view]

Topographic Map



Target Property (TP)

Quadrangle(s): Murrieta
Source: USGS, 05/16/2012
MVUSD Murrieta Canyon Academy
24150 Hayes Avenue
Murrieta, California
92562

N W E S

0' 1000' 2000' 3000'
SCALE: 1" = 2000'

Click here to access Satellite view

Located Sites Summary

*NOTE: Standard environmental records are displayed in **bold**.*

Map ID#	Database Name	Site ID#	Relative Elevation	Distance From Site	Site Name	Address	PAGE #
1	FRSCA	110025730298	Equal (1,136 ft.)	TP	CREEKSIDE HIGH SCHOOL	24150 HAYES AVENUE, MURRIETA, CA 92562	20
1	FRSCA	110036098692	Equal (1,136 ft.)	TP	TENAJA CANYON ACADEMY	24150 HAYES AVE, MURRIETA, CA 92562	21
2	***ENVIROSTOR***	***60002368***	***Higher (1,157 ft.)***	***0.379 mi. NNE (2001 ft.)***	***TEMECULA VALLEY GUN CLUB***	***NORTHEAST OF AULD ROAD AT WINCHESTER ROAD (TRACK NO. 36733, SECTION 6, TOWNSHIP, MURRIETA, CA 92562***	***22***
3	***CLEANUPSITES***	***T0606501114***	***Lower (1,119 ft.)***	***0.468 mi. E (2471 ft.)***	***INCO DEVELOPMENT CORP***	***24391 WASHINGTON, MURRIETA, CA 92362***	***23***
3	***LUST***	***T0606501114LUST***	***Lower (1,119 ft.)***	***0.468 mi. E (2471 ft.)***	***INCO DEVELOPMENT CORP***	***24391 WASHINGTON, MURRIETA, CA 92362***	***25***
3	***RCLUST***	***89146***	***Lower (1,119 ft.)***	***0.468 mi. E (2471 ft.)***	***INCO DEVELOPMENT CORP***	***24391 WASHINGTON AVE, MURRIETA, CA 92562***	***26***
4	***ENVIROSTOR***	***33990004***	***Higher (1,156 ft.)***	***0.693 mi. ENE (3659 ft.)***	***CROSSROADS INVESTORS III, LLC***	***24250 ADAMS AVENUE, MURRIETA, CA 92562***	***27***

Elevation Summary

Elevations are collected from the USGS 3D Elevation Program 1/3 arc-second (approximately 10 meters) layer hosted at the NGTOC. .

Target Property Elevation: 1136 ft.

*NOTE: Standard environmental records are displayed in **bold**.*

EQUAL/HIGHER ELEVATION

Map ID#	Database Name	Elevation	Site Name	Address	Page #
1	FRSCA	1,136 ft.	CREEKSIDE HIGH SCHOOL	24150 HAYES AVENUE, MURRIETA, CA 92562	20
1	FRSCA	1,136 ft.	TENAJA CANYON ACADEMY	24150 HAYES AVE, MURRIETA, CA 92562	21
2	***ENVIROSTOR***	***1,157 ft.***	***TEMECULA VALLEY GUN CLUB***	***NORTHEAST OF AULD ROAD AT WINCHESTER ROAD (TRACK NO. 36733, SECTION 6, TOWNSHIP, MURRIETA, CA 92562***	***22***
4	***ENVIROSTOR***	***1,156 ft.***	***CROSSROADS INVESTORS III, LLC***	***24250 ADAMS AVENUE, MURRIETA, CA 92562***	***27***

LOWER ELEVATION

Map ID#	Database Name	Elevation	Site Name	Address	Page #
3	***CLEANUPSITES***	***1,119 ft.***	***INCO DEVELOPMENT CORP***	***24391 WASHINGTON, MURRIETA, CA 92362***	***23***
3	***LUST***	***1,119 ft.***	***INCO DEVELOPMENT CORP***	***24391 WASHINGTON, MURRIETA, CA 92362***	***25***
3	***RCLUST***	***1,119 ft.***	***INCO DEVELOPMENT CORP***	***24391 WASHINGTON AVE, MURRIETA, CA 92562***	***26***

Facility Registry System (FRSCA)

MAP ID# 1 **Distance from Property: 0 mi. (0 ft.) X**
Elevation: 1,136 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110025730298**

NAME: **CREEKSIDE HIGH SCHOOL**

LOCATION ADDRESS: **24150 HAYES AVENUE**
MURRIETA, CA 92562

COUNTY: **RIVERSIDE**

EPA REGION: **09**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:

CREEKSIDE HIGH SCHOOL

PROGRAM/S LISTED FOR THIS FACILITY

GNIS - GEOGRAPHIC NAMES INFORMATION SYSTEM

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)
NO SIC DATA REPORTED

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)
NO NAICS DATA REPORTED

Back to Report Summary

Facility Registry System (FRSCA)

MAP ID# 1

Distance from Property: 0 mi. (0 ft.) X
Elevation: 1,136 ft. (Equal to TP)

FACILITY INFORMATION

REGISTRY ID: **110036098692**

NAME: **TENAJA CANYON ACADEMY**

LOCATION ADDRESS: **24150 HAYES AVE**
MURRIETA, CA 92562-9461

COUNTY: **RIVERSIDE COUNTY**

EPA REGION: **09**

FEDERAL FACILITY: **NOT REPORTED**

TRIBAL LAND: **NOT REPORTED**

ALTERNATIVE NAME/S:

TENAJA CANYON ACADEMY

PROGRAM/S LISTED FOR THIS FACILITY

NCES - NATIONAL CENTER FOR EDUCATION STATISTICS

STANDARD INDUSTRIAL CLASSIFICATION/S (SIC)
NO SIC DATA REPORTED

NORTH AMERICAN INDUSTRY CLASSIFICATION/S (NAICS)
NO NAICS DATA REPORTED

Back to Report Summary

MAP ID# 2

Distance from Property: 0.379 mi. (2,001 ft.) NNE
Elevation: 1,157 ft. (Higher than TP)

SITE INFORMATION

ID #: **60002368** ASSESSOR'S PARCEL #: **NONE SPECIFIED**

FACILITY LINK: CLICK HERE

NAME: **TEMECULA VALLEY GUN CLUB**

ADDRESS: **NORTHEAST OF AULD ROAD AT WINCHESTER ROAD (TRACK NO. 36733, SECTION 6, TOWNSHIP 6 SOUTH, RANGE 2 WEST, LOT 3 OF LOT LINE ADJUSTMENT 13-244)**
MURRIETA, CA 92562

COUNTY: **RIVERSIDE**

SITE SIZE (ACRES): **122**

LEAD AGENCY: **SMBRP**

DTSC PROJECT MANAGER: **MUSTAPHA GUERBAZ**

DTSC SUPERVISOR: **MARYAM TASNIF-ABBASI**

DTSC DIVISION BRANCH: **CLEANUP CYPRESS**

NPL LISTED: **NO** RESTRICTED LAND USE: **NO**

SITE TYPE: **VOLUNTARY CLEANUP**

SITE TYPE DESCRIPTION

VOLUNTARY CLEANUP: IDENTIFIES SITES WITH EITHER CONFIRMED OR UNCONFIRMED RELEASES, AND THE PROJECT PROPONENTS HAVE REQUESTED THAT DTSC OVERSEE EVALUATION, INVESTIGATION, AND/OR CLEANUP ACTIVITIES AND HAVE AGREED TO PROVIDE COVERAGE FOR DTSC'S COSTS.

DTSC's CURRENT INVOLVEMENT AT SITE (as of 06/09/2012)

ACTIVE - IDENTIFIES THAT AN INVESTIGATION AND/OR REMEDIATION IS CURRENTLY IN PROGRESS AND THAT DTSC IS ACTIVELY INVOLVED, EITHER IN A LEAD OR SUPPORT CAPACITY

PAST USE/S THAT CAUSED THE CONTAMINATION

FIRING RANGE - SMALL ARMS ETC...

CONFIRMED CONTAMINANTS OF CONCERN

NONE SPECIFIED

Back to Report Summary

GeoTracker Cleanup Sites (CLEANUPSITES)

MAP ID# 3

Distance from Property: 0.468 mi. (2,471 ft.) E
Elevation: 1,119 ft. (Lower than TP)

FACILITY INFORMATION

GLOBAL ID: **T0606501114**
URL LINK: CLICK HERE
BUSINESS NAME: **INCO DEVELOPMENT CORP**
ADDRESS: **24391 WASHINGTON**
MURRIETA, CA 92362
COUNTY: **RIVERSIDE**

FACILITY DETAILS

CASE TYPE: **LUST CLEANUP SITE**
CASE NUMBER: **9UT1417**
STATUS: **COMPLETED - CASE CLOSED 1/9/1990**
POTENTIAL CONTAMINATION:
GASOLINE
POTENTIAL MEDIA AFFECTED:
SOIL
DISADVANTAGED COMMUNITY:
NO
SEVERELY DISADVANTAGED COMMUNITY:
NO
SITE HISTORY:
NOT REPORTED

REGULATORY ACTIVITIES

TYPE OF ACTION:	DATE:	ACTION:
OTHER	**01/01/50**	**LEAK DISCOVERY**
OTHER	**01/01/50**	**LEAK REPORTED**
ENFORCEMENT	**01/27/2009**	**CLOSURE/NO FURTHER ACTION LETTER - #SITE CLOSURE**
ENFORCEMENT	**01/26/2009**	**FILE REVIEW - #RCDEH UPLOAD SITE FILE 4/24/2015**
OTHER	**02/27/1989**	**LEAK REPORTED**
OTHER	**02/01/1989**	**LEAK DISCOVERY**

STATUS HISTORY

STATUS:	DATE:
COMPLETED - CASE CLOSED	**01/09/1990**
OPEN - REMEDIATION	**12/12/1989**
OPEN - SITE ASSESSMENT	**05/15/1989**
OPEN - SITE ASSESSMENT	**02/28/1989**
OPEN - CASE BEGIN DATE	**02/01/1989**

CONTACT DETAILS

ORGANIZATION: **RIVERSIDE COUNTY LOP**
ADDRESS: **3880 LEMON ST SUITE 200**
CITY: **RIVERSIDE**
CONTACT NAME: **RIVERSIDE COUNTY LOP**
CONTACT TYPE: **LOCAL AGENCY CASEWORKER**
CONTACT PHONE: **9519558980**

EMAIL: **NOT REPORTED**

Back to Report Summary

Leaking Underground Storage Tanks (LUST)

MAP ID# 3

Distance from Property: 0.468 mi. (2,471 ft.) E
Elevation: 1,119 ft. (Lower than TP)

FACILITY INFORMATION

GLOBAL ID: **T0606501114**

URL LINK: CLICK HERE

BUSINESS NAME: **INCO DEVELOPMENT CORP**

ADDRESS: **24391 WASHINGTON**
MURRIETA, CA 92362

COUNTY: **RIVERSIDE**

FACILITY DETAILS

CASE TYPE: **LUST CLEANUP SITE**

CASE NUMBER: **9UT1417**

STATUS: **COMPLETED - CASE CLOSED 01/09/1990**

POTENTIAL CONTAMINATION:
GASOLINE

POTENTIAL MEDIA AFFECTED:
SOIL

DISADVANTAGED COMMUNITY:
NO

SEVERELY DISADVANTAGED COMMUNITY:
NO

SITE HISTORY:
NOT REPORTED

HISTORICAL FACILITY DETAILS

NO HISTORICAL DETAIL(S) INFORMATION REPORTED FOR THIS FACILITY

Back to Report Summary

Riverside County Underground Storage Tanks Cleanup Sites (RCLUST)

MAP ID# 3

Distance from Property: 0.468 mi. (2,471 ft.) E
Elevation: 1,119 ft. (Lower than TP)

SITE INFORMATION

SITE ID#: **89146**

SITE NUMBER: **24391**

NAME: **INCO DEVELOPMENT CORP**

ADDRESS: **24391 WASHINGTON AVE**
MURRIETA, CA 92562

COUNTY: **RIVERSIDE**

STATUS: **CLOSED CASE**

DATE CLOSED: **1/9/1990**

CASE TYPE: **SOIL ONLY IS IMPACTED**

Back to Report Summary

MAP ID# 4

Distance from Property: 0.693 mi. (3,659 ft.) ENE
Elevation: 1,156 ft. (Higher than TP)

SITE INFORMATION

ID #: **33990004** ASSESSOR'S PARCEL #: **NONE SPECIFIED**

FACILITY LINK: CLICK HERE

NAME: **CROSSROADS INVESTORS III, LLC**

ADDRESS: **24250 ADAMS AVENUE**
MURRIETA, CA 92562

COUNTY: **RIVERSIDE**

SITE SIZE (ACRES): **20**

LEAD AGENCY: **SMBRP**

DTSC PROJECT MANAGER: **NOT REPORTED**

DTSC SUPERVISOR: *** GREG HOLMES**

DTSC DIVISION BRANCH: **CLEANUP CYPRESS**

NPL LISTED: **NO** RESTRICTED LAND USE: **NO**

SITE TYPE: **STATE RESPONSE**

SITE TYPE DESCRIPTION

STATE RESPONSE: IDENTIFIES CONFIRMED RELEASE SITES WHERE DTSC IS INVOLVED IN REMEDIATION, EITHER IN A LEAD OR OVERSIGHT CAPACITY. THESE CONFIRMED RELEASE SITES ARE GENERALLY HIGH-PRIORITY AND HIGH POTENTIAL RISK.

DTSC's CURRENT INVOLVEMENT AT SITE (as of 12/24/2002)

CERTIFIED - IDENTIFIES COMPLETED SITES WITH PREVIOUSLY CONFIRMED RELEASE THAT ARE SUBSEQUENTLY CERTIFIED BY DTSC AS HAVING BEEN REMEDIATED SATISFACTORILY UNDER DTSC OVERSIGHT

PAST USE/S THAT CAUSED THE CONTAMINATION

BATTERY RECLAMATION

CONFIRMED CONTAMINANTS OF CONCERN

NONESPECIFIED - NONE SPECIFIED

Back to Report Summary

Unlocated Sites Summary

This list contains sites that could not be mapped due to limited or incomplete address information.

No Records Found

AIRSAFS Aerometric Information Retrieval System / Air Facility Subsystem

VERSION DATE: 10/20/14

The United States Environmental Protection Agency (EPA) modified the Aerometric Information Retrieval System (AIRS) to a database that exclusively tracks the compliance of stationary sources of air pollution with EPA regulations: the Air Facility Subsystem (AFS). Since this change in 2001, the management of the AIRS/AFS database was assigned to EPA's Office of Enforcement and Compliance Assurance.

BRS Biennial Reporting System

VERSION DATE: 12/31/15

The United States Environmental Protection Agency (EPA), in cooperation with the States, biennially collects information regarding the generation, management, and final disposition of hazardous wastes regulated under the Resource Conservation and Recovery Act of 1976 (RCRA), as amended. The Biennial Report captures detailed data on the generation of hazardous waste from large quantity generators and data on waste management practices from treatment, storage and disposal facilities. Currently, the EPA states that data collected between 1991 and 1997 was originally a part of the defunct Biennial Reporting System and is now incorporated into the RCRAInfo data system.

CDL Clandestine Drug Laboratory Locations

VERSION DATE: 05/06/19

The U.S. Department of Justice ("the Department") provides this information as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments. The Department does not establish, implement, enforce, or certify compliance with clean-up or remediation standards for contaminated sites; the public should contact a state or local health department or environmental protection agency for that information.

DOCKETS EPA Docket Data

VERSION DATE: 12/22/05

The United States Environmental Protection Agency Docket data lists Civil Case Defendants, filing dates as far back as 1971, laws broken including section, violations that occurred, pollutants involved, penalties assessed and superfund awards by facility and location. Please refer to ICIS database as source of current data.

EC Federal Engineering Institutional Control Sites

VERSION DATE: 06/11/19

This database includes site locations where Engineering and/or Institutional Controls have been identified as part of a selected remedy for the site as defined by United States Environmental Protection Agency official remedy decision documents. The data displays remedy component information for Superfund decision documents issued in fiscal years 1982-2017, and it includes final and deleted NPL sites as well as sites with a Superfund Alternative Approach (SAA) agreement in place. A site listing does not indicate that the institutional and engineering controls are currently in place nor will be in place once the remedy is complete; it only indicates that the decision to include either of them in the remedy is documented as of the completed date of the document. Institutional controls are actions, such as legal controls, that help minimize the potential for human exposure to contamination by ensuring appropriate land or resource use. Engineering controls include caps, barriers, or other device engineering to prevent access, exposure, or continued migration of contamination.

ECHOR09 Enforcement and Compliance History Information

VERSION DATE: 10/27/19

The U.S. Environmental Protection Agency's Enforcement and Compliance History Online (ECHO) database, provides compliance and enforcement information for facilities nationwide. This database includes facilities regulated as Clean Air Act stationary sources, Clean Water Act direct dischargers, Resource Conservation and Recovery Act hazardous waste handlers, Safe Drinking Water Act public water systems along with other data, such as Toxics Release Inventory releases.

ERNSCA Emergency Response Notification System

VERSION DATE: 10/06/19

This National Response Center database contains data on reported releases of oil, chemical, radiological, biological, and/or etiological discharges into the environment anywhere in the United States and its territories. The data comes from spill reports made to the U.S. Environmental Protection Agency, U.S. Coast Guard, the National Response Center and/or the U.S. Department of Transportation.

FRSCA Facility Registry System

VERSION DATE: 10/09/19

The United States Environmental Protection Agency's Office of Environmental Information (OEI) developed the Facility Registry System (FRS) as the centrally managed database that identifies facilities, sites or places subject to environmental regulations or of environmental interest. The Facility Registry System replaced the Facility Index System or FINDS database.

HMIRSR09 Hazardous Materials Incident Reporting System

VERSION DATE: 11/20/19

The HMIRS database contains unintentional hazardous materials release information reported to the U.S. Department of Transportation located in EPA Region 9. This region includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

ICIS Integrated Compliance Information System (formerly DOCKETS)

VERSION DATE: 09/21/19

ICIS is a case activity tracking and management system for civil, judicial, and administrative federal Environmental Protection Agency enforcement cases. ICIS contains information on federal administrative and federal judicial cases under the following environmental statutes: the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act, the Emergency Planning and Community Right-to-Know Act - Section 313, the Toxic Substances Control Act, the Federal Insecticide, Fungicide, and Rodenticide Act, the Comprehensive Environmental Response, Compensation, and Liability Act, the Safe Drinking Water Act, and the Marine Protection, Research, and Sanctuaries Act.

ICISNPDES Integrated Compliance Information System National Pollutant Discharge Elimination System

VERSION DATE: 07/09/17

Authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. This database is provided by the U.S. Environmental Protection Agency.

LUCIS Land Use Control Information System

VERSION DATE: 09/01/06

The LUCIS database is maintained by the U.S. Department of the Navy and contains information for former Base Realignment and Closure (BRAC) properties across the United States.

MLTS Material Licensing Tracking System

VERSION DATE: 06/29/17

MLTS is a list of approximately 8,100 sites which have or use radioactive materials subject to the United States Nuclear Regulatory Commission (NRC) licensing requirements. Disclaimer: Due to agency regulations and policies, this database contains applicant/licensee location information which may or may not be related to the physical location per MLTS site.

NPDESR09 National Pollutant Discharge Elimination System

VERSION DATE: 04/01/07

Authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. The NPDES database was collected from the U.S. Environmental Protection Agency (EPA) from December 2002 through April 2007. Refer to the PCS and/or ICIS-NPDES database as source of current data. This database includes permitted facilities located in EPA Region 9. This region includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

PADS PCB Activity Database System

VERSION DATE: 09/14/18

PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of Polychlorinated Biphenyls (PCB) who are required to notify the U.S. Environmental Protection Agency of such activities.

PCSR09 Permit Compliance System

VERSION DATE: 08/01/12

The Permit Compliance System is used in tracking enforcement status and permit compliance of facilities controlled by the National Pollutant Discharge Elimination System (NPDES) under the Clean Water Act and is maintained by the United States Environmental Protection Agency's Office of Compliance. PCS is designed to support the NPDES program at the state, regional, and national levels. This database includes permitted facilities located in EPA Region 9. This region includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa. PCS has been modernized, and no longer exists. National Pollutant Discharge Elimination System (ICIS-NPDES) data can now be found in Integrated Compliance Information System (ICIS).

RCRASC RCRA Sites with Controls

VERSION DATE: 09/12/19

The Resource Conservation and Recovery Act (RCRA) gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities with institutional controls in place.

SEMSLIENS SEMS Lien on Property

VERSION DATE: 08/13/18

The U.S. Environmental Protection Agency's (EPA) Office of Solid Waste and Emergency Response, Office of Superfund Remediation and Technology Innovation (OSRTI), has implemented The Superfund Enterprise Management System (SEMS), formerly known as CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) to track and report on clean-up and enforcement activities taking place at Superfund sites. SEMS represents a joint development and ongoing collaboration between Superfund's Remedial, Removal, Federal Facilities, Enforcement and Emergency Response programs. This is a listing of SEMS sites with a lien on the property.

SFLIENS CERCLIS Liens

VERSION DATE: 06/08/12

A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which United States Environmental Protection Agency has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties. This database contains those CERCLIS sites where the Lien on Property action is complete. Please refer to the SEMSLIENS database as source of current data.

SSTS Section Seven Tracking System

VERSION DATE: 02/01/17

The United States Environmental Protection Agency tracks information on pesticide establishments through the Section Seven Tracking System (SSTS). SSTS records the registration of new establishments and records pesticide production at each establishment. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) requires that production of pesticides or devices be conducted in a registered pesticide-producing or device-producing establishment. ("Production" includes formulation, packaging, repackaging, and relabeling.)

TRI Toxics Release Inventory

VERSION DATE: 12/31/17

The Toxics Release Inventory, provided by the United States Environmental Protection Agency, includes data on toxic chemical releases and waste management activities from certain industries as well as federal and tribal facilities. This inventory contains information about the types and amounts of toxic chemicals that are released each year to the air, water, and land as well as information on the quantities of toxic chemicals sent to other facilities for further waste management.

TSCA Toxic Substance Control Act Inventory

VERSION DATE: 12/31/12

The Toxic Substances Control Act (TSCA) was enacted in 1976 to ensure that chemicals manufactured, imported, processed, or distributed in commerce, or used or disposed of in the United States do not pose any unreasonable risks to human health or the environment. TSCA section 8(b) provides the United States Environmental Protection Agency authority to "compile, keep current, and publish a list of each chemical substance that is manufactured or processed in the United States." This TSCA Chemical Substance Inventory contains non-confidential information on the production amount of toxic chemicals from each manufacturer and importer site.

RCRAGR09 Resource Conservation & Recovery Act - Generator

VERSION DATE: 08/19/19

The Resource Conservation and Recovery Act (RCRA) gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities currently generating hazardous waste. EPA Region 9 includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

RCRANGR09 Resource Conservation & Recovery Act - Non-Generator

VERSION DATE: 08/19/19

The Resource Conservation and Recovery Act (RCRA) gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities classified as non-generators. Non-Generators do not presently generate hazardous waste. EPA Region 9 includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

ALTFUELS Alternative Fueling Stations

VERSION DATE: 09/24/19

Nationwide list of alternative fueling stations made available by the U.S. Department of Energy's Office of Energy Efficiency & Renewable Energy. Includes Bio-diesel stations, Ethanol (E85) stations, Liquefied Petroleum Gas (Propane) stations, Ethanol (E85) stations, Natural Gas stations, Hydrogen stations, and Electric Vehicle Supply Equipment (EVSE).

FEMAUST FEMA Owned Storage Tanks

VERSION DATE: 12/01/16

This is a listing of FEMA owned underground and aboveground storage tank sites. For security reasons, address information is not released to the public according to the U.S. Department of Homeland Security.

HISTPST Historical Gas Stations

VERSION DATE: NR

This historic directory of service stations is provided by the Cities Service Company. The directory includes Cities Service filling stations that were located throughout the United States in 1930.

ICISCLEANERS Integrated Compliance Information System Drycleaners

VERSION DATE: 09/21/19

This is a listing of drycleaner facilities from the Integrated Compliance Information System (ICIS). The U.S. Environmental Protection Agency (EPA) tracks facilities that possess NAIC and SIC codes that classify businesses as drycleaner establishments. The following Primary SIC Codes are included in this data: 7211, 7212, 7213, 7215, 7216, 7217, 7218, and/or 7219; the following Primary NAICS Codes are included in this data:

812320, 812331, and/or 812332.

MRDS	Mineral Resource Data System
VERSION DATE: 03/15/16	

MRDS (Mineral Resource Data System) is a collection of reports describing metallic and nonmetallic mineral resources throughout the world. Included are deposit name, location, commodity, deposit description, geologic characteristics, production, reserves, resources, and references. This database contains the records previously provided in the Mineral Resource Data System (MRDS) of USGS and the Mineral Availability System/Mineral Industry Locator System (MAS/MILS) originated in the U.S. Bureau of Mines, which is now part of USGS.

MSHA	Mine Safety and Health Administration Master Index File
VERSION DATE: 09/20/19	

The Mine dataset lists all Coal and Metal/Non-Metal mines under MSHA's jurisdiction since 1/1/1970. It includes such information as the current status of each mine (Active, Abandoned, NonProducing, etc.), the current owner and operating company, commodity codes and physical attributes of the mine. Mine ID is the unique key for this data. This information is provided by the United States Department of Labor - Mine Safety and Health Administration (MSHA).

BF	Brownfields Management System
VERSION DATE: 07/10/19	

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. The United States Environmental Protection Agency maintains this database to track activities in the various brown field grant programs including grantee assessment, site cleanup and site redevelopment. This database included tribal brownfield sites.

DNPL	Delisted National Priorities List
VERSION DATE: 10/18/19	

This database includes sites from the United States Environmental Protection Agency's Final National Priorities List (NPL) where remedies have proven to be satisfactory or sites where the original analyses were inaccurate, and the site is no longer appropriate for inclusion on the NPL, and final publication in the Federal Register has occurred.

NLRRCRAT	No Longer Regulated RCRA Non-CORRACTS TSD Facilities
VERSION DATE: 08/19/19	

This database includes RCRA Non-Corrective Action TSD facilities that are no longer regulated by the United

States Environmental Protection Agency or do not meet other RCRA reporting requirements. This listing includes facilities that formerly treated, stored or disposed of hazardous waste.

ODI Open Dump Inventory

VERSION DATE: 06/01/85

The open dump inventory was published by the United States Environmental Protection Agency. An "open dump" is defined as a facility or site where solid waste is disposed of which is not a sanitary landfill which meets the criteria promulgated under section 4004 of the Solid Waste Disposal Act (42 U.S.C. 6944) and which is not a facility for disposal of hazardous waste. This inventory has not been updated since June 1985.

RCRAT Resource Conservation & Recovery Act - Non-CORRACTS Treatment, Storage & Disposal Facilities

VERSION DATE: 08/19/19

The Resource Conservation and Recovery Act (RCRA) gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities recognized as hazardous waste treatment, storage, and disposal sites (TSD).

SEMS Superfund Enterprise Management System

VERSION DATE: 10/21/19

The U.S. Environmental Protection Agency's (EPA) Office of Solid Waste and Emergency Response, Office of Superfund Remediation and Technology Innovation (OSRTI), has implemented The Superfund Enterprise Management System (SEMS), formerly known as CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) to track and report on clean-up and enforcement activities taking place at Superfund sites. SEMS represents a joint development and ongoing collaboration between Superfund's Remedial, Removal, Federal Facilities, Enforcement and Emergency Response programs.

SEMSARCH Superfund Enterprise Management System Archived Site Inventory

VERSION DATE: 10/22/19

The U.S. Environmental Protection Agency's (EPA) Superfund Enterprise Management System Archived Site Inventory (List 8R Archived) replaced the CERCLIS NFRAP reporting system in 2015. This listing reflects sites at which the EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program.

SMCRA Surface Mining Control and Reclamation Act Sites

VERSION DATE: 11/26/19

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by the Office of Surface Mining Reclamation and Enforcement (OSMRE) to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

USUMTRCA Uranium Mill Tailings Radiation Control Act Sites

VERSION DATE: 03/04/17

The Legacy Management Office of the Department of Energy (DOE) manages radioactive and chemical waste, environmental contamination, and hazardous material at over 100 sites across the U.S. The L.M. Office manages this database of sites registered under the Uranium Mill Tailings Control Act (UMTRCA).

DOD Department of Defense Sites

VERSION DATE: 12/01/14

This information originates from the National Atlas of the United States Federal Lands data, which includes lands owned or administered by the Federal government. Army DOD, Army Corps of Engineers DOD, Air Force DOD, Navy DOD and Marine DOD areas of 640 acres or more are included.

FUDS Formerly Used Defense Sites

VERSION DATE: 06/01/15

The Formerly Used Defense Sites (FUDS) inventory includes properties previously owned by or leased to the United States and under Secretary of Defense Jurisdiction, as well as Munitions Response Areas (MRAs). The remediation of these properties is the responsibility of the Department of Defense. This data is provided by the U.S. Army Corps of Engineers (USACE), the boundaries/polygon data are based on preliminary findings and not all properties currently have polygon data available. DISCLAIMER: This data represents the results of data collection/processing for a specific USACE activity and is in no way to be considered comprehensive or to be used in any legal or official capacity as presented on this site. While the USACE has made a reasonable effort to insure the accuracy of the maps and associated data, it should be explicitly noted that USACE makes no warranty, representation or guaranty, either expressed or implied, as to the content, sequence, accuracy, timeliness or completeness of any of the data provided herein. For additional information on Formerly Used Defense Sites please contact the USACE Public Affairs Office at (202) 528-4285.

FUSRAP Formerly Utilized Sites Remedial Action Program

VERSION DATE: 03/04/17

The U.S. Department of Energy (DOE) established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from the Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations. The DOE Office of Legacy Management (LM) established long-term surveillance and maintenance (LTS&M) requirements for remediated FUSRAP sites. DOE evaluates the final site conditions of a remediated site on the basis of risk for different future uses. DOE then confirms that LTS&M requirements will maintain protectiveness.

NLRRCRAC No Longer Regulated RCRA Corrective Action Facilities

VERSION DATE: 08/19/19

This database includes RCRA Corrective Action facilities that are no longer regulated by the United States Environmental Protection Agency or do not meet other RCRA reporting requirements.

NMS Former Military Nike Missile Sites

VERSION DATE: 12/01/84

This information was taken from report DRXTH-AS-IA-83A016 (Historical Overview of the Nike Missile System, 12/1984) which was performed by Environmental Science and Engineering, Inc. for the U.S. Army Toxic and Hazardous Materials Agency Assessment Division. The Nike system was deployed between 1954 and the mid-1970’s. Among the substances used or stored on Nike sites were liquid missile fuel (JP-4); starter fluids (UDKH, aniline, and furfuryl alcohol); oxidizer (IRFNA); hydrocarbons (motor oil, hydraulic fluid, diesel fuel, gasoline, heating oil); solvents (carbon tetrachloride, trichloroethylene, trichloroethane, stoddard solvent); and battery electrolyte. The quantities of material a disposed of and procedures for disposal are not documented in published reports. Virtually all information concerning the potential for contamination at Nike sites is confined to personnel who were assigned to Nike sites. During deactivation most hardware was shipped to depot-level supply points. There were reportedly instances where excess materials were disposed of on or near the site itself at closure. There was reportedly no routine site decontamination.

NPL National Priorities List

VERSION DATE: 10/18/19

This database includes United States Environmental Protection Agency (EPA) National Priorities List sites that fall under the EPA's Superfund program, established to fund the cleanup of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action.

PNPL Proposed National Priorities List

VERSION DATE: 10/18/19

This database contains sites proposed to be included on the National Priorities List (NPL) in the Federal Register. The United States Environmental Protection Agency investigates these sites to determine if they may present long-term threats to public health or the environment.

RCRAC Resource Conservation & Recovery Act - Corrective Action Facilities

VERSION DATE: 08/19/19

The Resource Conservation and Recovery Act (RCRA) gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities with corrective action activity.

RCRASUBC Resource Conservation & Recovery Act - Subject to Corrective Action Facilities

VERSION DATE: 08/19/19

The Resource Conservation and Recovery Act (RCRA) gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities subject to corrective actions.

RODS Record of Decision System

VERSION DATE: 10/18/19

These decision documents maintained by the United States Environmental Protection Agency describe the chosen remedy for NPL (Superfund) site remediation. They also include site history, site description, site characteristics, community participation, enforcement activities, past and present activities, contaminated media, the contaminants present, and scope and role of response action.

CDL Clandestine Drug Labs

VERSION DATE: 06/30/18

The California Department of Toxic Substance Control (DTSC) maintains this listing of illegal drug laboratories. DTSC maintains a limited cost-tracking database to manage and pay appropriate contractor invoices for removal costs. The data source is an expenditure report with the contractors' invoice information and the reported removal action locations. The reported location information may or may not include the actual location of the illegal drug lab for several reasons. First, DTSC receives the location information verbally from law enforcement or local environmental health officials in the initial request for emergency support. Second, DTSC does not verify the information received and does not perform "data cleaning" or other measures to ensure data quality. Third, the location information may not be the actual location of an illegal drug lab or any hazardous substance release to the environment. The initial report may have provided the location of the nearest identifiable address to an illegal drug lab or mobile lab or abandonment of illegal drug lab wastes, or a nearby meeting location for the contractor. Please note the DTSC does not guarantee the accuracy of the address or location information or the condition of the location listed. The listing of an address or location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the address or location either requires or does not require additional cleanup work or mitigation action.

CHMIRS California Hazardous Material Incident Report System

VERSION DATE: 05/15/19

The California Hazardous Material Incident Report System list is maintained by the California Governor's Office of Emergency Services (OES). This list contains all spills called in to the California OES Warning Center for a specific year since 1993.

DTSCDR DTSC Deed Restrictions

VERSION DATE: 09/25/19

The California Department of Toxic Substances Control (DTSC) maintains this listi of sites with deed restrictions. According to the DTSC, restricted land use indicates whether the site or area within the site has an environmental restriction recorded and/or other institutional control preventing certain types of land use or activities. The land use restrictions listed under the site management requirements are only an abbreviated summary of the land use restrictions, and may not encompass all restrictions and notification requirements placed on a property. For complete land use restriction information please contact the DTSC to review associated Land Use Restriction documents.

EMI Emissions Inventory Data

VERSION DATE: 12/31/17

This list of Emissions Inventory Data is maintained by the California Environmental Protection Agency California Environmental Agency Air Resources Board. This list includes criteria pollutant data and toxic data. Please note gas stations, print shops, autobody shops, and dry cleaners are not included in this list.

HWTS	Hazardous Waste Tanner Summary
VERSION DATE: 12/31/17	

The Hazardous Waste Tanner Summary is maintained by the California Department of Toxic Substances Control (DTSC). This list includes data extracted from the copies of hazardous waste manifests received each year by the DTSC.

LDS	Land Disposal Sites
VERSION DATE: 10/02/19	

This list of Land Disposal sites (Landfills) is a subset of the GeoTracker Cleanup Sites database, maintained by the California State Water Resources Control Board. Sites are queried from GeoTracker by case type = Land Disposal Site.

LIENS	Recorded Environmental Cleanup Liens
VERSION DATE: 11/18/19	

The California Department of Toxic Substance Control (DTSC) maintains this list of liens placed upon real properties. A lien is utilized by the DTSC to obtain reimbursement from responsible parties for costs associated with the remediation of contaminated properties.

MCS	Military Cleanup Sites
VERSION DATE: 10/02/19	

This list of Military sites is a subset of the GeoTracker Cleanup Sites database maintained by the California State Water Resources Control Board. Sites are queried from GeoTracker by case type = Military Cleanup Sites. This list includes : Military UST sites; Military Privatized sites; and Military Cleanup sites (formerly known as DoD non UST).

NPDES	National Pollutant Discharge Elimination System Facilities
VERSION DATE: 11/20/19	

This list of active, historical, and terminated National Pollutant Discharge Elimination System Facilities permits is maintained by the California Environmental Protection Agency State Water Resources Control Board. This data includes storm water general permit enrollees that are active or have been active within the past three years. Please note there can be multiple listings for a single permit due to multiple dischargers, multiple facilities, and/or multiple address listings. Please use the Regulatory Measure ID to identify duplicates, as this is a unique identifier for each permit.

ABST	Above Ground Storage Tanks
VERSION DATE: 12/04/19	

This database, provided by the California Environmental Protection Agency's (CalEPA) Regulated Site Portal, contains aboveground petroleum storage tank facilities originating from the California Environmental Reporting System (CERS). These facilities store petroleum in aboveground storage tanks with oversight by local agencies. As of January 1, 2008, Assembly Bill No. 1130 of the Aboveground Petroleum Storage Act (APSA) authorized the Certified Unified Program Agencies to implement and administer the requirements of the APSA. CalEPA Data Disclaimer: Information displayed in the portal is collected from separate agency databases and displayed unaltered. Information that is considered confidential, trade secret, or is otherwise protected by the agency that manages the database is not loaded into the portal. For more detail about information displayed in the portal, please visit the data source sites. Please refer to AST2007 database for aboveground storage tank information obtained from the California State Water Resources Control Board prior to 2008 APSA requirements.

AST2007 Aboveground Storage Tanks Prior to January 2008

VERSION DATE: 12/01/07

This database contains aboveground storage tank facilities registered with the California State Water Resources Control Board (SWRCB) between 2007 and 2003. Since 2006, tanks were required to contain a minimum (even as cumulative) of 1320 gallons to be in the program. As of January 1, 2008, the SWRCB no longer maintains a list of registered aboveground storage tanks, due to effective Assembly Bill No. 1130 (Laird) of the Aboveground Petroleum Storage Act (APSA). This Bill authorized the Certified Unified Program Agencies to implement and administer the requirements of the APSA. Please refer to ABST database as a current source for aboveground petroleum storage tank data.

CLEANER Dry Cleaner Facilities

VERSION DATE: 06/13/19

This list of dry cleaners is maintained by the California Department of Toxic Substances Control (DTSC). Data is extracted from the DTSC Hazardous Waste Tracking System. This list includes dry cleaner facilities that have registered EPA identification numbers. These facilities are categorized by SIC codes (7211, 7212, 7213, 7215, 7216, 7217, 7218, 7219). This database may also include facilities other than dry cleaners who also register with these same NAICS Codes. Not all companies report their NAICS/SIC Codes to the DTSC, therefore this database may exclude registered dry cleaner facilities with incomplete classification information.

DTSCHWT DTSC Registered Hazardous Waste Transporters

VERSION DATE: 10/27/19

The California Department of Toxic Substances Control maintains this list of Registered Hazardous Waste Transporters.

HISTUST Historical Underground Storage Tanks

VERSION DATE: 12/31/87

The Hazardous Substance Storage Container Database is a historical list of Underground Storage Tank sites, compiled from tank survey and registration information collected at one time between 1984 and 1987 by the State Water Resources Control Board. The hazardous substances stored within these tanks includes, but not restricted to, petroleum products, industrial solvents, and other materials.

MINES Mines Listing

VERSION DATE: 10/21/19

This list includes mine site locations extracted from the Mines Online database, maintained by the California Department of Conservation. Mines Online (MOL) is an interactive web map designed with GIS features that provide information such as the mine name, mine status, commodity sold, location, and other mine specific data. Please note: Mine location information is provided to assist experts in determining the location of mine operators in accordance with California Civil Code section 1103.4 and reflects information reported by mine operators in annual reports provided under Public Resources Code section 2207. While the Division of Mine Reclamation (DMR) attempts to populate MOL with accurate location information, the DMR cannot guarantee the accuracy of operator reported location information.

MWMP California Medical Waste Management Program Facility List

VERSION DATE: 10/04/19

This list of Medical Waste Management Program Facilities is maintained by the California Department of Public Health. The Medical Waste Management Program (MWMP) regulates the generation, handling, storage, treatment, and disposal of medical waste by providing oversight for the implementation of the Medical Waste Management Act (MWMA). The MWMP permits and inspects all medical waste off-site treatment facilities, medical waste transporters, and medical waste transfer stations. This list contains transporters, treatment, and transfer facilities.

SLIC Spills, Leaks, Investigation & Cleanup Recovery Listing

VERSION DATE: 11/11/19

This list of Spills, Leaks, Investigation & Cleanup Recovery sites is maintained by the California Regional Water Quality Control Board (RWQCB). This list all "non-federally owned" sites that are regulated under the State Water Resources Control Board's Site Cleanup Program and/or similar programs conducted by each of the nine Regional Water Quality Control Boards. Cleanup Program Sites are also commonly referred to as "Site Cleanup Program sites". Cleanup Program Sites are varied and include but are not limited to pesticide and fertilizer facilities, rail yards, ports, equipment supply facilities, metals facilities, industrial manufacturing and maintenance sites, dry cleaners, bulk transfer facilities, refineries, mine sites, landfills, RCRA/CERCLA cleanups, and some brownfields. Unauthorized releases detected at Cleanup Program Sites are highly variable and include but are not limited to hydrocarbon solvents, pesticides, perchlorate, nitrate, heavy metals, and petroleum constituents, to name a few.

SWEEPS Statewide Environmental Evaluation and Planning System

VERSION DATE: 10/01/94

The Statewide Environmental Evaluation and Planning System (SWEEPS) contains a historical listing of active and inactive underground storage tank locations from the State Water Resources Control Board. The hazardous substances stored within these tanks includes, but not restricted to, petroleum products, industrial solvents, and other materials. Refer to CUPA listing for source of current data.

USTCUPA Underground Storage Tanks

VERSION DATE: 10/15/19

The California State Water Resources Control Board maintains this list of permitted underground storage tanks. Permitted Underground Storage Tank (UST) Facilities includes facilities at which the owner or operator has been issued a permit to operate one or more USTs by the local permitting agency. Permitted UST Facilities are imported weekly from the California Environmental Reporting System (CERS).

BF Brownfield Sites

VERSION DATE: 11/19/19

This database of Brownfield Memorandum of Agreement (MOA) sites is maintained by the California Environmental Protection Agency. The California Department of Toxic Substances Control (CTSC), the State Water Resources Control Board, and the Regional Water Quality Control Boards (RWQCBs) agreed to a Brownfield Memorandum of Agreement (MOA). The MOA limits the oversight of a brownfields site to one agency, establishes procedures and guidelines for identifying the lead agency, calls for a single uniform site assessment procedure, requires all cleanups to address the requirements of the agencies, defines roles and responsibilities, provides for ample opportunity for public involvement, commits agencies to review time frames, and commits agencies to coordinate and communicate on brownfields issues. The Brownfield MOA site list is obtained from the State Water Resources Control Board GeoTracker online database. This list contains both open and completed sites.

CALSITES CALSITES Database

VERSION DATE: 05/01/04

This historical database was maintained by the Department of Toxic Substance Control for more than a decade. CALSITES contains information on Brownfield properties with confirmed or potential hazardous contamination. In 2006, DTSC introduced EnviroStor as the latest Brownfields site database.

CLEANUPSITES GeoTracker Cleanup Sites

VERSION DATE: 10/02/19

This list of GeoTracker Cleanup Sites is maintained by the California State Water Resources Control Board. The database contains contaminated sites that impact groundwater or have the potential to impact ground water, including sites that require cleanup, such as Leaking Underground Storage Tank Sites, Department of Defense Sites, and Cleanup Program Sites. GeoTracker also contains records for various unregulated projects as well as permitted facilities including: Irrigated Lands, Oil and Gas production, operating Permitted USTs, and Land Disposal Sites. GeoTracker portals retrieve records and view integrated data sets from multiple State Water

Board programs and other agencies.

CORTESE Cortese List

VERSION DATE: 10/14/19

This list of hazardous waste and substances sites (Cortese List) is maintained by the California Department of Toxic Substances Control (DTSC). DTSC's Brownfields and Environmental Restoration Program (Cleanup Program) EnviroStor database provides DTSC's component of Cortese List data by identifying Annual Workplan (now referred to State Response and/or Federal Superfund), and Backlog sites listed under Health and Safety Code section 25356. In addition, DTSC's Cortese List includes Certified with Operation and Maintenance sites. The list, or a site's presence on the list, has bearing on the local permitting process as well as on compliance with the California Environmental Quality Act (CEQA). Because this statute was enacted over twenty years ago, some of the provisions refer to agency activities that were conducted many years ago and are no longer being implemented and, in some cases, the information to be included in the Cortese List does not exist.

DROP Listing of Certified Dropoff, Collection, and Community Service Programs

VERSION DATE: 09/30/19

This list of Certified Dropoff, Collection, and Community Service Programs (non-buyback) operating under the state of California's Beverage Container Recycling Program is maintained by the California Department of Resources Recycling and Recovery.

ERAP Expedited Removal Action Program Sites

VERSION DATE: 10/10/19

This list of Expedited Removal Action Program Sites is a subset of the EnviroStor database, maintained by the California Department of the Toxic Substance Control. Sites are queried from Envirostor by site type = State Response ERAP.

HISTCORTESE Historical Cortese List

VERSION DATE: 11/02/02

This historical listing includes hazardous waste and substances sites designated by the State Water Resources Control Board, the Integrated Waste Board, and the Department of Toxic Substance Control. The Cortese List was utilized by the State, local agencies and developers to comply with the California Environmental Quality Act requirements in providing information about the location of hazardous materials release sites. See CACORTESE for an updated version of this database.

LUST Leaking Underground Storage Tanks

VERSION DATE: 10/02/19

This list of leaking underground storage tanks is a subset of the GeoTracker Cleanup Sites database maintained by the California State Water Resources Control Board. Sites are queried from GeoTracker by case type = LUST Cleanup Site.

NFA No Further Action Determination

VERSION DATE: 09/09/19

This list of No Further Action (NFA) sites is maintained by the California Department of Toxic Substances Control. NFA identifies sites where a Phase I Environmental Assessment was completed and resulted in a no action required determination. Please refer to ENVIROSTOR for current No Further Action sites.

NFE Sites Needing Further Evaluation

VERSION DATE: 12/05/19

This list of Inactive - Needs Evaluation sites is maintained by the California Department of Toxic Substances Control. These are unconfirmed contaminated properties that need further assessment. This data is queried from the Department of Toxic Substances Control Evirostor online database.

PROC Listing of Certified Processors

VERSION DATE: 11/04/19

This list of Certified Processors that are operating under the state of California's Beverage Container Recycling Program is maintained by the California Department of Resources Recycling and Recovery.

REF Referred to Another Local or State Agency

VERSION DATE: 12/05/19

This Referred to Another Local or State Agency list, maintained by the California Department of Toxic Substances Control (DTSC), contains properties where contamination has not been confirmed and which were determined as not requiring direct Department of Toxic Substance Control Site Mitigation Program action or oversight. Accordingly, these sites have been referred to another state or local regulatory agency. This data is extracted from the DTSC Envirostor online database and is queried by Status = "Refer state and local agencies".

SWIS Solid Waste Information System Sites

VERSION DATE: 09/30/19

This list of Solid Waste Information System Sites is extracted from the Solid Waste Information System (SWIS) database, maintained by the California Department of Resources Recycling and Recovery. The SWIS database includes information on solid waste facilities, operations, and disposal sites located in California. The types of facilities found in this database include landfills, transfer stations, material recovery facilities, composting sites, transformation facilities, waste tire sites, and closed disposal sites.

SWRCY Recycling Centers

VERSION DATE: 11/06/19

This list of Certified Recycling Centers that are operating under the state of California's Beverage Container Recycling Program is maintained by the California Department of Resources Recycling and Recovery.

VCP Voluntary Cleanup Program

VERSION DATE: 10/10/19

This list of Voluntary Cleanup Sites is a subset of the Envirostor database maintained by the California Department of Toxic Substance Control. Sites are queried from Envirostor by site type = Voluntary Cleanup.

WMUDS Waste Management Unit Database

VERSION DATE: 01/01/00

The Waste Management Unit Database System tracks and inventories waste management units. CCR Title 27 contains criteria stating that Waste Management Units are classified according to their ability to contain wastes. Containment shall be determined by geology, hydrology, topography, climatology, and other factors relating to the ability of the Unit to protect water quality. Water Code Section 13273.1 requires that operators submit a water quality solid waste assessment test (SWAT) report to address leak status. The WMUDS was last updated by the State Water Resources control board in 2000.

ENVIROSTOR EnviroStor Cleanup Sites

VERSION DATE: 10/10/19

This list of Envirostor Cleanup Sites is maintained by the California Department of Toxic Substances Control (DTSC). DTSC has developed the EnviroStor database system to evaluate and track sites with confirmed or potential contamination and sites where further investigation may be necessary. This EnviroStor database of cleanup sites contains the following: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites.

ENVIROSTORPCA EnviroStor Permitted and Corrective Action Sites

VERSION DATE: 10/16/19

The California Department of Toxic Substance Control maintains this list of Hazardous Waste sites in their Envirostor online database. This list contains: 1) data pertaining to the Hazardous Waste Sites tracked in Envirostor; 2) the completed activities for Hazardous Waste Units; 3) the completed activities for Hazardous Waste Units undergoing closure; 4) completed maintenance activities; 5) the various "aliases" for a project (Some examples are: alt project name, alt address, EPA ID, etc.).

TOXPITS Toxic Pits Cleanup Act Sites

VERSION DATE: 07/01/95

Toxic Pits are sites with possible contamination of hazardous substances where cleanup is necessary. This listing is no longer updated by the State Water Resources Control Board.

Environmental Records Definitions - LOCAL

RCGL	Riverside County Generator List
VERSION DATE: 07/30/19	

The Riverside County Generator List is maintained by the County of Riverside Department of Environmental Health. This list includes permitted facilities that create hazardous waste.

RCDL	Riverside County Disclosure List
VERSION DATE: 09/04/19	

The Riverside County Disclosure List is maintained by the County of Riverside Department of Environmental Health. This list includes permitted facilities that handle hazardous materials.

RCMW	Riverside County Medical Waste Facilities
VERSION DATE: 08/06/19	

This list of active and inactive medical waste facilities is maintained by the County of Riverside Department of Environmental Health.

RCUST	Riverside County Underground Storage Tank Sites
VERSION DATE: 10/29/19	

This list of permitted underground storage tanks is maintained by the Riverside County Department of Environmental Health.

RCLUST	Riverside County Underground Storage Tanks Cleanup Sites
VERSION DATE: 10/30/19	

This list of facilities with unauthorized releases (leaking underground storage tanks) is maintained by the County of Riverside Department of Environmental Health.

USTR09 Underground Storage Tanks On Tribal Lands

VERSION DATE: 04/08/19

This database, provided by the United States Environmental Protection Agency (EPA), contains underground storage tanks on Tribal lands located in EPA Region 9. This region includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

LUSTR09 Leaking Underground Storage Tanks On Tribal Lands

VERSION DATE: 04/08/19

This database, provided by the United States Environmental Protection Agency (EPA), contains leaking underground storage tanks on Tribal lands located in EPA Region 9. This region includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

ODINDIAN Open Dump Inventory on Tribal Lands

VERSION DATE: 11/08/06

This Indian Health Service database contains information about facilities and sites on tribal lands where solid waste is disposed of, which are not sanitary landfills or hazardous waste disposal facilities, and which meet the criteria promulgated under section 4004 of the Solid Waste Disposal Act (42 U.S.C. 6944).

TORRESDUMPSITES Illegal Dump Sites on the Torres Martinez Reservation

VERSION DATE: 10/29/07

This listing of illegal dump site locations on the Torres Martinez Reservation is maintained by the United States Environmental Protection Agency, Region IX. These dump sites contain unlawfully discarded household waste such as landscaping and wood wastes with no known soil or groundwater contamination. A majority of the sites have already been cleaned up through the collaborative efforts of the EPA, The California Integrated Waste Management Board and the Torres Martinez Tribe.

INDIANRES Indian Reservations

VERSION DATE: 01/01/00

The Department of Interior and Bureau of Indian Affairs maintains this database that includes American Indian Reservations, off-reservation trust lands, public domain allotments, Alaska Native Regional Corporations and Recognized State Reservations.

APPENDIX E

REGULATORY RECORDS DOCUMENTATION

Leighton

Anisah Kabbara

From: Anisah Kabbara
Sent: Thursday, December 12, 2019 11:07 AM
To: 'sandiego@waterboards.ca.gov'
Cc: 'cypressfileroom@dtsc.ca.gov'; 'chatsworthfileroom@dtsc.ca.gov'
Subject: File Search Request

Good morning,

I'm with Leighton Consulting and I'd like to request any information regarding hazardous material storage, release, disposal, investigations or information concerning aboveground and underground storage tanks at the following address: 24150 Hayes Avenue, Murrieta, CA

Thank you,

Anisah Kabbara
Staff Geologist
10532 Acacia Street Suite B-6
Rancho Cucamonga, CA 91730
(909) 360-3772 Cellular
(909) 527-1127 Office
Leighton
Solutions You Can Build On

Jared Blumenfeld
Secretary for
Environmental Protection

Department of Toxic Substances Control

Meredith Williams, Ph.D.
Acting Director
9211 Oakdale Avenue
Chatsworth, California 91311

Gavin Newsom
Governor

December 13, 2019

Ms. Anisah Kabbara
Leighton Consulting
10532 Acacia Street, Suite B-6
Rancho Cucamonga, CA 91730

24150 Hayes Avenue, Murrieta, CA

PR3-121219-06

Dear Ms. Kabbara:

We have received your Public Records Act Request for records from the Department of Toxic Substances Control.

After a thorough review of our files we have found that no such records exist at this office pertaining to the site/facility referenced above.

We would also like to inform you about Envirostor, a database that provides information and documents on over 5,000 DTSC cleanup sites. Envirostor can be accessed at: http://www.envirostor.dtsc.ca.gov/public. Also, a computer is available in the Central Files of each DTSC Regional Office for use by community members to view Envirostor.

If you have any questions or would like further information regarding your request, please contact me at (818) 717-6522.

Sincerely,

Glenn Castillo /SA
Regional Records Coordinator

Anisah Kabbara

From: Lorch, Leah@Waterboards <Leah.Lorch@Waterboards.ca.gov>
Sent: Monday, December 16, 2019 2:25 PM
To: Anisah Kabbara
Subject: RE: File Search Request

Good Afternoon Anisah,

No records were found for the requested address.

If you have any further records requests please send them to rb9_records@waterboards.ca.gov

Thank you,
Leah Lorch
Office Technician (T)
Public Records Coordinator
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108
(619) 516-1993

Save Our Water
Visit for tips at:
saveourwater.com
www.waterboards.ca.gov

From: Munoz, Cleo@Waterboards <Cleo.Munoz@Waterboards.ca.gov> **On Behalf Of** sandiego
Sent: Thursday, December 12, 2019 11:32 AM
To: RB9_Records, WB@Waterboards <rb9_records@waterboards.ca.gov>
Subject: FW: File Search Request

From: Anisah Kabbara <akabbara@leightongroup.com>
Sent: Thursday, December 12, 2019 11:07 AM
To: sandiego <sandiego@waterboards.ca.gov>
Cc: CypressFileRoom@DTSC <CypressFileRoom@dtsc.ca.gov>; ChatsworthFileRoom@DTSC <ChatsworthFileRoom@dtsc.ca.gov>
Subject: File Search Request

EXTERNAL:

Good morning,

I'm with Leighton Consulting and I'd like to request any information regarding hazardous material storage, release, disposal, investigations or information concerning aboveground and underground storage tanks at the following address: 24150 Hayes Avenue, Murrieta, CA

Thank you,

Anisah Kabbara
Staff Geologist
10532 Acacia Street Suite B-6
Rancho Cucamonga, CA 91730
(909) 360-3772 Cellular
(909) 527-1127 Office
Leighton
Solutions You Can Build On

County of Riverside

DEPARTMENT OF ENVIRONMENTAL HEALTH

www.rivcoeh.org

Environmental Protection & Oversight Division
Hazardous Materials Management Branch

REQUEST FOR RECORDS

Requests for review of records are processed on a first come, first serve basis and the processing time is approximately 2-4 weeks. As required by California Public Records Act Section 6250 et seq., a response will be given within ten (10) business days to confirm receipt of your request.

Pursuant to California Government Code, Section 6254 (f), records of pending investigations and informant's names, addresses, and telephone numbers, will not be released.

For access to electronic records available online, visit the Public Information section at www.rivcoeh.org for more details.

REQUESTOR INFORMATION		
NAME: Anisah Kabbara	DATE OF REQUEST: 12/12/2019	
BUSINESS NAME (IF ANY): Leighton Consulting		
RETURN LEGAL MAILING ADDRESS: 10532 Acacia Street Suite B-6		
CITY: Rancho Cucamonga	STATE: CA	ZIP: 91730
PHONE: 909-360-3772		

The following information is required. **List each street address separately.**

	SITE STREET ADDRESS (NO APNs)	CITY
1.	24150 Hayes Avenue	Murrieta
2.		
3.		
4.		
5.		
6.		
7.		

Requests must be made in writing and submitted by mail, email, or in person to the following office:

4065 County Circle Drive, Room 104, Riverside, CA 92503
Phone: (951) 358-5055
Email: DEHRecordsMgmt@rivco.org
Mailing Address: P.O. Box 7909, Riverside, CA 92513-7909

County of Riverside

DEPARTMENT OF ENVIRONMENTAL HEALTH

STEVE VAN STOCKUM, DIRECTOR

RELEASE OF RECORDS RESPONSE

December 24, 2019

Service Request No: 46739

Leighton Consulting
10532 Acacia Street
Suite B-6
Rancho Cucamonga, CA 91730
Attn: Anisah Kabbara

Your request concerning **Hazardous Materials Management Records** has been received and a file search has been conducted. The appropriate action has been taken.

Site Address	City	Records Found
24150 Hayes Ave.	**Murrieta**	☐ **YES** ☒ **NO**
THIS IS NOT AN INVOICE	Estimated Cost	$0.00

If no records are found, no further action will be taken.

If records are found, please contact our office at (951) 358-5055 to schedule a file review appointment. Records will be available for 30 days from the date of this letter, after which a new Records Request will need to be submitted.

** There is a clerical records research fee of **$.50 for the first page, plus $.10 per additional page **Records will not be made available until this fee is paid****

Other fees may apply

Note: Additional time for processing may be required

Appointments are scheduled in one (1) hour increments, not to exceed two (2) hours.

Environmental Protection & Oversight Division
Hazardous Materials Management Branch
Attn: Records Management
P.O. Box 7909
Riverside, CA 92513-7909
Ph: (951) 358-5055
Fax (951) 358-5342

*additional fees may include costs for appt. cancellation/no show, time per service, scan/fax/mail of documents, cd/dvd

APPENDIX F

HISTORICAL RESEARCH DOCUMENTATION

Leighton

GeoSearch
On time. On target. In touch.™

Historical Aerial Photographs

NEW: *GeoLens by Geosearch*

Target Property:

MVUSD Murrieta Canyon Academy
24150 Hayes Avenue
Murrieta, Riverside, California 92562

Prepared For:

Leighton Consulting Inc.

Order #: 138113
Job #: 329085
Project #: 12393.002
Date: 12/19/2019

Target Property Summary

MVUSD Murrieta Canyon Academy
24150 Hayes Avenue
Murrieta, Riverside, California 92562

USGS Quadrangle: ***Murrieta***
Target Property Geometry: ***Area***

Target Property Longitude(s)/Latitude(s):
(-117.232506710, 33.559718684), (-117.233686882, 33.560836233), (-117.233547407, 33.561068681), (-117.233171898, 33.561050801), (-117.232313591, 33.560791531), (-117.231820065, 33.561149144), (-117.231294352, 33.560639545)

Aerial Research Summary

Date	Source	Scale	Frame
2016	USDA	1" = 400'	N/A
2014	USDA	1" = 400'	N/A
2012	USDA	1" = 400'	N/A
2010	USDA	1" = 400'	N/A
2009	USDA	1" = 400'	N/A
2005	USDA	1" = 400'	N/A
2004	USDA	1" = 400'	N/A
06/06/2002	USGS	1" = 400'	N/A
09/30/1996	USGS	1" = 400'	N/A
08/15/1989	USGS	1" = 400'	1836-128
07/28/1985	USGS	1" = 400'	353-158
10/31/1979	USGS	1" = 400'	1-63
10/28/1976	AMI	1" = 400'	8310
05/08/1967	USGS	1" = 400'	1-202
10/02/1961	ASCS	1" = 1000'	PI-7
08/28/1953	ASCS	1" = 400'	2-151
06/21/1938	ASCS	1" = 400'	55-60

N
W E
S

MVUSD Murrieta Canyon Academy
USDA
2016

GeoSearch

JOB #: 329085 - 12/19/2019

N
W E
S

MVUSD Murrieta Canyon Academy
USDA
_2014_

GeoSearch

JOB #: 329085 - 12/19/2019

MVUSD Murrieta Canyon Academy
USDA
_2012_

GeoSearch

JOB #: 329085 - 12/19/2019

N
W E
S

MVUSD Murrieta Canyon Academy
USDA
2010

GeoSearch

JOB #: 329085 - 12/19/2019

N
W E
S

MVUSD Murrieta Canyon Academy
USDA
2009

GeoSearch

MVUSD Murrieta Canyon Academy
USDA
2005

GeoSearch

JOB #: 329085 - 12/19/2019

MVUSD Murrieta Canyon Academy
USDA
2004

GeoSearch

N
W E
S

MVUSD Murrieta Canyon Academy
USGS
06/06/2002

GeoSearch

N
W E
S

MVUSD Murrieta Canyon Academy
USGS
09/30/1996

GeoSearch

N
W
E
S

MVUSD Murrieta Canyon Academy
USGS
08/15/1989

GeoSearch

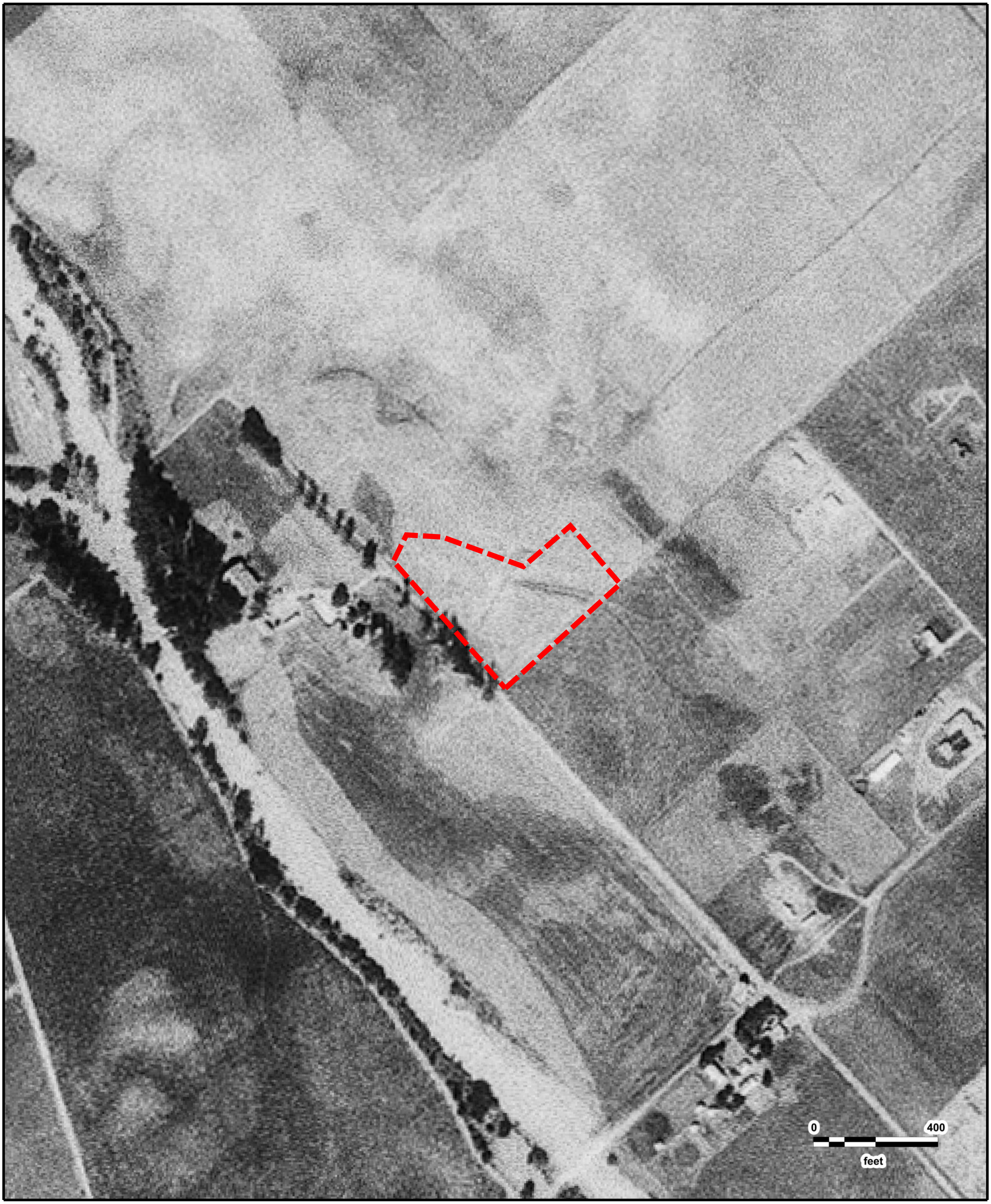
JOB #: 329085 - 12/19/2019

N
W E
S

MVUSD Murrieta Canyon Academy
USGS
07/28/1985

GeoSearch

JOB #: 329085 - 12/19/2019



N
W
E
S

MVUSD Murrieta Canyon Academy
USGS
10/31/1979

GeoSearch

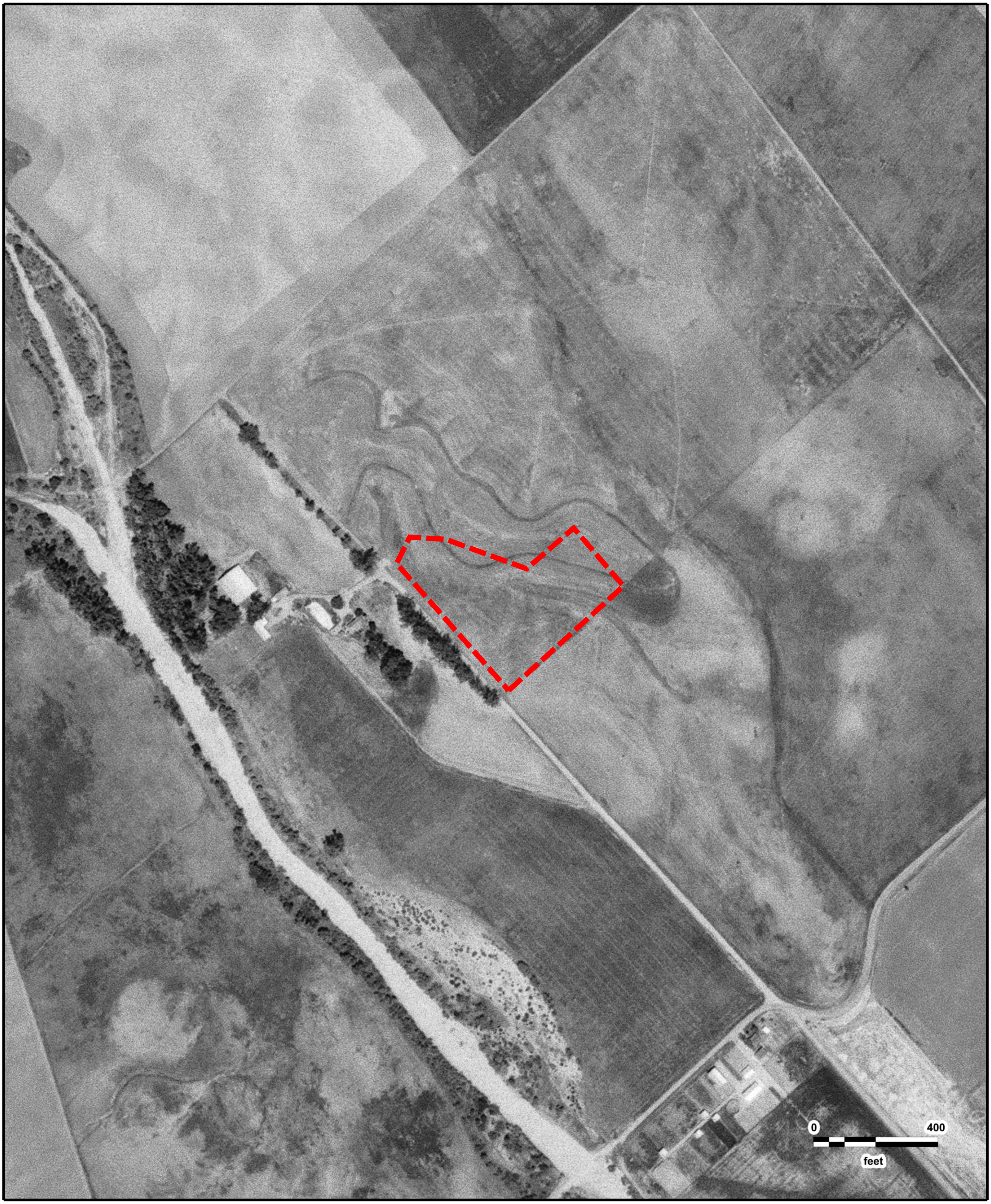
JOB #: 329085 - 12/19/2019

N
W E
S

MVUSD Murrieta Canyon Academy
AMI
10/28/1976

GeoSearch

JOB #: 329085 - 12/19/2019



N
W E
S

MVUSD Murrieta Canyon Academy
USGS
05/08/1967

GeoSearch

JOB #: 329085 - 12/19/2019

N
W E
S

MVUSD Murrieta Canyon Academy
ASCS
10/02/1961

GeoSearch

N
W
E
S

MVUSD Murrieta Canyon Academy
ASCS
08/28/1953

GeoSearch

JOB #: 329085 - 12/19/2019

N
W E
S

MVUSD Murrieta Canyon Academy
ASCS
06/21/1938

GeoSearch

JOB #: 329085 - 12/19/2019

GeoSearch
On time. On target. In touch.™

Historical Topographic Maps

NEW: GeoLens by Geosearch

Target Property:

MVUSD Murrieta Canyon Academy
24150 Hayes Avenue
Murrieta, Riverside, California 92562

Prepared For:

Leighton Consulting Inc.

Order #: 138113
Job #: 329084
Project #: 12393.002
Date: 12/17/2019

Target Property Summary

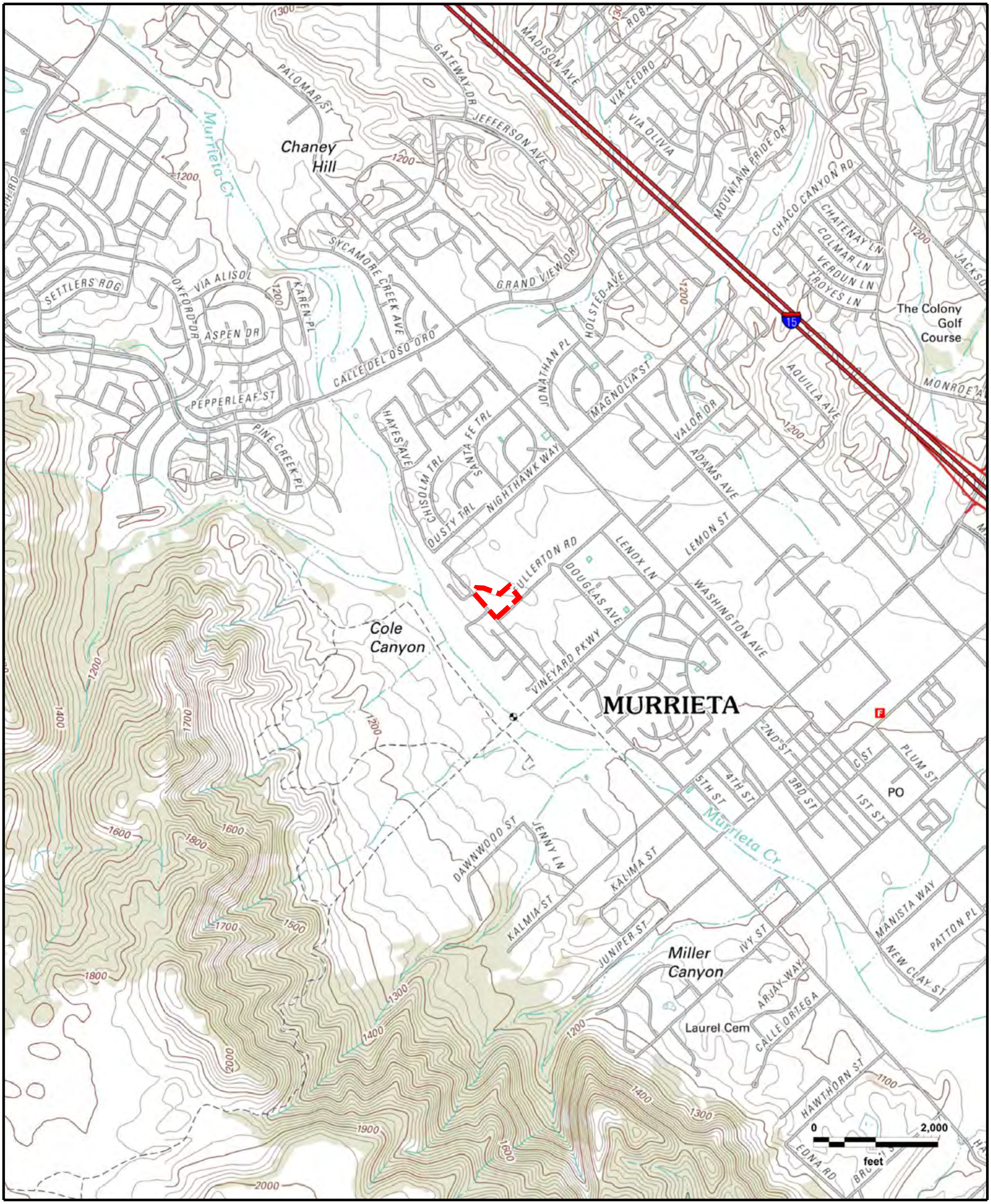
MVUSD Murrieta Canyon Academy
24150 Hayes Avenue
Murrieta, Riverside, California 92562

USGS Quadrangle: ***Murrieta***
Target Property Geometry: ***Area***

Target Property Longitude(s)/Latitude(s):
(-117.232506710, 33.559718684), (-117.233686882, 33.560836233), (-117.233547407, 33.561068681), (-117.233171898, 33.561050801), (-117.232313591, 33.560791531), (-117.231820065, 33.561149144), (-117.231294352, 33.560639545)

Topographic Map Summary

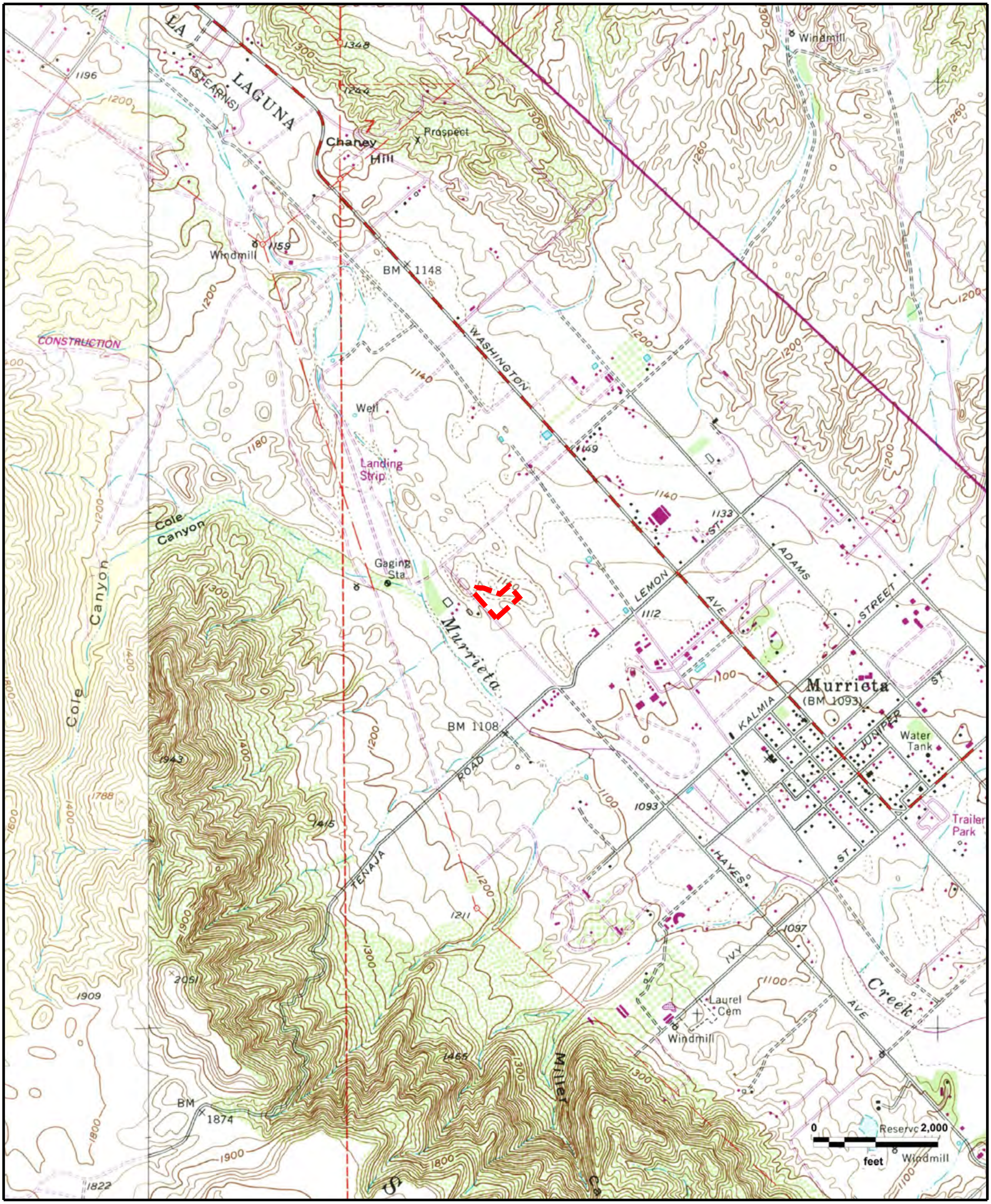
Date	Quadrangle	Scale
2012	***WILDOMAR, CA (2012)***	***1" = 2000'***
	MURRIETA, CA (2012)	
1953 PHOTOREVISED 1979	***WILDOMAR, CA (1982)***	***1" = 2000'***
	MURRIETA, CA (1979)	
1953 PHOTOREVISED 1973	***WILDOMAR, CA (1973)***	***1" = 2000'***
	MURRIETA, CA (1973)	
1953	***WILDOMAR, CA (1953)***	***1" = 2000'***
	MURRIETA, CA (1953)	
1943	***MURRIETA, CA***	***1" = 5208'***
1942	***MURRIETA, CA***	***1" = 5208'***
1901	***ELSINORE, CA (1901)***	***1" = 10420'***
	SAN LUIS REY, CA (1901)	



MVUSD Murrieta Canyon Academy
WILDOMAR, CA (2012), MURRIETA, CA (2012)

GeoSearch

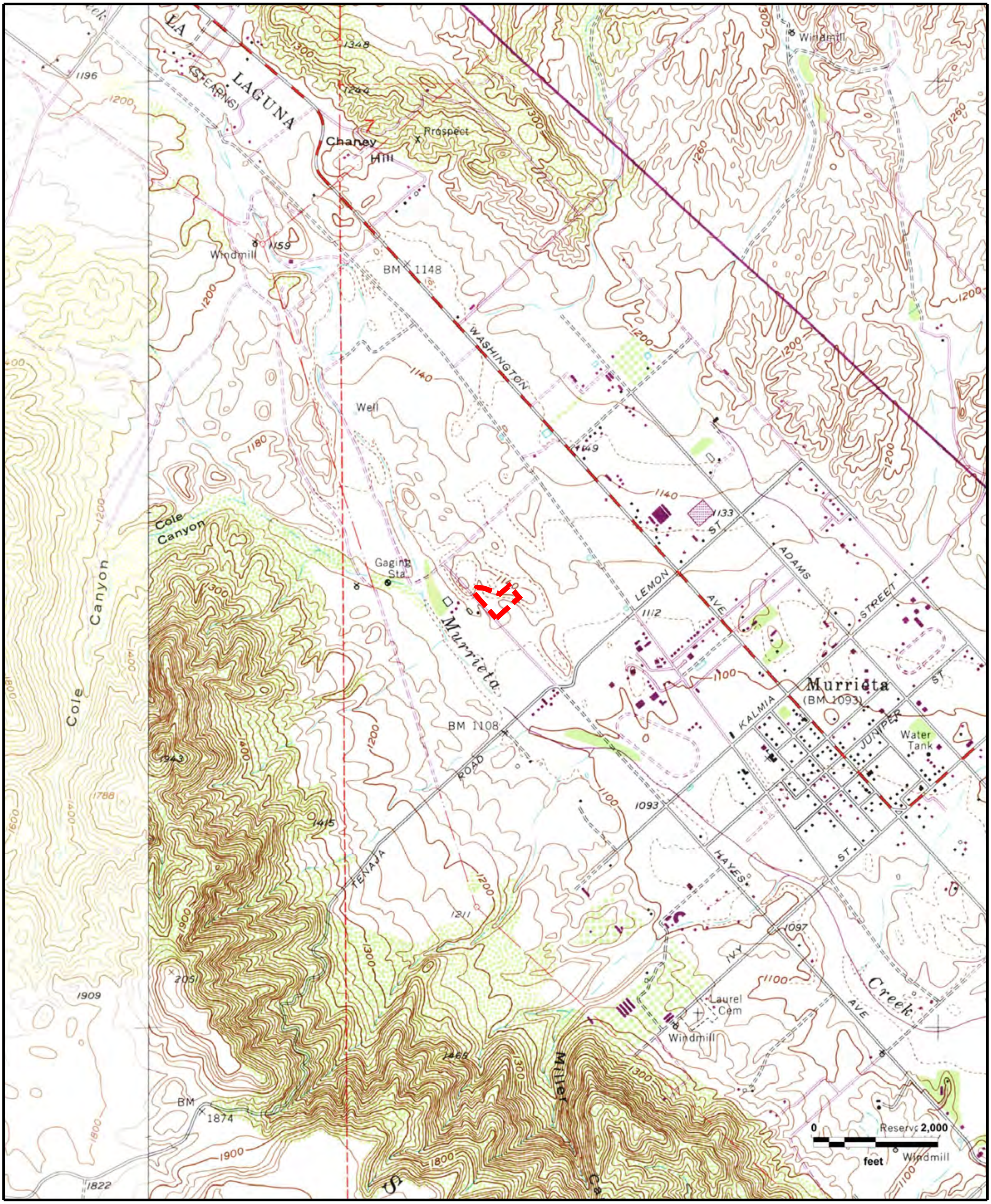
JOB #: 329084 - 12/17/2019



MVUSD Murrieta Canyon Academy
WILDOMAR, CA (1982), MURRIETA, CA (1979)

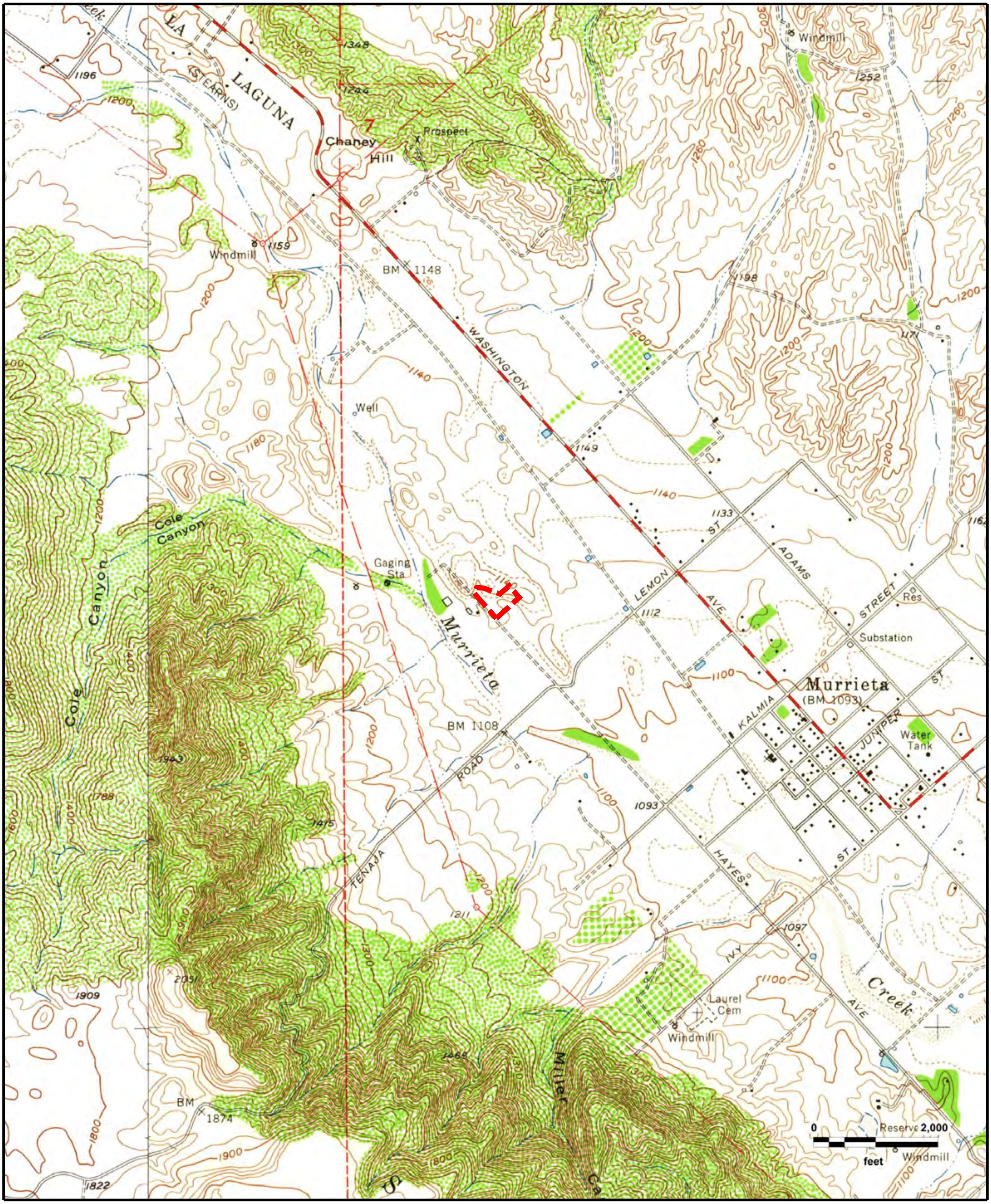
GeoSearch

JOB #: 329084 - 12/17/2019



MVUSD Murrieta Canyon Academy
WILDOMAR, CA (1973), MURRIETA, CA (1973)

GeoSearch

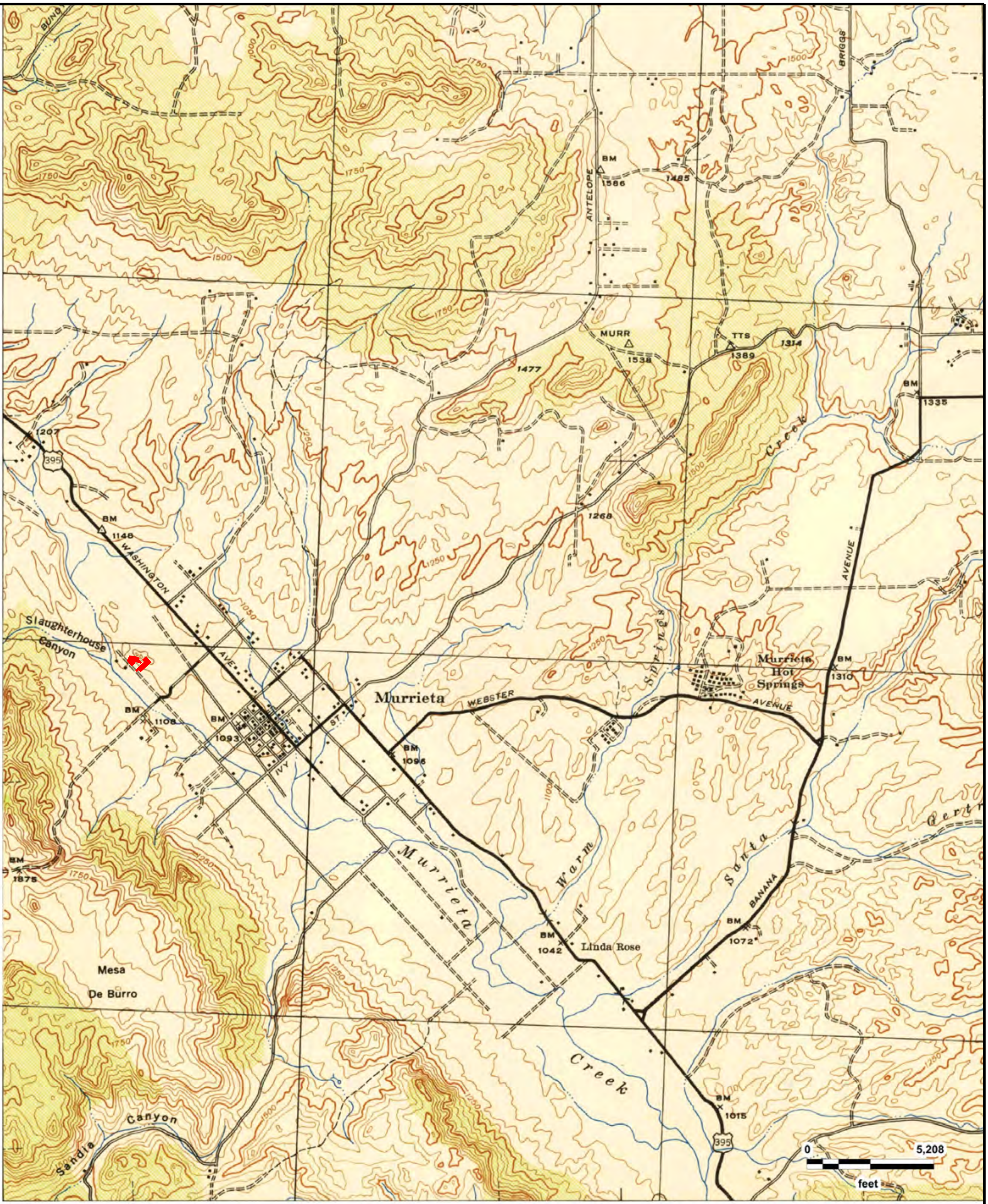


N
W E
S

MVUSD Murrieta Canyon Academy
WILDOMAR, CA (1953), MURRIETA, CA (1953)

GeoSearch

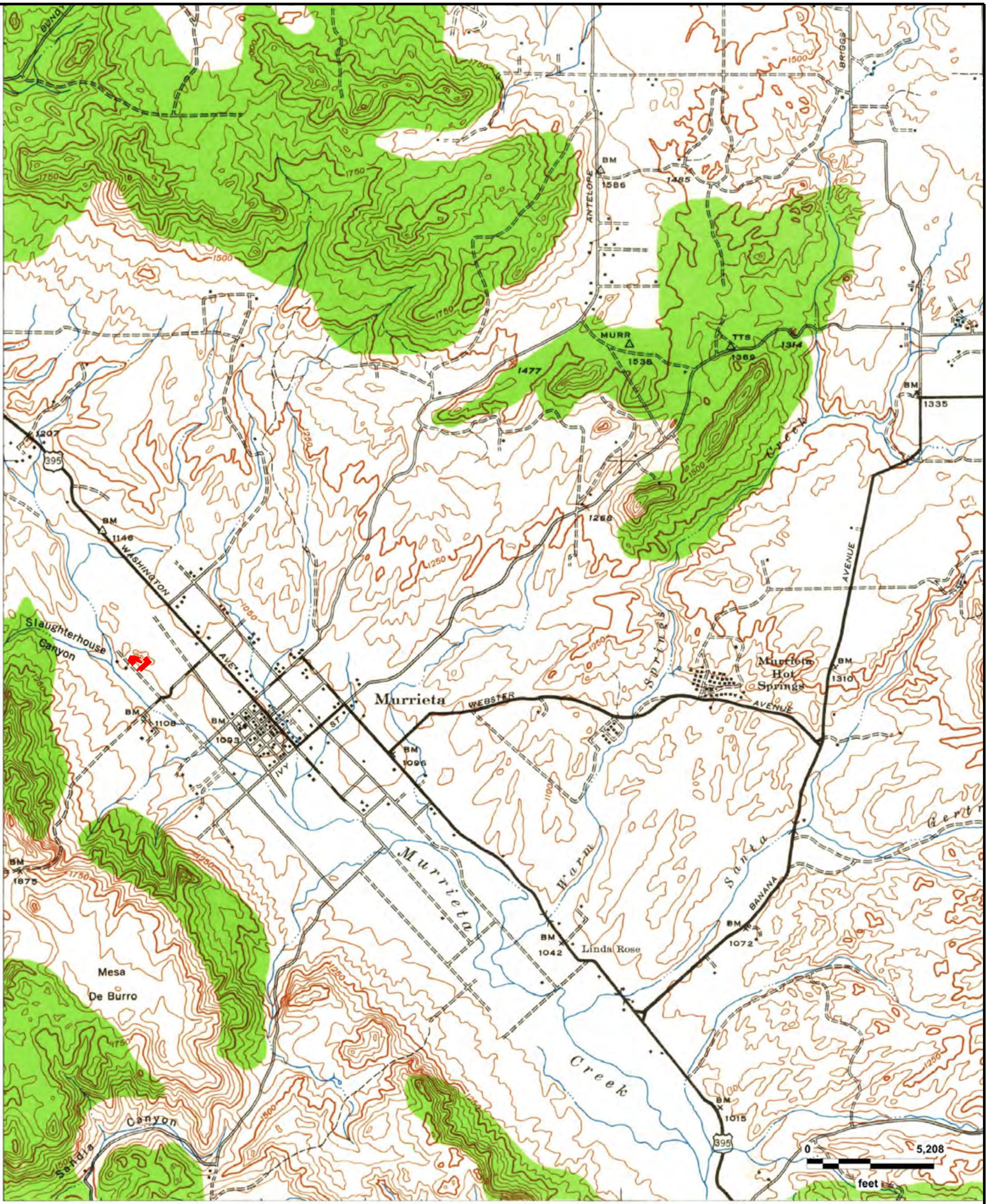
JOB #: 329084 - 12/17/2019



MVUSD Murrieta Canyon Academy
MURRIETA, CA (1943)

GeoSearch

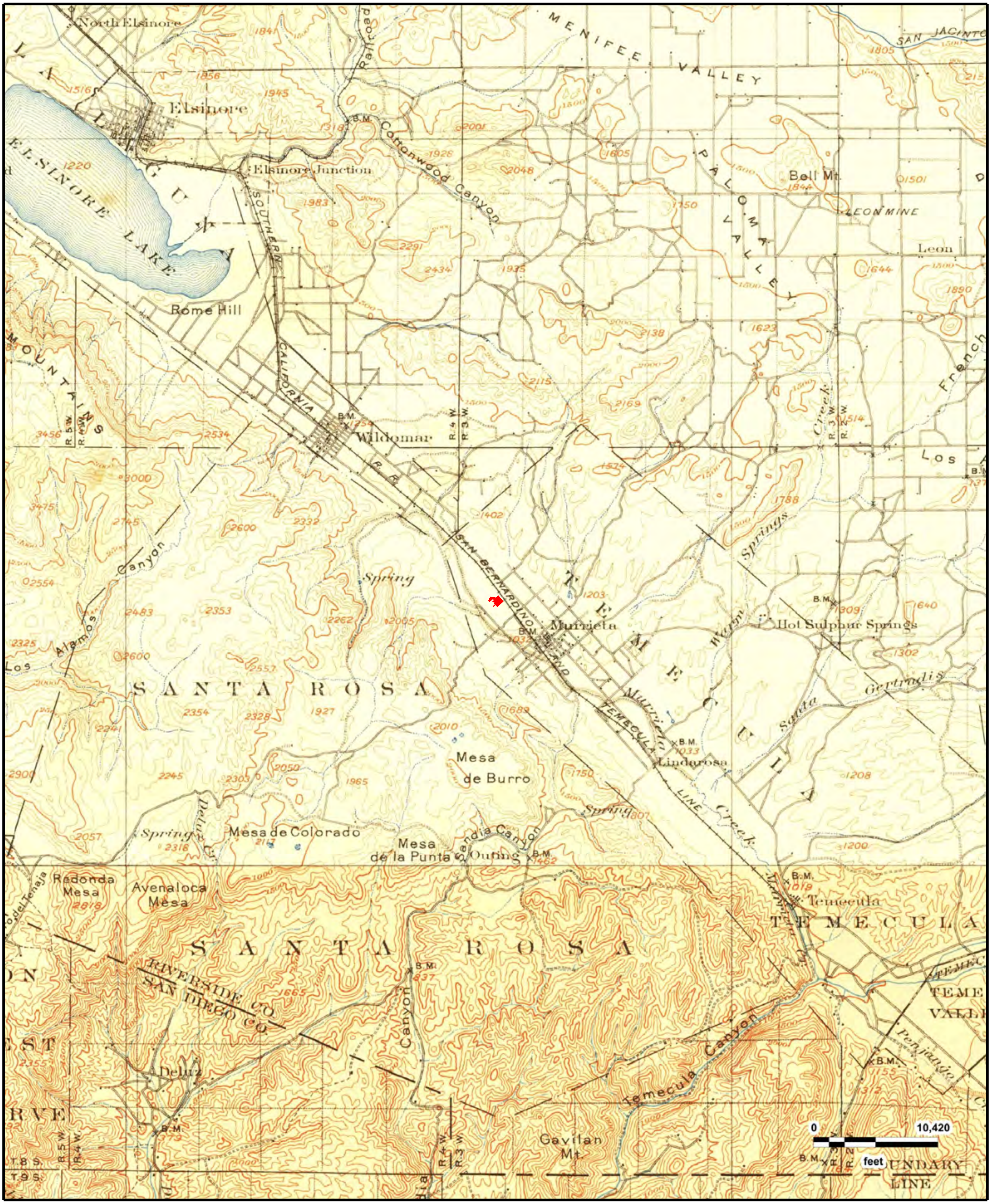
JOB #: 329084 - 12/17/2019



MVUSD Murrieta Canyon Academy
MURRIETA, CA (1942)

GeoSearch

JOB #: 329084 - 12/17/2019



MVUSD Murrieta Canyon Academy
ELSINORE, CA (1901), SAN LUIS REY, CA (1901)

GeoSearch

JOB #: 329084 - 12/17/2019

The NETR Environmental Lien and AUL Search Report

**MVUSD CANYON ACADEMY PHASE I
24150 HAYES AVENUE ALSO KNOWN AS 42200 NIGHTHAWK WAY
MURRIETA, CALIFORNIA**

Monday, December 16, 2019

Project Number: L19-02082

Real Estate Research & Information
NETROnline.com

2055 East Rio Salado Parkway
Tempe, Arizona 85281

Telephone: 480-967-6752
Fax: 480-966-9422

ENVIRONMENTAL LIEN AND AUL REPORT

The NETR Environmental LienSearch Report provides results from a search of available current land title records for environmental cleanup liens and other activity and use limitations, such as engineering controls and institutional controls.

A network of professional, trained researchers, following established procedures, uses client supplied property information to:

- search for parcel information and/or legal description;
- search for ownership information;
- research official land title documents recorded at jurisdictional agencies such as recorders' office, registries of deed, county clerks' offices, etc.;
- access a copy of the deed;
- search for environmental encumbering instrument(s) associated with the deed;
- provide a copy of any environmental encumbrance(s) based upon a review of key words in the instrument(s) (title, parties involved and description); and
- provide a copy of the deed or cite documents reviewed;

Thank you for your business
Please contact NETR at 480-967-6752
with any questions or comments

Disclaimer - Copyright and Trademark Notice

This report was prepared for the use of Nationwide Environmental Title Research, and Leighton Consulting, Inc., exclusively. This report is neither a guarantee of title, a commitment to insure, nor a policy of title insurance. **NO WARRANTY, EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT.** Nationwide Environmental Title Research (NETR) specifically disclaims the making of any such warranties, including without limitation, merchantability or fitness for a particular use or purpose. The information contained in this report is retrieved as it is recorded from the various agencies that make it available. The total liability is limited to the fee paid for this report.

ENVIRONMENTAL LIEN AND AUL REPORT

The NETR Environmental Lien Search Report is intended to assist in the search for environmental liens filed in land title records.

TARGET PROPERTY INFORMATION

ADDRESS

MVUSD Canyon Academy Phase I
24150 Hayes Avenue also known as 42200 Nighthawk Way
Murrieta, California

RESEARCH SOURCE

Source: Riverside County Assessor
Riverside County Recorder

DEED INFORMATION

Type of Instrument: Grant Deed

Grantor: Joaquin Ranch partners, a California general partnership

Grantee: Murrieta Valley Unified School District, a California public school district

Deed Dated: 10/22/1990
Deed Recorded: 11/05/1990
Instrument: 406046

LEGAL DESCRIPTION

All that certain piece or parcel of land being Parcel 1 of Parcel Map Number 18348, according to the map or plat thereof, as filed of record in Book 106, Page 29, Riverside County, State of California

Assessor's Parcel Number(s): 904-050-047

ENVIRONMENTAL LIEN

Environmental Lien: Found ☐ Not Found ☒

OTHER ACTIVITY AND USE LIMITATIONS (AULs)

Other AULs: Found ☐ Not Found ☒

Order No. [illegible] TITLE INSURANCE COMPANY
Escrow No. 1871941-TC
Loan No.

WHEN RECORDED MAIL TO:

Murrieta Valley Unified School
District
24725 Adams Ave
Murrieta CA 92362
ATTN: Austin Linsley

RECEIVED FOR RECORD
AT 3:00 O'CLOCK P.M.
NOV 5 - 1990

SPACE ABOVE THIS LINE FOR RECORDER'S USE

MAIL TAX STATEMENTS TO:

SAME AS ABOVE

PARCEL NO. 904-050-001-3

NO DOCUMENTARY TRANSFER TAX IS DUE PER GOVERNMENT CODE #6103
DOCUMENTARY TRANSFER TAX $.........
..... Computed on the consideration or value of property conveyed, OR
..... Computed on the consideration or value less liens or encumbrances remaining at time of sale.

the undersigned grantor
Signature of Declarant or Agent determining tax Firm Name

406046

Nov. 5,1990

GRANT DEED

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged,

JOAQUIN RANCH PARTNERS, a California general partnership

hereby GRANT(S) to MURRIETA VALLEY UNIFIED SCHOOL DISRICT, a California public school district operating pursuant to the California Education Code

the real property in the City of unincorporated area
County of Riverside , State of California, described as

LEGAL DESCRIPTION ATTACHED HERETO AND MADE A PART HEREOF:

1871941-22

Dated October 22,1990

STATE OF CALIFORNIA
COUNTY OF ________ } ss.

On ________
before me, the undersigned, a Notary Public in and for said State, personally appeared ________

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same.

WITNESS my hand and official seal.

Signature ________

JOAQUIN RANCH PARTNERS, a
California general partnership

BY: GREAT AMERICAN DEVELOPMENT COMPANY, a
California corporation, general partner

BY: ________ Sr Vice VP

BY: ________ SVP

BY: ________
WON SANG YOO, general partner

(This area for official notarial seal)

MAIL TAX STATEMENTS AS DIRECTED ABOVE

Order No.
Escrow No. 1871941-TC
Loan No.

WHEN RECORDED MAIL TO

Murrieta Valley Unified School District
24725 Adams Ave
Murrieta CA 92362
ATTN: Austin Linsley

RECEIVED FOR RECORD
AT 3:00 O'CLOCK P.M.
NOV 5 - 1990

SPACE ABOVE THIS LINE FOR RECORDER'S USE

4 0 6 0 4 6

Nov. 5, 1990

MAIL TAX STATEMENTS TO.

SAME AS ABOVE

PARCEL NO. 904-050-001-3

NO DOCUMENTARY TRANSFER TAX IS DUE PER GOVERNMENT CODE #6103
DOCUMENTARY TRANSFER TAX $..........
...... Computed on the consideration or value of property conveyed; OR
...... Computed on the consideration or value less liens or encumbrances remaining at time of sale.

the undersigned grantor
Signature of Declarant or Agent determining tax · Firm Name

GRANT DEED

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged,

JOAQUIN RANCH PARTNERS, a California general partnership

hereby GRANT(S) to MURRIETA VALLEY UNIFIED SCHOOL DISRICT, a California public school district operating pursuant to the California Education Code

the real property in the City of unicorporated area
County of Riverside, State of California, described as

LEGAL DESCRIPTION ATTACHED HERETO AND MADE A PART HEREOF:

1871941-22

STATE OF CALIFORNIA
COUNTY OF Riverside } ss
On October 24, 1990 before me, the undersigned, a Notary Public in and for said State, personally appeared Won Sang Yoo

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person that executed the within instrument as General partner(s) on behalf of Joaquin Ranch Partners, the partnership therein named and acknowledged to me that the partnership executed it.

WITNESS my hand and official seal.

Signature Amanda T. Noble

OFFICIAL SEAL
AMANDA T. NOBLE
NOTARY PUBLIC - CALIFORNIA
RIVERSIDE COUNTY
My comm. expires OCT 5 1993

(This area for official notarial seal)

Dated October 22, 1990

JOAQUIN RANCH PARTNERS, a California general partnership

BY: GREAT AMERICAN DEVELOPMENT COMPANY, a California corporation, general partner

~~BY:~~ [signature] Sr. Exec VP

BY: [signature] SVP

BY: [signature]
WON SANG YOO, general partner

STATE OF CALIFORNIA
COUNTY OF __________ } ss.
On __________
before me, the undersigned, a Notary Public in and for said State, personally appeared __________

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same.

WITNESS my hand and official seal.

Signature __________

(This area for official notarial seal)

MAIL TAX STATEMENTS AS DIRECTED ABOVE

COMPANY

Escrow No. 1871941-TC
Loan No.

WHEN RECORDED MAIL TO

Murrieta Valley Unified School District
24725 Adams Ave
Murrieta CA 92362
ATTN: Austin Linsley

RECEIVED FOR RECORD AT 3:00 O'CLOCK P.M.
NOV 5 - 1990

SPACE ABOVE THIS LINE FOR RECORDER'S USE

4060046

MAIL TAX STATEMENTS TO

SAME AS ABOVE

PARCEL NO. 904-050-001-3

NO DOCUMENTARY TRANSFER TAX IS DUE PER GOVERNMENT CODE #6103
DOCUMENTARY TRANSFER TAX $
...... Computed on the consideration or value of property conveyed; OR
...... Computed on the consideration or value less liens or encumbrances remaining at time of sale.

the undersigned grantor
Signature of Declarant or Agent determining tax   Firm Name

GRANT DEED

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged,

JOAQUIN RANCH PARTNERS, a California general partnership

hereby GRANT(S) to MURRIETA VALLEY UNIFIED SCHOOL DISRICT, a California public school district operating pursuant to the California Education Code

the real property in the ~~City of~~ unicorporated area
County of Riverside, State of California, described as

LEGAL DESCRIPTION ATTACHED HERETO AND MADE A PART HEREOF:

1871941-22

Nov. 5, 1990

STATE OF CALIFORNIA
COUNTY OF San Diego } ss
On October 23, 1990 before me the undersigned a Notary Public in and for said State personally appeared Lawrence A. Heffner and Gustave Orozco personally known to me (or proved to me on the basis of satisfactory evidence) to be the persons who executed the within instrument as Sr. Executive Vice President and Sr. Vice President ~~Secretary~~ on behalf of Great American Development Company the corporation therein named, and acknowledged to me that said corporation executed the within instrument pursuant to its by-laws or a resolution of its board of directors, said corporation being known to me to be one of the partners of Joaquin Ranch Partners the partnership that executed the within instrument, and acknowledged to me that such corporation executed the same as such partner and that such partnership executed the same

WITNESS my hand and official seal

Signature Anna D. Peralta

OFFICIAL SEAL
ANNA D PERALTA
Notary Public California
SAN DIEGO COUNTY
My Comm. Exp. May 25, 1993

(This area for official notarial seal)

3005 (6-82) (Corporation as Partner of Partnership) First American Title Company

Dated October 22, 1990

JOAQUIN RANCH PARTNERS, a California general partnership

BY: GREAT AMERICAN DEVELOPMENT COMPANY, a California corporation, general partner

~~BY:~~ [signature] Sr. Exec VP

BY: [signature] SVP

BY: [signature]
WON SANG WOO, general partner

STATE OF CALIFORNIA
COUNTY OF ______ } ss

On ______ before me, the undersigned, a Notary Public in and for said State, personally appeared ______

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same.

WITNESS my hand and official seal.

Signature ______

(This area for official notarial seal)

1002 (6/82)

MAIL TAX STATEMENTS AS DIRECTED ABOVE

LEGAL DESCRIPTION

Parcel 1 of Parcel Map 18348, in the County of Riverside, State of California, as shown by map on file in Book 106 pages 29 to 36, inclusive, of maps, records of Riverside County, California;

Except that portion described in the deed to Bear Valley Vineyard Company, LTD., recorded July 26, 1983 as instrument no. 150192 of Official Records of Riverside County, California.

406046

Nov. 5,1990

CERTIFICATE OF ACCEPTANCE

THIS IS TO CERTIFY, pursuant to California Government Code Section 27281, that the interest in real property conveyed by the Grant Deed dated October 22, 1990 from Joaquin Ranch Partners, a California General Partnership (the "Grantor") to Murrieta Valley Unified School District, a California public school district operating pursuant to the California Education Code (the "Grantee") is hereby accepted by the undersigned officer on behalf of the Board of Trustees of the Murrieta Valley Unified School District (the "Board") pursuant to statutory and other authority, and the Grantee hereby consents to recordation thereof.

Dated: October 29, 1990

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT

By [signature]
Charles Van de Wetering,
Secretary, Board of Trustees

SWS: work\murgen\certacc1

406046

Nov. 5, 1990

GeoSearch
On time. On target. In touch.™

Fire Insurance Map Abstract

Target Property:
MVUSD Murrieta Canyon Academy
24150 Hayes Avenue,
Murrieta, CA 92562

Prepared For:
Leighton Consulting Inc.

Order #: 138113
Job #: 329088
Project #: 12393.002
Date #: 12/17/19

Date: 12/17/19

GS Job Number: 138113

Company Name: Leighton Consulting Inc.

Project Number: 12393.002

Site Information: MVUSD Murrieta Canyon Academy
24150 Hayes Avenue,
Murrieta, CA 92562

The collections of fire insurance maps listed below were reviewed according to the site information supplied by client. Based on the information provided, no coverage is available.

Library of Congress
University Publications of America
Other Libraries (universities, state, local, etc.).

GeoSearch
On time. On target. In touch.™

Historical By Street Number

Target Property:

Hayes Ave,

Murrieta, CA 92563

Prepared For:
Leighton Consulting, Inc.

Order #: 138113

Project #: 12393.002

Date: 12/16/2019

City Directory Historical by Street Number

1 Hayes Ave	Street Begins (1974-2000); No Listing (2004-2019)
23958 Hayes Ave	No Listing (1974-2007/08); Fleenor Jeremy (2014-2019)
23999 Hayes Ave	No Listing (1974-1986); Ultralight Flying (1991); Encore Ultra Lights (1995); Jim Wallace Sktdvng (1995); Skydive Wally World (1995); A-1 Perfect (2000); Elsinore Skylights (2000); Hulbert Jessica (2000-2007/08); Murrietas Ultralight Flying Sc (2000); No Listing (2014-2019)
24040 Hayes Ave	No Listing (1974-2007/08); Thompson Middle School (2014-2019); Murrieta Valley Unified School (2019)
24141 Hayes Ave	No Current Listing (1974); Baltazar Jesus L (1986-1991); No Current Listing (1995-2004); No Listing (2007/08-2019)
24150 Hayes Ave	No Listing (1974-1995); Murrieta Valley Unified (2000-2004); Murrieta Vly Sc Dst Crksde Hi (2000); Murrieta Vly Sc Creekside (2007/08); Creekside High School (2014); Garage Door Repair In (2014-2019); Murrieta Valley Adult School (2014-2019)
24200 Hayes Ave	No Listing (1974-2000); Mcdaniel Danny (2004-2007/08); No Listing (2014-2019)
24212 Hayes Ave	No Listing (1974-2000); Boucher Michael (2004-2007/08); No Listing (2014); Majchrzak James (2019)
24218 Hayes Ave	No Listing (1974-2000); Razo Arturo (2004-2019)
24224 Hayes Ave	No Listing (1974-2007/08); Martinez Richard (2014-2019)
24230 Hayes Ave	No Listing (1974-2000); Brown Jack (2004); Espinoza Ricardo (2007/08); Espinoza Ricardo (2014-2019)
24240 Hayes Ave	No Listing (1974); Fullerton Ann (1986-1991); Hilderbrand John J (1986); Carlisle Marsha (1995); No Current Listing (2000); No Listing (2004-2019)
24246 Hayes Ave	No Listing (1974-2000); No Current Listing (2004); Lopez J (2007/08); Sparks Bruce (2014-2019)
24511 Hayes Ave	No Listing (1974-2000); Harrison Revelle (2004-2007/08); Teets Tony (2014); Vandenburgh Leland (2019)
24515 Hayes Ave	No Listing (1974); Sugden Engineering (1986); Vandenburgh Leleano (1986-2000); No Listing (2004-2019)
24614 Hayes Ave	No Listing (1974); Barton Wm D (1986); Ausman William D (1991); Evenson Dale (1991); Mourer Betty H (1991); No Current Listing (1995); Woody Betty (2000); No Listing (2004-2019)
24780 Hayes Ave	Nichols Electric (1974); No Listing (1986-2019)
24830 Hayes Ave	Baker Bruce O Dvm (1974); Baker Marsha (1974); No Listing (1986-2019)
24916 Hayes Ave	No Current Listing (1974); No Listing (1986-2019)
24920 Hayes Ave	Mefferd Clifford (1974); No Listing (1986-2019)
24982 Hayes Ave	Colby H A (1974); No Listing (1986-2019)
25070 Hayes Ave	Gwinn W A (1974); No Listing (1986-2019)
25350 Hayes Ave	Hodges Jeffrey (1974); Miller M L (1974); No Listing (1986-2019)
25570 Hayes Ave	Renfroe Fred (1974); No Listing (1986-2019)
26253 Hayes Ave	Dyer H E Jr (1974); No Listing (1986-2019)

Comments: No coverage for Murrieta from 1986-1974, and prior to 1971.

Historical By Street Number

Target Property:

Nighthawk Way,

Murrieta, CA 92563

Prepared For:
Leighton Consulting, Inc.

Order #: 138113

Project #: 12393.002

Date: 12/16/2019

City Directory Historical by Street Number

1 Nighthawk Way	No Listing (1991-1995); Street Begins (2000); No Listing (2004); Street Begins (2007/08); No Listing (2014); Street Begins (2019)
42200 Nighthawk Way	No Listing (1991-2014); M V H S Wrestling Booster Club (2019); Mv Football (2019); Passion Life Church (2019)
42400 Nighthawk Way	No Listing (1991-1995); Mcmurray B E (2000); Murrieta Vly Sc Dst Thmpsn Md (2000); No Listing (2004); Murrieta Vly Unfd Sc Dst (2007/08); No Listing (2014); Murrieta Valley Unified School (2019); [X] End Of Listings (2019)

Comments: No coverage for Murrieta from 1986-1974, and prior to 1971.

APPENDIX G

GBA GEOENVIRONMENTAL REPORT

Leighton

Important Information about This

Geoenvironmental Report

Geoenvironmental studies are commissioned to gain information about environmental conditions on and beneath the surface of a site. The more comprehensive the study, the more reliable the assessment is likely to be. But remember: Any such assessment is to a greater or lesser extent based on professional opinions about conditions that cannot be seen or tested. Accordingly, no matter how many data are developed, risks created by unanticipated conditions will always remain. *Have realistic expectations.* Work with your geoenvironmental consultant to manage known and unknown risks. Part of that process should already have been accomplished, through the risk allocation provisions you and your geoenvironmental professional discussed and included in your contract's general terms and conditions. This document is intended to explain some of the concepts that may be included in your agreement, and to pass along information and suggestions to help you manage your risk.

Beware of Change; Keep Your Geoenvironmental Professional Advised

The design of a geoenvironmental study considers a variety of factors that are subject to change. Changes can undermine the applicability of a report's findings, conclusions, and recommendations. *Advise your geoenvironmental professional about any changes you become aware of.* Geoenvironmental professionals cannot accept responsibility or liability for problems that occur because a report fails to consider conditions that did not exist when the study was designed. Ask your geoenvironmental professional about the types of changes you should be particularly alert to. Some of the most common include:

- modification of the proposed development or ownership group,
- sale or other property transfer,
- replacement of or additions to the financing entity,
- amendment of existing regulations or introduction of new ones, or
- changes in the use or condition of adjacent property.

Should you become aware of any change, *do not rely on a geoenvironmental report.* Advise your geoenvironmental professional immediately; follow the professional's advice.

Recognize the Impact of Time

A geoenvironmental professional's findings, recommendations, and conclusions cannot remain valid indefinitely. The more time that passes, the more likely it is that important latent changes will occur. *Do not rely on a geoenvironmental report if too much time has elapsed since it was completed.* Ask your environmental professional to define "too much time." In the case of Phase I Environmental Site Assessments (ESAs), for example, more than 180 days after submission is generally considered "too much."

Prepare To Deal with Unanticipated Conditions

The findings, recommendations, and conclusions of a Phase I ESA report typically are based on a review of historical information, interviews, a site "walkover," and other forms of noninvasive research. When site subsurface conditions are not sampled in any way, the risk of unanticipated conditions is higher than it would otherwise be.

While borings, installation of monitoring wells, and similar invasive test methods can help reduce the risk of unanticipated conditions, *do not overvalue the effectiveness of testing.* Testing provides information about actual conditions only at the precise locations where samples are taken, and only when they are taken. Your geoenvironmental professional has applied that specific information to develop a general opinion about environmental conditions. *Actual conditions in areas not sampled may differ (sometimes sharply) from those predicted in a report.* For example, a site may contain an unregistered underground storage tank that shows no surface trace of its existence. *Even conditions in areas that were tested can change*, sometimes suddenly, due to any number of events, not the least of which include occurrences at adjacent sites. Recognize, too, that *even some conditions in tested areas may go undiscovered,* because the tests or analytical methods used were designed to detect only those conditions assumed to exist.

Manage your risks by retaining your geoenvironmental professional to work with you as the project proceeds. Establish a contingency fund or other means to enable your geoenvironmental professional to respond rapidly, in order to limit the impact of unforeseen conditions. And to help prevent any misunderstanding, identify those empowered to authorize changes and the administrative procedures that should be followed.

Do Not Permit Any Other Party To Rely on the Report

Geoenvironmental professionals design their studies and prepare their reports to meet the specific needs of the clients who retain them, in light of the risk management methods that the client and geoenvironmental professional agree to, and the statutory, regulatory, or other requirements that apply. The study designed for a developer may differ sharply from one designed for a lender, insurer, public agency...or even another developer. *Unless the report specifically states otherwise, it was developed for you and only you.* Do not unilaterally permit any other party to rely on it. The report and the study underlying it may not be adequate for another party's needs, and you could be held liable for shortcomings your geoenvironmental professional was powerless to prevent or anticipate. Inform your geoenvironmental professional when you know or expect that someone else—a third-party—will want to use or rely on the report. *Do not permit third-party use or reliance until you first confer with the geoenvironmental professional who prepared the report.* Additional testing, analysis, or study may be required and, in any event, appropriate terms and conditions should be agreed to so both you and your geoenvironmental professional are protected from third-party risks. *Any party who relies on a geoenvironmental report without the express written permission of the professional who prepared it and the client for whom it was prepared may be solely liable for any problems that arise.*

Avoid Misinterpretation of the Report

Design professionals and other parties may want to rely on the report in developing plans and specifications. They need to be advised, in writing, that their needs may not have been considered when the study's scope was developed, and, even if their needs were considered, they might misinterpret geoenvironmental findings, conclusions, and recommendations. *Commission your geoenvironmental professional to explain pertinent elements of the report to others who are permitted to rely on it, and to review any plans, specifications or other instruments of professional service that incorporate any of the report's findings, conclusions, or recommendations.* Your geoenvironmental professional has the best understanding of the issues involved, including the fundamental assumptions that underpinned the study's scope.

Give Contractors Access to the Report

Reduce the risk of delays, claims, and disputes by giving contractors access to the full report, *providing that it is accompanied by a letter of transmittal that can protect you* by making it unquestionably clear that: 1) the study was not conducted and the report was not prepared for purposes of bid development, and 2) the findings, conclusions, and recommendations included in the report are based on a variety of opinions, inferences, and assumptions and are subject to interpretation. Use the letter to also advise contractors to consult with your geoenvironmental professional to obtain clarifications, interpretations, and guidance (a fee may be required for this service), and that—in any event—they should conduct additional studies to obtain the specific type and extent of information each prefers for preparing a bid or cost estimate. Providing access to the full report, with the appropriate caveats, helps prevent formation of adversarial attitudes and claims of concealed or differing conditions. If a contractor elects to ignore the warnings and advice in the letter of transmittal, it would do so at its own risk. Your geoenvironmental professional should be able to help you prepare an effective letter.

Do Not Separate Documentation from the Report

Geoenvironmental reports often include supplemental documentation, such as maps and copies of regulatory files, permits, registrations, citations, and correspondence with regulatory agencies. If subsurface explorations were performed, the report may contain final boring logs and copies of laboratory data. If remediation activities occurred on site, the report may include: copies of daily field reports; waste manifests; and information about the disturbance of subsurface materials, the type and thickness of any fill placed on site, and fill placement practices, among other types of documentation. *Do not separate supplemental documentation from the report. Do not, and do not permit any other party to redraw or modify any of the supplemental documentation for incorporation into other professionals' instruments of service.*

Understand the Role of Standards

Unless they are incorporated into statutes or regulations, standard practices and standard guides developed by the American Society for Testing and Materials (ASTM) and other recognized standards-developing organizations (SDOs) are little more than aspirational methods agreed to by a consensus of a committee. The committees that develop standards may not comprise those best-qualified to establish methods and, no matter what, no standard method can possibly consider the infinite client- and project-specific variables that fly in the face of the theoretical "standard conditions" to which standard practices and standard guides apply. In fact, these variables can be so pronounced that geoenvironmental professionals who comply with every directive of an ASTM or other standard procedure could run afoul of local custom and practice, thus violating the standard of care. Accordingly, when geoenvironmental professionals indicate in their reports that they have performed a service "in general compliance" with one standard or another, it means they have applied professional judgement in creating and implementing a scope of service designed for the specific client and project involved, and which follows some of the general precepts laid out in the referenced standard. To the extent that a report indicates "general compliance" with a standard, you may wish to speak with your geoenvironmental professional to learn more about what was and was not done. *Do not assume a given standard was followed to the letter.* Research indicates that that seldom is the case.

Realize That Recommendations May Not Be Final

The technical recommendations included in a geoenvironmental report are based on assumptions about actual conditions, and so are preliminary or tentative. Final recommendations can be prepared only by observing actual conditions as they are exposed. For that reason, you should retain the geoenvironmental professional of record to observe construction and/or remediation activities on site, to permit rapid response to unanticipated conditions. *The geoenvironmental professional who prepared the report cannot assume responsibility or liability for the report's recommendations if that professional is not retained to observe relevant site operations.*

Understand That Geotechnical Issues Have Not Been Addressed

Unless geotechnical engineering was specifically included in the scope of professional service, a report is not likely to relate any findings, conclusions, or recommendations about the suitability of subsurface materials for construction purposes, especially when site remediation has been accomplished through the removal, replacement, encapsulation, or chemical treatment of on-site soils. The equipment, techniques, and testing used by geotechnical engineers differ markedly from those used by geoenvironmental professionals; their education, training, and experience are also significantly different. If you plan to build on the subject site, but have not yet had a geotechnical engineering study conducted, your geoenvironmental professional should be able to provide guidance about the next steps you should take. The same firm may provide the services you need.

Read Responsibility Provisions Closely

Geoenvironmental studies cannot be exact; they are based on professional judgement and opinion. Nonetheless, some clients, contractors, and others assume geoenvironmental reports are or certainly should be unerringly precise. Such assumptions have created unrealistic expectations that have led to wholly unwarranted claims and disputes. To help prevent such problems, geoenvironmental professionals have developed a number of report provisions and contract terms that explain who is responsible for what, and how risks are to be allocated. Some people mistake these for "exculpatory clauses," that is, provisions whose purpose is to transfer one party's rightful responsibilities and liabilities to someone else. Read the responsibility provisions included in a report and in the contract you and your geoenvironmental professional agreed to. *Responsibility provisions are not "boilerplate."* They are important.

Rely on Your Geoenvironmental Professional for Additional Assistance

Membership in the Geoprofessional Business Association exposes geoenvironmental professionals to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a geoenvironmental project. Confer with your GBA-member geoenvironmental professional for more information.

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

Appendix H: Hydrology - Murrieta Canyon Academy

Hydrology – Murrieta Canyon Academy

The Murrieta Canyon Academy located at 24150 Hayes Avenue, Murrieta, California, is a fully functioning adult education school campus constructed during various phases. The proposed buildings are generally located within the existing softball fields located immediately north of the existing campus and south of Thompson Middle School. The existing Murrieta Canyon Academy buildings are to be demolished and new parking/landscape to be constructed. The goal of this study is to see if the 36" pipe out letting the on-site run-off will be able to handle the added run-off from the proposed improvements from Murrieta Canyon Academy and the existing run-off from Thompson Middle School. 100-year storm flows were modelled.

Area A

Area A starts at node 100, on the north portion of Thompson Middle School, run-off flows into a CB at node 101. The CB at 101 is connected to the pipe, node 102, that flows from Thompson Middle School, which is primarily impervious due to Thompson Middle School being an active public school. The run-off is conveyed through an existing 18" storm drain pipe to node 103, a 27" storm drain pipe. The "Q" at node 104 is 20.05 cfs.

Area B

Area B starts at node 200, on the north side of the existing field at Thompson Middle School. This flow drains into the south into an existing catch basin, node 201. The flow is then routed through the existing catch basin and into an existing storm drain pipe for 581' and connects to the existing 27" storm drain pipe, node 203. The "Q" at node 203 is 10.22 cfs.

Flow from Area A and Area B are then confluenced at node 300. The flow from Area A and Area B then flow through a 36" pipe for 133' until node 301. The "Q" at node 301 if 24.43 cfs.

Area C

Area C starts at node 400, on the north side of the existing field at Thompson Middle School. This flow drains south and into a drop inlet CB, node 401. The CB at 401 is connected to a proposed 6" storm drain pipe, node 402, that flows from the CB to the proposed basin, which has subsurface 6" perforated pipes. The perforated pipes are then confluence with 301, at node 403. The "Q" at node 403 is 15.60 cfs.

Area D

Area D starts at Node 600, on the north side of the parking lot at Thompson Middle School. This flow drains south into a drop inlet CB, node 601. The CB at 601 is connected to an existing storm drain pipe, node 602, which conveys the run-off from Thompson Middle School to node 603 via an existing 18" storm drain pipe. The run-off is conveyed through an existing 18" storm drain pipe to node 603. The "Q" at node 603 is 8.70 cfs.

Area E

Area E starts at Node 700, on the north side of the southern parking lot at Thompson Middle School. This flow drains south into a drop inlet CB, node 701. The CB at 701 is connected to an existing storm drain pipe, node 702, which conveys the run-off from Thompson Middle School to node 703 via an existing 18" storm drain pipe. The run-off is conveyed through an existing 18" storm drain pipe to node 703. The "Q" at node 703 is 7.75 cfs.

In conclusion, the 36" pipe out letting the on-site run-off will be able to handle the added run-off from the proposed improvements from Murrieta Canyon Academy and the existing run-off from Thompson Middle School in a 100-year storm.

```
               Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
       Rational Hydrology Study        Date: 01/08/20  File:MCARAT100ABC.out
------------------------------------------------------------------------
MURRIETA CANYON ACADEMY
AREA A / AREA B / AREA C RATIONAL METHOD STUDY
TDM / SRU
01/08/2020
------------------------------------------------------------------------
 *********  Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6386

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [ Murrieta,Tmc,Rnch CaNorco ] area used.
10 year storm 10 minute intensity =  2.360(In/Hr)
10 year storm 60 minute intensity =  0.880(In/Hr)
100 year storm 10 minute intensity =  3.480(In/Hr)
100 year storm 60 minute intensity =  1.300(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.300(In/Hr)
Slope of intensity duration curve = 0.5500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =     95.000(Ft.)
Top (of initial area) elevation =    39.890(Ft.)
Bottom (of initial area) elevation =    35.650(Ft.)
Difference in elevation =     4.240(Ft.)
Slope =     0.04463  s(percent)=      4.46
TC = k(0.336)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration =    5.000 min.
Rainfall intensity =      5.099(In/Hr) for a   100.0 year storm
MOBILE HOME PARK subarea type
Runoff Coefficient = 0.890
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.250; Impervious fraction =  0.750
Initial subarea runoff =     20.050(CFS)
Total initial stream area =        4.420(Ac.)
Pervious area fraction = 0.250


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation =    32.650(Ft.)
Downstream point/station elevation =    27.720(Ft.)
Pipe length  =   606.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     20.050(CFS)
```

```
Given pipe size =      12.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
   202.113(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =    191.863(Ft.)
 Minor friction loss =     15.180(Ft.)       K-factor =   1.50
Pipe flow velocity =     25.53(Ft/s)
Travel time through pipe =    0.40 min.
Time of concentration (TC) =     5.40 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    27.720(Ft.)
Downstream point/station elevation =    21.320(Ft.)
Pipe length  =   462.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.050(CFS)
Given pipe size =      27.00(In.)
Calculated individual pipe flow  =    20.050(CFS)
Normal flow depth in pipe =   14.30(In.)
Flow top width inside pipe =   26.95(In.)
Critical Depth =   18.79(In.)
Pipe flow velocity =      9.39(Ft/s)
Travel time through pipe =    0.82 min.
Time of concentration (TC) =     6.22 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.420(Ac.)
Runoff from this stream =     20.050(CFS)
Time of concentration =    6.22 min.
Rainfall intensity =     4.524(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   184.000(Ft.)
Top (of initial area) elevation =    40.700(Ft.)
Bottom (of initial area) elevation =    31.400(Ft.)
Difference in elevation =     9.300(Ft.)
Slope =    0.05054  s(percent)=       5.05
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.751 min.
Rainfall intensity =       2.923(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  87.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      10.220(CFS)
Total initial stream area =        4.140(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    29.900(Ft.)
Downstream point/station elevation =    21.320(Ft.)
Pipe length  =   581.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.220(CFS)
Given pipe size =      12.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
    43.151(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =     47.788(Ft.)
```

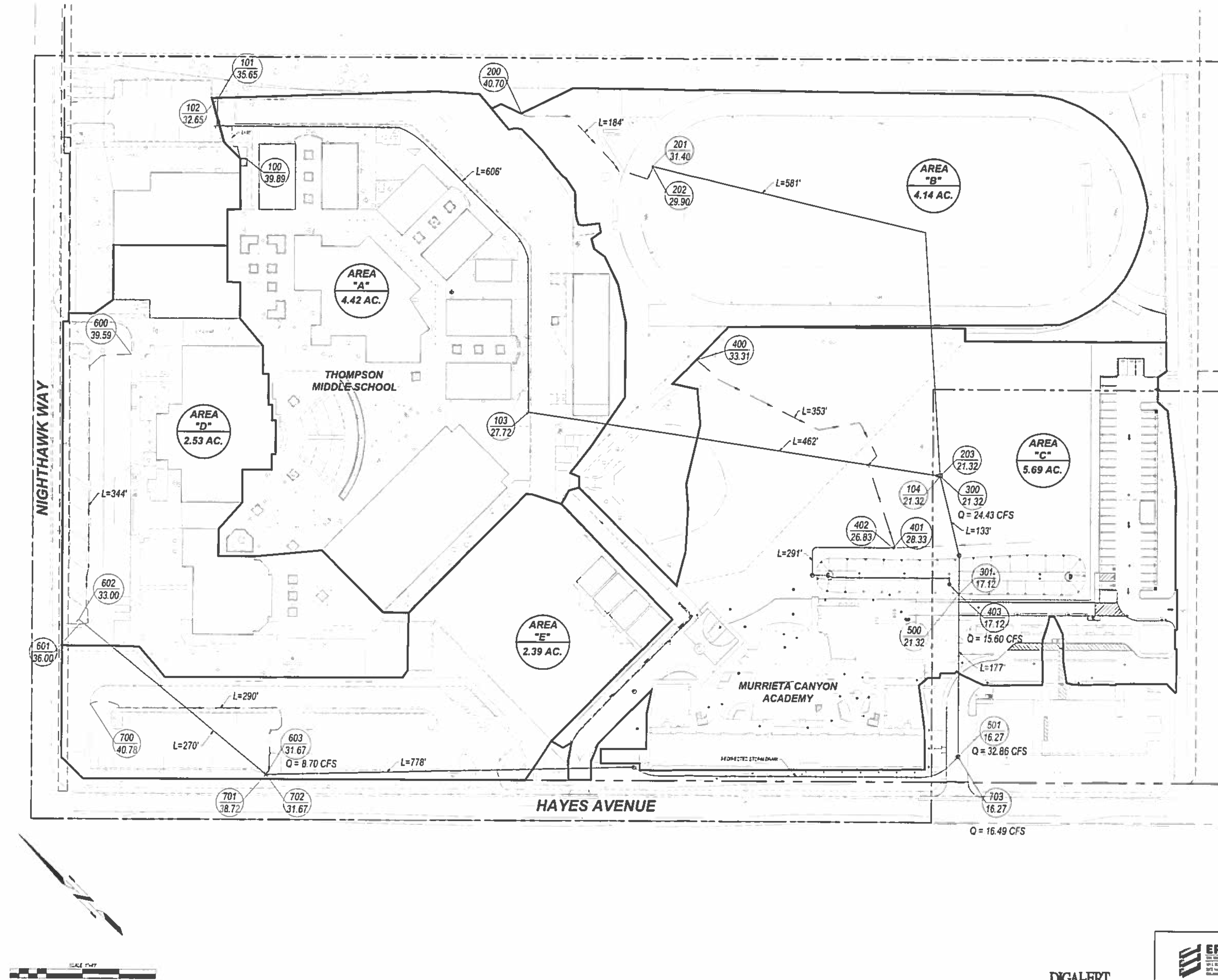
```
 Minor friction loss =      3.944(Ft.)       K-factor =   1.50
Pipe flow velocity =     13.01(Ft/s)
Travel time through pipe =    0.74 min.
Time of concentration (TC) =    14.49 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      203.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      4.140(Ac.)
Runoff from this stream =     10.220(CFS)
Time of concentration =   14.49 min.
Rainfall intensity =     2.840(In/Hr)
Summary of stream data:

Stream   Flow rate      TC             Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1       20.050      6.22                  4.524
2       10.220     14.49                  2.840
Largest stream flow has longer or shorter time of concentration
Qp =     20.050 + sum of
         Qa           Tb/Ta
         10.220 *     0.429 =      4.383
Qp =     24.433

Total of 2 streams to confluence:
Flow rates before confluence point:
      20.050      10.220
Area of streams before confluence:
       4.420        4.140
Results of confluence:
Total flow rate =     24.433(CFS)
Time of concentration =     6.216 min.
Effective stream area after confluence =      8.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      301.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    21.320(Ft.)
Downstream point/station elevation =    17.120(Ft.)
Pipe length  =    133.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    24.433(CFS)
Given pipe size =     36.00(In.)
Calculated individual pipe flow  =    24.433(CFS)
Normal flow depth in pipe =    11.09(In.)
Flow top width inside pipe =    33.24(In.)
Critical Depth =   19.12(In.)
Pipe flow velocity =     13.20(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    6.38 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      301.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      8.560(Ac.)
Runoff from this stream =     24.433(CFS)
Time of concentration =    6.38 min.
Rainfall intensity =     4.458(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      401.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   353.000(Ft.)
Top (of initial area) elevation =    33.310(Ft.)
Bottom (of initial area) elevation =    28.330(Ft.)
Difference in elevation =     4.980(Ft.)
Slope =    0.01411  s(percent)=       1.41
```

```
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.761 min.
Rainfall intensity =      3.185(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.861
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =     15.608(CFS)
Total initial stream area =        5.690(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    26.830(Ft.)
Downstream point/station elevation =    17.120(Ft.)
Pipe length  =   291.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.608(CFS)
Given pipe size =      6.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
  2388.394(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =   2250.925(Ft.)
 Minor friction loss =    147.180(Ft.)       K-factor =   1.50
Pipe flow velocity =     79.49(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    11.82 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      403.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      5.690(Ac.)
Runoff from this stream =     15.608(CFS)
Time of concentration =   11.82 min.
Rainfall intensity =    3.176(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       24.433      6.38                 4.458
2       15.608     11.82                 3.176
Largest stream flow has longer or shorter time of concentration
Qp =     24.433 + sum of
         Qa            Tb/Ta
         15.608 *     0.540 =      8.428
Qp =     32.861

Total of 2 streams to confluence:
Flow rates before confluence point:
      24.433       15.608
Area of streams before confluence:
        8.560        5.690
Results of confluence:
Total flow rate =     32.861(CFS)
Time of concentration =     6.384 min.
Effective stream area after confluence =     14.250(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      500.000 to Point/Station      501.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    17.120(Ft.)
Downstream point/station elevation =    16.270(Ft.)
Pipe length  =   177.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    32.861(CFS)
Given pipe size =     36.00(In.)
```

```
Calculated individual pipe flow  =    32.861(CFS)
Normal flow depth in pipe =   22.43(In.)
Flow top width inside pipe =   34.89(In.)
Critical Depth =   22.30(In.)
Pipe flow velocity =      7.10(Ft/s)
Travel time through pipe =    0.42 min.
Time of concentration (TC) =     6.80 min.
End of computations, total study area =          14.25 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.688
Area averaged RI index number =  72.8
```

```
               Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
       Rational Hydrology Study        Date: 02/21/20  File:MCARAT100D.out
------------------------------------------------------------------------
MURRIETA CANYON ACADEMY
AREA D & AREA E 100YR RATIONAL STUDY
TDM / SRU
2/21/2020
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6386

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [ Murrieta,Tmc,Rnch CaNorco ] area used.
10 year storm 10 minute intensity =  2.360(In/Hr)
10 year storm 60 minute intensity =  0.880(In/Hr)
100 year storm 10 minute intensity =  3.480(In/Hr)
100 year storm 60 minute intensity =  1.300(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.300(In/Hr)
Slope of intensity duration curve = 0.5500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      600.000 to Point/Station      601.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =    344.000(Ft.)
Top (of initial area) elevation =     39.590(Ft.)
Bottom (of initial area) elevation =     36.000(Ft.)
Difference in elevation =       3.590(Ft.)
Slope =     0.01044  s(percent)=        1.04
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =     8.320 min.
Rainfall intensity =        3.854(In/Hr) for a   100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.892
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)   =  88.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =         8.695(CFS)
Total initial stream area =          2.530(Ac.)
Pervious area fraction = 0.200


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      602.000 to Point/Station      603.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation =      33.000(Ft.)
Downstream point/station elevation =      31.670(Ft.)
Pipe length  =    270.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      8.695(CFS)
Given pipe size =      18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
```

```
     1.084(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      1.850(Ft.)
 Minor friction loss =      0.564(Ft.)       K-factor =   1.50
Pipe flow velocity =      4.92(Ft/s)
Travel time through pipe =    0.91 min.
Time of concentration (TC) =    9.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      700.000 to Point/Station     701.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Time of concentration =     9.23 min.
Rainfall intensity =      3.639(In/Hr) for a   100.0 year storm
Subarea runoff =      7.752(CFS) for      2.390(Ac.)
Total runoff =     16.448(CFS)        Total area =       4.920(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      702.000 to Point/Station     703.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation =    31.670(Ft.)
Downstream point/station elevation =    16.270(Ft.)
Pipe length  =    778.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.448(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     5.686(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =     19.069(Ft.)
 Minor friction loss =      2.018(Ft.)       K-factor =   1.50
Pipe flow velocity =      9.31(Ft/s)
Travel time through pipe =    1.39 min.
Time of concentration (TC) =   10.63 min.
End of computations, total study area =           4.92 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.200
Area averaged RI index number =  75.0
```



DIGALERT
Call 2 Working Days Before You Dig!
811

EPIC ENGINEERS

W.O.	104 13
BY	SRU
DATE	2/21/2020
SCALE	1" = 40'

MURRIETA CANYON ACADEMY
HYDROLOGY EXHIBIT

SHEET NUMBER
1 of 1

Appendix I: Project Specific Water Quality Management Plan

Project Specific Water Quality Management Plan

A Template for preparing Project Specific WQMPs for Priority Development Projects located within the ***Santa Margarita Region*** *of* ***Riverside County****. This template does not apply to projects in other watersheds within Riverside County. It does not apply to projects in San Diego or Orange County.*

Attention: This submittal package only applies to "Priority Development Projects" and does not apply to "Other Development Projects". Proceed only if the Applicabilty Checklist completed for your project categorizes project activities as a "Priority Development Project."

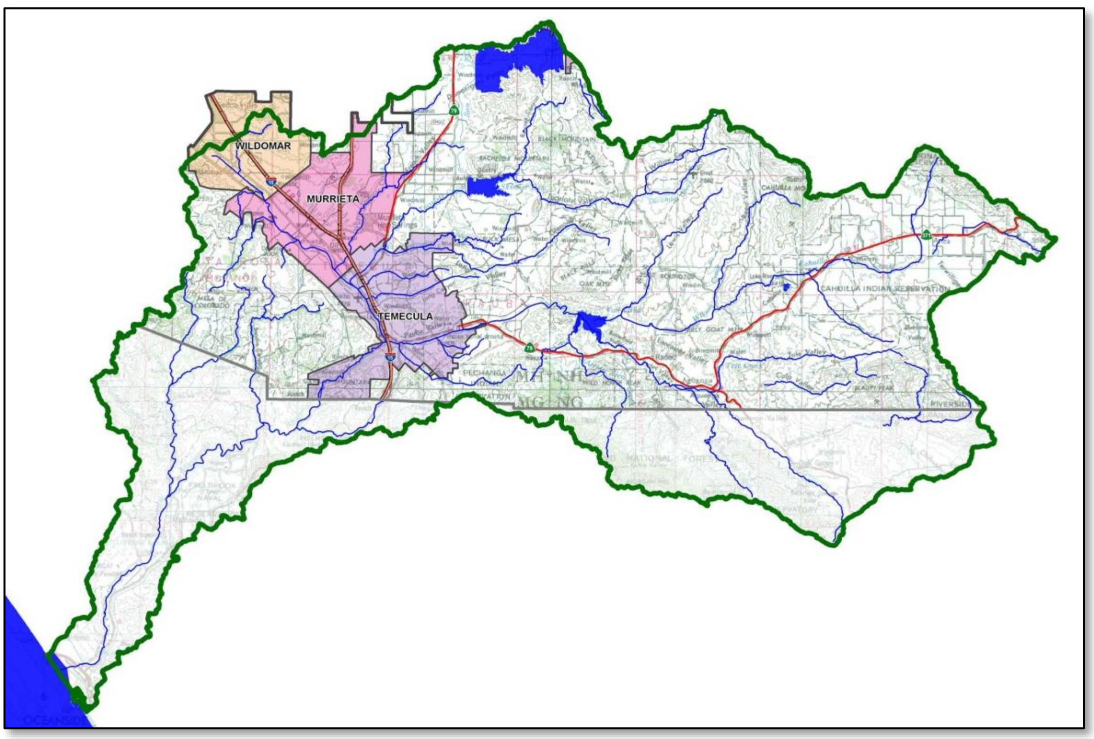
Project Title: Murrieta Canyon Academy

Development No: N/A

Design Review/Case No: N/A

Prepared for:
Murrieta Valley Unified School District
41870 McAlby Court
Murrieta, CA 92562

Prepared by: EPIC Engineers
101 E. Redlands Blvd., Ste. 146
Redlands, CA 92373



☐ **Preliminary**
☒ **Final**

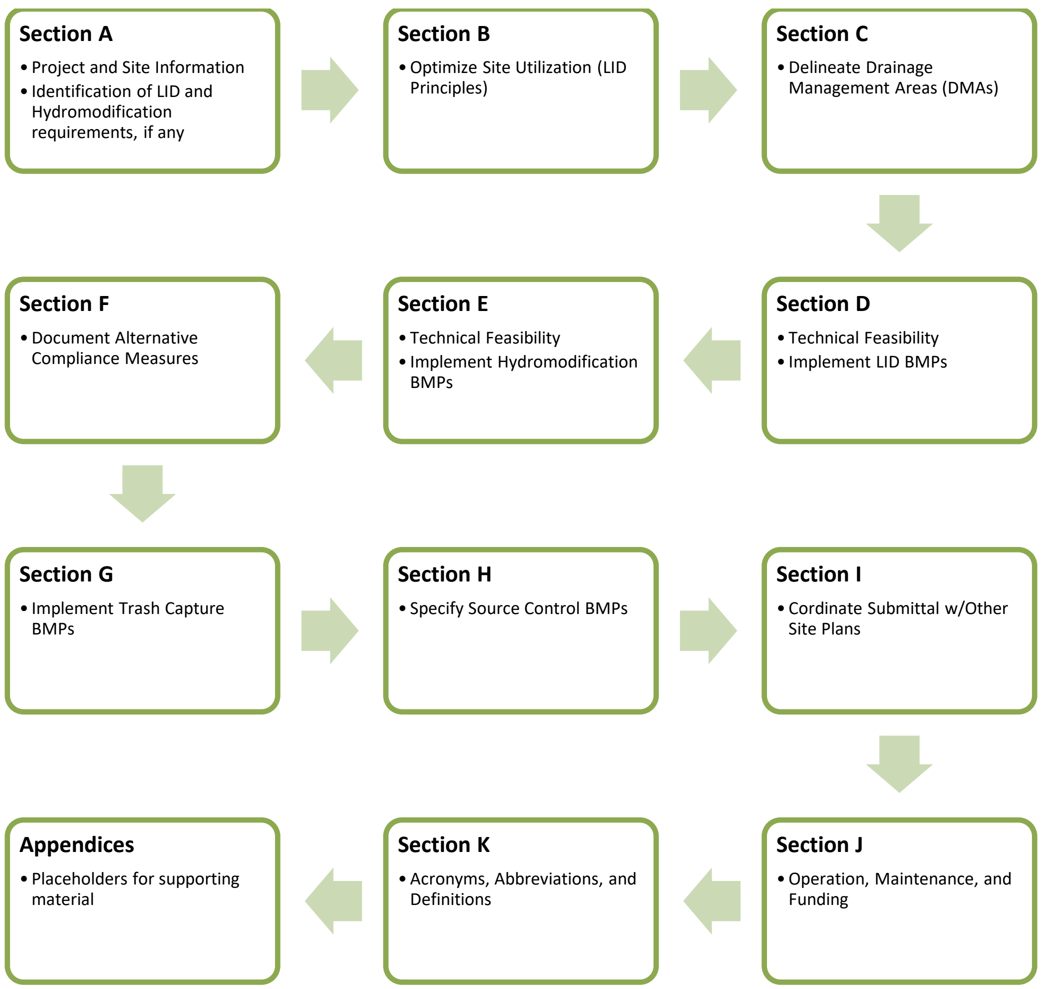
Original Date Prepared: 10/30/2019

Revision Date(s): N/A

Prepared for Compliance with Regional Board Order No. **<u>R9-2013-0001</u>** *as amended by Order No.* **R9-2015-0001** *and Order No.* **R9-2015-0100**

A Brief Introduction

The Regional Municipal Separate Stormwater Sewer System (MS4) Permit[1] requires that a Project-Specific WQMP be prepared for all development projects within the Santa Margarita Region (SMR) that meet the 'Priority Development Project' categories and thresholds listed in the SMR Water Quality Management Plan (WQPM). This Project-Specific WQMP Template for Development Projects in the **Santa Margarita Region** has been prepared to help document compliance and prepare a WQMP submittal. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



[1] Order No. R9-2013-0001 as amended by Order Nos. R9-2015-0001 and R9-2015-0100, NPDES No. CAS0109266, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the MS4s Draining the Watersheds within the San Diego Region, California Regional Water Quality Control Board, May 8, 2013.

OWNER'S CERTIFICATION

This Project-Specific WQMP has been prepared for Murrieta Valley Unified School District by Epic Engineers for the Murrieta Canyon Academy project.

This WQMP is intended to comply with the requirements of City of Murrieta Stormwater and Runoff Management and Discharge Controls Municipal Code Section 8.36.320, Water Quality Management Plan, which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater Best Management Practices until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under the City of Murrieta Stormwater and Runoff Management and Discharge Controls (Municipal Code Section 8.36).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

______________________	______________________
Owner's Signature	Date
Lori Noorigian	Coordinator of Facilities
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control Best Management Practices in this plan meet the requirements of Regional Water Quality Control Board Order No. **R9-2013-0001** as amended by Order Nos. **R9-2015-0001 and R9-2015-0100**."

______________________	______________________
Preparer's Signature	Date
Tory Mulaug	P.E./QSD/ President
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

List of Tables

List of Appendices

Section A: Project and Site Information

Use the table below to compile and summarize basic site information that will be important for completing subsequent steps. Subsections A.1 through A.4 provide additional detail on documentation of additional project and site information.

PROJECT INFORMATION			
Type of PDP:	Redevelopment		
Type of Project:	School (Public Development)		
Planning Area:	N/A		
Community Name:	N/A		
Development Name:	N/A		
PROJECT LOCATION			
Latitude & Longitude (DMS):	33.5605, -117.2325		
Project Watershed and Sub-Watershed:	Santa Margarita River, Murrieta Creek		
24-Hour 85th Percentile Storm Depth (inches):	0.81		
Is project subject to Hydromodification requirements?	☐ Y ☒ N (Select based on Section A.3)		
APN(s):	904-050-047		
Map Book and Page No.:	Thomas Brothers Page 927		
PROJECT CHARACTERISTICS			
Proposed or Potential Land Use(s)		Education Facility	
Proposed or Potential SIC Code(s)		8211	
Existing Impervious Area of Project Footprint (SF)		111,061 SF	
Total area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement		111,513 SF	
Total Project Area (ac)		5.14	
Does the project consist of offsite road improvements?		☐ Y	☒ N
Does the project propose to construct unpaved roads?		☐ Y	☒ N
Is the project part of a larger common plan of development (phased project)?		☐ Y	☒ N
Is the project exempt from Hydromodification Performance Standards?		☒ Y	☐ N
Does the project propose the use of Alternative Compliance to satisfy BMP requirements? (note, alternative compliance is not allowed for coarse sediment performance standards)		☐ Y	☒ N
Has preparation of Project-Specific WQMP included coordination with other site plans?		☒ Y	☐ N
EXISTING SITE CHARACTERISTICS			
Is the project located within any Multi-Species Habitat Conservation Plan area (MSHCP Criteria Cell?)		☐ Y N/A	☒ N
Are there any natural hydrologic features on the project site?		☐ Y	☒ N
Is a Geotechnical Report attached?		☐ Y	☒ N
If no Geotech. Report, list the Natural Resources Conservation Service (NRCS) soils type(s) present on the site (A, B, C and/or D)		A, C, D	

<u>Provide a brief description of the project</u>:
For purposes of this WQMP, the project at Murrieta Canyon Academy is broken into eight main Drainage Areas (DA):

DA-1 – Proposed buildings, Courtyard, fire lane, and northeastern parking lot collected into Biofiltration Basin.

DA-2 – Front courtyard and planters collected into a Bio-Clean Biofiltration System
DA-3 – South existing parking lot and planters drain into an existing curb inlet with a Flogard Catch Basin Insert Filter
DA-4 – Proposed drive aisle and sidewalk drain into a trench drain. Area cannot feasibly be collected into BMPs
DA-5 – South slope of proposed building drains onto Hayes Avenue, Area cannot feasibly be collected into BMPs
DA-6 – South slope of existing parking lot drains onto Hayes Avenue, Area cannot feasibly be collected into BMPs
DA-7 – Areas that cannot feasibly be collected into BMPs
DA-8 – Areas that cannot feasibly be collected into BMPs

Project Description:

The Murrieta Canyon Academy located at 24150 Hayes Avenue, Murrieta, California, is a fully functioning adult education school campus constructed during various phases. The proposed buildings are generally located within the existing softball fields located immediately north of the existing campus and south of Thompson Middle School. The existing Murrieta Canyon Academy buildings are to be demolished and new parking/landscape to be constructed. Access to all portions of the site was through a locked gate along the south side of the campus.

The project will generally include the design of a new campus (Buildings A through D) with approximately 33,000 square-feet footprint total and associated parking lot, and other site improvements. More specifically, the new campus will include construction of a single-story laboratory and classroom building, student pavilion, administration office, various academic and activity courts with additional parking and landscape at the existing campus.

The proposed project has eight Drainage Areas (DA). Stormwater runoff from DA-1 sheet flows into proposed catch basins throughout the Drainage Area. Stormwater runoff will be conveyed through proposed storm drain lines into the proposed BMP, a Biofiltration with Partial Infiltration Basin. The stormwater will filter through 3” of non-floating hardwood mulch, 36” of engineered media soil, per the Riverside County – Low Impact Development BMP Design Handbook, and 18” of an open graded ASTM #57 stone layer, before outletting through a perforated pipe and into outlet #1. The DCV for DA-1 is 4,795 cubic feet. The design volume for the proposed Biofiltration with partial infiltration basin is 7,725 cubic feet. Stormwater greater than the DCV will outlet through a Type X inlet per RCFCWCD standard. The design for the biofiltration basin meets Hydromod requirements.

Stormwater runoff from DA-2 sheet flows south into proposed catch basins in the Drainage Area. Stormwater runoff will be conveyed through proposed storm drain lines into the proposed BMP, a Bio-Clean Biofiltration System.

Stormwater runoff from DA-3 sheet flows south into an existing curb inlet. This Drainage Area cannot be collected into the proposed BMP, so we proposed a catch basin insert filter to treat the flows. The Design Flow Rate for DA-3 is 0.1 cfs and the filtered flow rate of the catch basin insert filter is 1.76 cfs.

Stormwater runoff from DA-4 cannot be collected into onsite BMPs. Stormwater runoff flows south towards Hayes Avenue and gets captured by a trench drain onsite before it has a chance to outlet onto Hayes Avenue. Stormwater runoff will be conveyed into the existing storm drain pipe via a proposed storm drain line.

Stormwater runoff from DA-5 cannot be collected into onsite BMPs. Stormwater runoff will sheet flow south down the slope onto Hayes Avenue as it did in the existing condition.

Stormwater runoff from DA-6 cannot be collected into onsite BMPs. Stormwater runoff will sheet flow south down the slope onto Hayes Avenue as it did in the existing condition.

Stormwater runoff from DA-7 cannot be collected into onsite BMPs. Stormwater runoff will sheet flow onto the onsite alley way as it did in the existing condition.

Stormwater runoff from DA-8 cannot be collected into onsite BMPs. Stormwater runoff will sheet flow onto the onsite alley way as it did in the existing condition.

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the Project vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Vicinity and location maps
- Parcel Boundary and Project Footprint
- Existing and Proposed Topography
- Drainage Management Areas (DMAs)
- Proposed Structural Best Management Practices (BMPs)
- Drainage Paths
- Drainage infrastructure, inlets, overflows
- Source Control BMPs
- Site Design BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Pervious Surfaces (i.e. Landscaping)
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Copermittee plan reviewer must be able to easily analyze your Project utilizing this template and its associated site plans and maps. Complete the checklists in Appendix 1 to verify that all exhibits and components are included.

A.2 Identify Receiving Waters

Using Table A-1 below, list in order of upstream to downstream, the Receiving Waters that the Project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated Beneficial Uses, and proximity, if any, to a RARE Beneficial Use. Include a map of the Receiving Waters in Appendix 1. This map should identify the path of the stormwater discharged from the site all the way to the outlet of the Santa Margarita River to the Pacific Ocean. Use the most recent 303(d) list available from the State Water Resources Control Board Website.
(*http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/*)

Table A-1 Identification of Receiving Waters

Receiving Waters	USEPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Murrieta Creek	Chlorpyrifos, Copper, Indicator Bacteria, Iron, Manganese, Nitrogen, Phosphorous, and Toxicity	MUN, AGR, IND, PROC, REC1, REC2, GWR, WILD	
Santa Margarita River (Upper)	Indicator Bacteria, Iron, Manganese, Nitrogen, Phosphorous, and Toxicity	MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD, RARE	None
Santa Margarita River (Lower)	Benthic Community Effects, Chlorpyrifos, Indicator Bacteria, Nitrogen, Phosphorous, and Toxicity	MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD, RARE	None
Santa Margarita Lagoon	Eutrophic	REC1, REC2, EST, WILD, RARE, MAR, MIGR, SPWN	None

A.3 Drainage System Susceptibility to Hydromodification

Using Table A-2 below, list in order of the point of discharge at the project site down to the Santa Margarita River[2], each drainage system or receiving water that the project site is tributary to. Continue to fill each row with the material of the drainage system, and any exemption (if applicable). Based on the results, summarize the applicable hydromodification performance standards that will be documented in Section E. Exempted categories of receiving waters include:

- Existing storm drains that discharge directly to water storage reservoirs, lakes, or enclosed embayments, or
- Conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- Other water bodies identified in an approved WMAA (See Exhibit G to the WQMP)

Include a map exhibiting each drainage system and the associated susceptibility in Appendix 1.

Table A-2 Identification of Susceptibility to Hydromodification

Drainage System	Drainage System Material	Hydromodification Exemption	Hydromodification Exempt
Murrieta Creek	Unlined Channel	None	☐ Y ☒ N
Santa Margarita River (Upper)	Unlined Channel	None	☐ Y ☒ N
Santa Margarita River (Lower)	Unlined Channel	None	☐ Y ☒ N
Santa Margarita Lagoon	Unlined	None	☐ Y ☒ N
Summary of Performance Standards			
☐ **Hydromodification Exempt** – Select if "Y" is selected in the Hydromodification Exempt column above, project is exempt from hydromodification requirements. ☒ **Not Exempt**-Select if "N" is selected in any row of the Hydromodification Exempt column above. Project is subject to hydrologic control requirements and may be subject to sediment supply requirements.			

[2] Refer to Exhibit G of the WQMP for a map of exempt and potentially exempt areas. These maps are from the Draft SMR WMAA as of January 5, 2018 and will be replaced upon acceptance of the SMR WMAA.

A.4 Additional Permits/Approvals required for the Project:

Table A-3 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act Section 401 Water Quality Certification	☐ Y	☒ N
US Army Corps of Engineers, Clean Water Act Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)*	☐ Y	☒ N

If yes is answered to any of the questions above, the Copermittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for LID Bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your Low Impact Development (LID) design and explain your design decisions to others.

Apply the following LID Principles to the layout of the PDP to the extent they are applicable and feasible. Putting thought upfront about how best to organize the various elements of a site can help to significantly reduce the PDP's potential impact on the environment and reduce the number and size of Structural LID BMPs that must be implemented. Integrate opportunities to accommodate the following LID Principles within the preliminary PDP site layout to maximize implementation of LID Principles.

Site Optimization

Complete checklist below to determine applicable Site Design BMPs for your site.

Project- Specific WQMP Site Design BMP Checklist	
The following questions below are based upon Section 3.2 of the SMR WQMP will help you determine how to best optimize your site and subsequently identify opportunities and/or constraints, and document compliance.	
SITE DESIGN REQUIREMENTS	
Answer the following questions below by indicating "Yes," "No," or "N/A" (Not Applicable). Justify all "No" and "N/A" answers by inserting a narrative at the end of the section. The narrative should include identification and justification of any constraints that would prevent the use of those categories of LID BMPs. Upon identifying Site Design BMP opportunities, include these on your WQMP Site plan in Appendix 1.	
☒ Yes ☐ No ☐ N/A	**Did you identify and preserve existing drainage patterns?** Integrating existing drainage patterns into the site plan helps to maintain the time of concentration and infiltration rates of runoff, decreasing peak flows, and may also help preserve the contribution of Critical Coarse Sediment (i.e., Bed Sediment Supply) from the PDP to the Receiving Water. Preserve existing drainage patterns by: • Minimizing unnecessary site grading that would eliminate small depressions, where appropriate add additional "micro" storage throughout the site landscaping. • Where possible conform the PDP site layout along natural landforms, avoid excessive grading and disturbance of vegetation and soils, preserve or replicate the sites natural drainage features and patterns. • Set back PDP improvements from creeks, wetlands, riparian habitats and any other natural water bodies. • Use existing and proposed site drainage patterns as a natural design element, rather than using expensive impervious conveyance systems. Use depressed landscaped areas, vegetated buffers, and bioretention areas as amenities and focal points within the site and landscape design.
We did identify and preserve existing drainage patterns on the property. Grade on property still drains run-off on the south side of the property.	
☐ Yes ☒ No ☐ N/A	**Did you identify and protect existing vegetation?** Identify any areas containing dense native vegetation or well-established trees, and try to avoid disturbing these areas. Soils with thick, undisturbed vegetation have a much higher capacity to store and infiltrate runoff than do disturbed soils. Reestablishment of a mature vegetative community may take decades. Sensitive areas, such as streams and floodplains should also be avoided. • Define the development envelope and protected areas, identifying areas that are most suitable for development and areas that should be left undisturbed. • Establish setbacks and buffer zones surrounding sensitive areas. • Preserve significant trees and other natural vegetation where possible.
We did not protect existing vegetation. We did incorporate natural ground planters throughout the property.	
☒ Yes ☐ No ☐ N/A	**Did you identify and preserve natural infiltration capacity?** A key component of LID is taking advantage of a site's natural infiltration and storage capacity. A site survey and geotechnical investigation can help define areas with high potential for infiltration and surface storage. • Identify opportunities to locate LID Principles and Structural BMPs in highly pervious areas. Doing so will maximize infiltration and limit the amount of runoff generated. • Concentrate development on portions of the site with less permeable soils, and preserve areas that can promote infiltration.

<table>
<tr><th colspan="2">Project- Specific WQMP Site Design BMP Checklist</th></tr>
<tr><td colspan="2">We implemented pervious areas as much as possible to be somewhat close to the natural infiltration capacity of the property. We also proposed a Bio-Filtration Basin with partial infiltration to further the infiltration capacity of the site.</td></tr>
<tr><td>☐ Yes ☒ No ☐ N/A</td><td>Did you minimize impervious area?
Look for opportunities to limit impervious cover through identification of the smallest possible land area that can be practically impacted or disturbed during site development.
Limit overall coverage of paving and roofs. This can be accomplished by designing compact, taller structures, narrower and shorter streets and sidewalks, clustering buildings and sharing driveways, smaller parking lots (fewer stalls, smaller stalls, and more efficient lanes), and indoor or underground parking.
Inventory planned impervious areas on your preliminary site plan. Identify where permeable pavements, or other permeable materials, such as crushed aggregate, turf block, permeable modular blocks, pervious concrete or pervious asphalt could be substituted for impervious concrete or asphalt paving. This will help reduce the amount of Runoff that may need to be addressed through Structural BMPs.
Examine site layout and circulation patterns and identify areas where landscaping can be substituted for pavement, such as for overflow parking.
Consider green roofs. Green roofs are roofing systems that provide a layer of soil/vegetative cover over a waterproofing membrane. A green roof mimics pre-development conditions by filtering, absorbing, and evapotranspiring precipitation to help manage the effects of an otherwise impervious rooftop.</td></tr>
<tr><td colspan="2">We drained impervious areas to pervious areas as much as possible. We have a natural ground playfield. We have pervious sections throughout the school.</td></tr>
</table>

<table>
<tr><th colspan="2">Project- Specific WQMP Site Design BMP Checklist</th></tr>
<tr><td>☒ Yes ☐ No ☐ N/A</td><td>Did you identify and disperse runoff to adjacent pervious areas or small collection areas?
Look for opportunities to direct runoff from impervious areas to adjacent landscaping, other pervious areas, or small collection areas where such runoff may be retained. This is sometimes referred to as reducing Directly Connected Impervious Areas.
• Direct roof runoff into landscaped areas such as medians, parking islands, planter boxes, etc., and/or areas of pervious paving. Instead of having landscaped areas raised above the surrounding impervious areas, design them as depressed areas that can receive Runoff from adjacent impervious pavement. For example, a lawn or garden depressed 3"-4" below surrounding walkways or driveways provides a simple but quite functional landscape design element.
• Detain and retain runoff throughout the site. On flatter sites, smaller Structural BMPs may be interspersed in landscaped areas among the buildings and paving.
• On hillside sites, drainage from upper areas may be collected in conventional catch basins and piped to landscaped areas and LID BMPs and/or Hydrologic Control BMPs in lower areas. Low retaining walls may also be used to create terraces that can accommodate LID BMPs. Wherever possible, direct drainage from landscaped slopes offsite and not to impervious surfaces like parking lots.
• Reduce curb maintenance and provide for allowances for curb cuts.
• Design landscaped areas or other pervious areas to receive and infiltrate runoff from nearby impervious areas.
• Use Tree Wells to intercept, infiltrate, and evapotranspire precipitation and runoff before it reaches structural BMPs. Tree wells can be used to limit the size of Drainage Management Areas that must be treated by structural BMPs. Guidelines for Tree Wells are included in the Tree Well Fact Sheet in the LID BMP Design Handbook.</td></tr>
<tr><td colspan="2">We identified and dispersed runoff to adjacent pervious areas wherever possible.</td></tr>
<tr><td>☒ Yes ☐ No ☐ N/A</td><td>Did you utilize native or drought tolerant species in site landscaping?
Wherever possible, use native or drought tolerant species within site landscaping instead of alternatives. These plants are uniquely suited to local soils and climate and can reduce the overall demands for potable water use associated with irrigation.</td></tr>
<tr><td colspan="2">We coordinated with the landscape architect to utilized native landscaping in the Bio-Filtration Basin per the Riverside County Santa Margarita Watershed TGD and the LID BMP Handbook.</td></tr>
</table>

Project- Specific WQMP Site Design BMP Checklist	
☐ Yes ☒ No ☐ N/A	**Did implement harvest and use of runoff?** Under the Regional MS4 Permit, Harvest and Use BMPs must be employed to reduce runoff on any site where they are applicable and feasible. However, Harvest and Use BMPs are effective for retention of stormwater runoff only when there is adequate demand for non-potable water during the wet season. If demand for non-potable water is not sufficiently large, the actual retention of stormwater runoff will be diminished during larger storms or during back-to-back storms. For the purposes of planning level Harvest and Use BMP feasibility screening, Harvest and Use is only considered to be a feasible if the total average wet season demand for non-potable water is sufficiently large to use the entire DCV within 72 hours. If the average wet season demand for non-potable water is not sufficiently large to use the entire DCV within 72 hours, then Harvest and Use is not considered to be feasible and need not be considered further. The general feasibility and applicability of Harvest and Use BMPs should consider: • Any downstream impacts related to water rights that could arise from capturing stormwater (not common). • Conflicts with recycled water used – where the project is conditioned to use recycled water for irrigation, this should be given priority over stormwater capture as it is a year-round supply of water. • Code Compliance - If a particular use of captured stormwater, and/or available methods for storage of captured stormwater would be contrary to building codes in effect at the time of approval of the preliminary Project-Specific WQMP, then an evaluation of harvesting and use for that use would not be required. • Wet season demand – the applicant shall demonstrate, to the acceptance of the [Insert Jurisdiction], that there is adequate demand for harvested water during the wet season to drain the system in a reasonable amount of time.
☒ Yes ☐ No ☐ N/A	**Did you keep the runoff from sediment producing pervious area hydrologically separate from developed areas that require treatment?** Pervious area that qualify as self-treating areas or off-site open space should be kept separate from drainage to structural BMPs whenever possible. This helps limit the required size of structural BMPs, helps avoid impacts to sediment supply, and helps reduce clogging risk to BMPs.
We kept runoff from sediment producing pervious area separate were possible.	

Section C: Delineate Drainage Management Areas (DMAs)

This section provides streamlined guidance and documentation of the DMA delineation and categorization process, for additional information refer to the procedure in Section 3.3 of the SMR WQMP which discusses the methods of delineating and mapping your project site into individual DMAs. Complete Steps 1 to 4 to successfully delineate and categorize DMAs.

Step 1: Identify Surface Types and Drainage Pathways

Carefully delineate pervious areas and impervious areas (including roofs) throughout site and identify overland flow paths and above ground and below ground conveyances. Also identify common points (such as BMPs) that these areas drain to.

Step 2: DMA Delineation

Use the information in Step 1 to divide the entire PDP site into individual, discrete DMAs. Typically, lines delineating DMAs follow grade breaks and roof ridge lines. Where possible, establish separate DMAs for each surface type (e.g., landscaping, pervious paving, or roofs). Assign each DMA a unique code and determine its size in square feet. The total area of your site should total the sum of all of your DMAs (unless water from outside the project limits comingles with water from inside the project limits, i.e. run-on). Complete Table C-1

Table C-1 DMA Identification

DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
DA-1/DMA-A	Concrete or Asphalt	68,639	Type 'D'
DA-1/DMA-A	Ornamental Landscaping	89,187	Type 'D'
DA-2/DMA-A	Concrete or Asphalt	5,103	Type 'D'
DA-2/DMA-A	Ornamental Landscaping	849	Type 'D'
DA-2/DMA-B	Concrete or Asphalt	3,646	Type 'D'
DA-2/DMA-B	Ornamental Landscaping	473	Type 'D'
DA-2/DMA-C	Concrete or Asphalt	3,072	Type 'D'
DA-2/DMA-C	Ornamental Landscaping	323	Type 'D'
DA-3/DMA-A	Concrete or Asphalt	16,490	--
DA-3/DMA-A	Ornamental Landscaping	801	--
DA-4/DMA-A	Concrete or Asphalt	5,785	--
DA-4/DMA-A	Ornamental Landscaping	2,612	--
DA-5/DMA-A	Concrete or Asphalt	1,788	--
DA-5/DMA-A	Ornamental Landscaping	4,306	--
DA-6/DMA-A	Concrete or Asphalt	817	--
DA-6/DMA-A	Ornamental Landscaping	7,889	--
DA-7/DMA-A	Concrete or Asphalt	4,320	--
DA-7/DMA-A	Ornamental Landscaping	1,272	--
DA-8/DMA-A	Concrete or Asphalt	1,853	--
DA-8/DMA-A	Ornamental Landscaping	4,555	--

Add Columns as Needed

Step 3: DMA Classification

Determine how drainage from each DMA will be handled by using information from Steps 1 and 2 and by completing Steps 3.A to 3.C. Each DMA will be classified as one of the following four types:

- Type 'A': Self-Treating Areas:
- Type 'B': Self-Retaining Areas
- Type 'C': Areas Draining to Self-Retaining Areas
- Type 'D': Areas Draining to BMPs

Step 3.A – Identify Type 'A' Self-Treating Area

Indicate if the DMAs meet the following criteria by answering "Yes" or "No".

☐ Yes ☒ No — Area is undisturbed from their natural condition OR restored with Native and/or California Friendly vegetative covers.

☐ Yes ☒ No — Area is irrigated, if at all, with appropriate low water use irrigation systems to prevent irrigation runoff.

☐ Yes ☒ No — Runoff from the area will not comingle with runoff from the developed portion of the site, or across other landscaped areas that do not meet the above criteria.

If all answers indicate "Yes," complete Table C-2 to document the DMAs that are classified as Self-Treating Areas.

Table C-2 Type 'A', Self-Treating Areas

DMA Name or Identification	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
N/A			

Step 3.B – Identify Type 'B' Self-Retaining Area and Type 'C' Areas Draining to Self-Retaining Areas

Type 'B' Self-Retaining Area: A Self-Retaining Area is shallowly depressed 'micro infiltration' areas designed to retain the Design Storm rainfall that reaches the area, without producing any Runoff.

Indicate if the DMAs meet the following criteria by answering "Yes," "No," or "N/A".

☐ Yes ☒ No ☐ N/A — Slopes will be graded toward the center of the pervious area.

☐ Yes ☒ No ☐ N/A — Soils will be freely draining to not create vector or nuisance conditions.

☐ Yes ☒ No ☐ N/A — Inlet elevations of area/overflow drains, if any, should be clearly specified to be three inches or more above the low point to promote ponding.

☐ Yes ☒ No ☐ N/A — Pervious pavements (e.g., crushed stone, porous asphalt, pervious concrete, or permeable pavers) can be self-retaining when constructed with a gravel base course four or more inches deep below any underdrain discharge elevation.

If all answers indicate "Yes," DMAs may be categorized as Type 'B', proceed to identify Type 'C' Areas Draining to Self-Retaining Areas.

Type 'C' Areas Draining to Self-Retaining Areas: Runoff from impervious or partially pervious areas can be managed by routing it to Self-Retaining Areas consistent with the LID Principle discussed in SMR WQMP Section 3.2.5 for 'Dispersing Runoff to Adjacent Pervious Areas'.
Indicate if the DMAs meet the following criteria by answering "Yes" or "No".

☐ Yes ☒ No — The drainage from the tributary area must be directed to and dispersed within the Self-Retaining Area.

☐ Yes ☒ No — Area must be designed to retain the entire Design Storm runoff without flowing offsite.

If all answers indicate "Yes," DMAs may be categorized as Type 'C'.

Complete Table C-3 and Table C-4 to identify Type 'B' Self-Retaining Areas and Type 'C' Areas Draining to Self-Retaining Areas.

Table C-3 Type 'B', Self-Retaining Areas

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area		
DMA Name/ ID	Post-project surface type	Area (square feet)	Storm Depth (inches)	DMA Name / ID	[C] from Table C-4=	Required Retention Depth (inches)
		[A]	[B]		[C]	[D] = $[B] + \frac{[B]\cdot[C]}{[A]}$

Table C-4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet) [A]	Post-project surface type	Runoff factor [B]	Product [C] = [A] x [B]	DMA name /ID	Area (square feet) [D]	Ratio [C]/[D]

<u>Note:</u> (See Section 3.3 of SMR WQMP) Ensure that partially pervious areas draining to a Self-Retaining area do not exceed the following ratio:

$$\left(\frac{\mathbf{2}}{\boldsymbol{Impervious\ Fraction}}\right) : \mathbf{1}$$

(Tributary Area**:** Self-Retaining Area)

Step 3.C – Identify Type 'D' Areas Draining to BMPs

Areas draining to BMPs are those that could not be fully managed through LID Principles (DMA Types A through C) and will instead drain to an LID BMP and/or a Conventional Treatment BMP designed to manage water quality impacts from that area, and Hydromodification where necessary.

Complete Table C-5 to document which DMAs are classified as Areas Draining to BMPs

Table C-5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID Receiving Runoff from DMA
DA-1	*Bio-Filtration Basin with Partial Infiltration*
DA-2	*Bio-Clean Biofiltration System*

<u>Note</u>: More than one DMA may drain to a single LID BMP; however, one DMA may not drain to more than one BMP.

Section D: Implement LID BMPs

The Regional MS4 Permit requires the use of LID BMPs to provide retention or treatment of the DCV and includes a BMP hierarchy which requires Full Retention BMPs (Priority 1) to be considered before Biofiltration BMPs (Priority 2) and Flow-Through Treatment BMPs and Alternative Compliance BMPs (Priority 3). LID BMP selection must be based on technical feasibility and should be considered early in the site planning and design process. Use this section to document the selection of LID BMPs for each DMA. Note that feasibility is based on the DMA scale and may vary between DMAs based on site conditions.

D.1 Full Infiltration Applicability

An assessment of the feasibility of utilizing full infiltration BMPs is required for all projects, *except where it can be shown that site design LID principals fully retain the DCV (i.e., all DMAs are Type A, B, or C), or where Harvest and Use BMPs fully retain the DCV. Check the following box if applicable:*

☐ Site design LID principals fully retain the DCV (i.e., all DMAs are Type A, B, or C), (Proceed to Section E).

If the above box remains unchecked, perform a site-specific evaluation of the feasibility of Infiltration BMPs using each of the applicable criteria identified in Chapter 2.3.3 of the SMR WQMP and complete the remainder of Section D.1.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Copermittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the SMR WQMP. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Infiltration Feasibility

Table D-1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the SMR WQMP in Chapter 2.3.3. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D-1 Infiltration Feasibility

Downstream Impacts (SMR WQMP Section 2.3.3.a)		
Does the project site…	**YES**	**NO**
…have any DMAs where infiltration would negatively impact downstream water rights or other Beneficial Uses[3]?		X
If Yes, list affected DMAs:		
Groundwater Protection (SMR WQMP Section 2.3.3.b)		
Does the project site…	**YES**	**NO**
…have any DMAs with industrial, and other land uses that pose a high threat to water quality, which cannot be treated by Bioretention BMPs? Or have DMAs with active industrial process areas?		X
If Yes, list affected DMAs:		
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet horizontally of a water supply well?		X
If Yes, list affected DMAs:		
…have any DMAs that would restrict BMP locations to within a 2:1 (horizontal: vertical) influence line extending from any septic leach line?		X
If Yes, list affected DMAs:		
…have any DMAs been evaluated by a licensed Geotechnical Engineer, Hydrogeologist, or Environmental Engineer, who has concluded that the soils do not have adequate physical and chemical characteristics for the protection of groundwater, and has treatment provided by amended media layers in Bioretention BMPs been considered in evaluating this factor?		X
If Yes, list affected DMAs:		
Public Safety and Offsite Improvements (SMR WQMP Section 2.3.3.c)		
Does the project site…	**YES**	**NO**
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
Infiltration Characteristics For LID BMPs (SMR WQMP Section 2.3.3.d)		
Does the project site…	**YES**	**NO**
…have factored infiltration rates of less than 0.8 inches / hour? (Note: on a case-by-case basis, the Local Jurisdiction may allow a factor of safety as low as 1.0 to support selection of full infiltration BMPs. Therefore, measured infiltration rates could be as low as 0.8 in/hr to support full infiltration. A higher factor of safety would be required for design in accordance with the LID BMP Deign Handbook).	X	
If Yes, list affected DMAs: DA-1, DA-2, DA-3, & DA-4		
Cut/Fill Conditions (SMR WQMP Section 2.3.3.e)		
Does the project site…	**YES**	**NO**
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
Other Site-Specific Factors (SMR WQMP Section 2.3.3.f)		
Does the project site…	**YES**	**NO**
…have DMAs where the geotechnical investigation discovered other site-specific factors that would preclude effective and/or safe infiltration?		X
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs that rely solely on infiltration should not be used for those DMAs and you should proceed to the assessment for

[3] Such a condition must be substantiated by sufficient modeling to demonstrate an impact and would be subject to [Insert Jurisdiction] discretion. There is not a standardized method for assessing this criterion. Water rights evaluations should be site-specific.

Biofiltration BMPs below. Biofiltration BMPs that provide partial infiltration may still be feasible and should be assessed in Section D.2. Summarize concerns identified in the Geotechnical Report, if any, that resulted in a "YES" response above in the table below.

Table D-2 Geotechnical Concerns for Onsite Infiltration

Type of Geotechnical Concern	DMAs Feasible (By Name or ID)	DMAs Infeasible (By Name or ID)
Collapsible Soil	N/A	
Expansive Soil	N/A	
Slopes	N/A	
Liquefaction	N/A	
Other	N/A	

D.2 Biofiltration Applicability

This section should document the applicability of biofiltration BMPs for Type D DMAs that are not feasible for full infiltration BMPs. The key decisions to be documented in this section include:

1. Are biofiltration BMPs with partial infiltration feasible?
    a. Biofiltration BMPs must be designed to maximize incidental infiltration via a partial infiltration design unless it is demonstrated that this design is not feasible.
    b. These designs can be used at sites with low infiltration rates where other feasibility factors do not preclude incidental infiltration.

   Document summary in Table D-3.

2. If not, what are the factors that require the use of biofiltration with no infiltration? This may include:
    a. Geotechnical hazards
    b. Water rights issues
    c. Water balance issues
    d. Soil contamination or groundwater quality issues
    e. Very low infiltration rates (factored rates < 0.1 in/hr)
    f. Other factors, demonstrated to the acceptance of the local jurisdiction

   If this applies to any DMAs, then rationale must be documented in Table D-3.

3. Are biofiltration BMPs infeasible?
    a. If yes, then provide a site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee with jurisdiction over the Project site to discuss this option. Proceed to Section F to document your alternative compliance measures.

Table D-3 Evaluation of Biofiltration BMP Feasibility

DMA ID	Is Partial/ Incidental Infiltration Allowable? (Y/N)	Basis for Infeasibility of Partial Infiltration (provide summary and include supporting basis if partial infiltration not feasible)
DA-1	N	Infiltration test results were extremely lox (P-1: <0.01 in/hr & P-2: 0.20 in/hr)
DA-2	N	Infiltration test results were extremely lox (P-1: <0.01 in/hr & P-2: 0.20 in/hr)

Proprietary Biofiltration BMP Approval Criteria

If the project will use proprietary BMPs as biofiltration BMPs, then this section is completed to document that the proprietary BMPs are selected in accordance with Section 2.3.7 of the SMR WQMP. Proprietary Biofiltration BMPs must meet both of the following approval criteria:

1. Approval Criteria for All Proprietary BMPs, and
2. Acceptance Criteria for Proprietary Biofiltration BMPs.

When the use of proprietary biofiltration BMPs is proposed to meet the Pollutant Control performance standards, use Table D-4 to document that appropriate approval criteria have been met for the proposed BMPs. Add additional rows to document approval criteria are met for each type of BMP proposed.

Table D-4 Proprietary BMP Approval Requirement Summary

Proposed Proprietary Biofiltration BMP	Approval Criteria	Notes/Comments
Bio-Filtration Basin with Partial Infiltration	☒ Proposed BMP has an active TAPE GULD Certification for the project pollutants of concern[4] or equivalent 3rd party demonstrated performance.	The proposed BMP has an active TAPE GULD Certification due to the County of Riverside requirements for engineered soil media manufacturers.
	☒ The BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification.	The BMP is used in a manner consistent with manufacturer guidelines.
	☒ The BMP includes biological features including vegetation supported by engineered or other growing media.	The biofiltration basin will be planted with densely planted shrubs and grasses.
	☒ The BMP is designed to maximize infiltration, or supplemental infiltration is provided to achieve retention equivalent to Biofiltration with Partial Infiltration BMPs if factored infiltration rate is between 0.1 and 0.8 inches/hour.	The BMP is designed to maximize supplemental infiltration.
	☒ The BMP is sized using one of two Biofiltration LID sizing options in Section 2.3.2 of the SRM WQMP.	The Riv. Co. BMP Design Worksheet was the sizing method used. The resulting size of the biofiltration basin

[4] Use Table F-1 and F-2 to identify and document the pollutants of concern and include these tables in Appendix 5.

		is 1,598 cubic feet, with an area of 2,664 square feet.

D.3 Feasibility Assessment Summaries

From the Infiltration, Biofiltration with Partial Infiltration and Biofiltration with No Infiltration Sections above, complete Table D-5 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D-5 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy			No LID (Alternative Compliance)
	1. Infiltration	2. Biofiltration with Partial Infiltration	3. Biofiltration with No Infiltration	
DA-1	☐	☒	☐	☐
DA-2	☒	☐	☐	☐
DA-3				
DA-4				
DA-5				
DA-6				
DA-7				
DA-8				

For those DMAs where LID BMPs are not feasible, provide a narrative in Table D-6 below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section F below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

This is based on the clarification letter titled “San Diego Water Board’s Expectations of Documentation to Support a Determination of Priority Development Project Infiltration Infeasibility” (April 28, 2017, Via email from San Diego Regional Water Quality Control Board to San Diego County Municipal Storm Water Copermittees[5]).

[5] http://www.projectcleanwater.org/download/pdp-infiltration-infeasibility/

Table D-6 Summary of Infeasibility Documentation

Question	Narrative Summary (include reference to applicable appendix/attachment/report, as applicable)
a) When in the entitlement process did a geotechnical engineer analyze the site for infiltration feasibility?	A geotechnical engineer analyzed the site for infiltration feasibility on July 9, 2019. The project did not go through the entitlement process. The project went through the DSA process.
b) When in the entitlement process were other investigations conducted (e.g., groundwater quality, water rights) to evaluate infiltration feasibility?	Project did not go through the entitlement process. The project went through the DSA process.
c) What was the scope and results of testing, if conducted, or rationale for why testing was not needed to reach findings?	Two percolation tests were performed within the proposed infiltration areas at the site in the existing playfield area. The percolation tests were performed in accordance with procedures of section 2.3 of the Riverside County Flood Control and Water Conservation District (RCFC&WCD) Design Handbook (RCFC, 2011). The results for P-1 was <0.01 (in/hr) at a depth of 4 feet below existing finish ground and P-2 was 0.20 (in/hr) at a depth of 4 feet below existing finish ground. No factor of safety was applied to the values given.
d) What public health and safety requirements affected infiltration locations?	None
e) What were the conclusions and recommendations of the geotechnical engineer and/or other professional responsible for other investigations?	Infiltration test results were too low therefor making infiltration BMPs infeasible.
f) What was the history of design discussions between the permittee and applicant for the proposed project, resulting in the final design determination related locations feasible for infiltration?	There were no design discussions between the permittee and applicant for the proposed project.
g) What site design alternatives were considered to achieve infiltration or partial	Bio-Filtration Basin with Partial Infiltration was considered to achieve partial infiltration on site.

infiltration on site?	
h) What physical impairments (i.e., fire road egress, public safety considerations, utilities) and public safety concerns influenced site layout and infiltration feasibility?	None
i) What LID Principles (site design BMPs) were included in the project site design?	Hardscape runoff to planters.

D.4 LID BMP Sizing

Each LID BMP must be designed to ensure that the DCV will be captured by the selected BMPs with no discharge to the storm drain or surface waters during the DCV size storm. Infiltration BMPs must at minimum be sized to capture the DCV to achieve pollutant control requirements.

Biofiltration BMPs must at a minimum be sized to:

- Treat 1.5 times the DCV not reliably retained on site using a volume-base or flow-based sizing method, or
- Include static storage volume, including pore spaces and pre-filter detention volume, at least 0.75 times the portion of the DCV not reliably retained on site.

First**,** calculate the DCV for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using the methods included in Section 3 of the LID BMP Design Handbook. Utilize the worksheets found in the LID BMP Design Handbook or consult with the Copermittee to assist you in correctly sizing your LID BMPs. Use Table D-7 below to document the DCV each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D-7 DA-1 DCV Calculations for LID BMPs

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Biofiltration Basin w/ Partial Infiltration*		
	[A]		[B]	[C]	[A] x [C]			
DA-1 / DMA-A	*68639*	*Impervious*	*1.00*	*0.89*	*61088.71*	*Design Storm Depth (in)*	*DCV, **V**$_{BMP}$ (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DA-1 / DMA-A	*89187*	*Pervious*	*0.10*	*0.11*	*8918.70*			
	157826				70007.41	0.81	4,725.50	***7,725.60***

Table D-8 DA-2 DCV Calculations for LID BMPs

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Torrent Maxwell IV Drywell*		
	[A]		[B]	[C]	[A] x [C]			
DA-2 / DMA-A	*5103*	*Impervious*	*1.00*	*0.89*	*4541.67*	*Design Storm Depth (in)*	*DCV, **V**$_{BMP}$ (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DA-2 / DMA-A	*849*	*Pervious*	*0.10*	*0.11*	*93.39*			
DA-2 / DMA-B	*3646*	*Impervious*	*1.00*	*0.89*	*3244.94*			
DA-2 / DMA-B	*473*	*Pervious*	*0.10*	*0.11*	*47.30*			
DA-2 / DMA-C	*3072*	*Impervious*	*1.00*	*0.89*	*2734.08*			
DA-2 / DMA-C	*323*	*Pervious*	*0.10*	*0.11*	*35.53*			
	13466				10696.91	0.81	8664.50	

Table D-9 DA-3 DCV Calculations for LID BMPs

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*FloGard Catch Basin Insert Filter*		
	[A]		[B]	[C]	[A] x [C]			
DA-3 / DMA-A	*16490*	*Impervious*	*1.00*	*0.89*	*14676.10*	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DA-3 / DMA-A	*801*	*Pervious*	*0.10*	*0.11*	*88.11*			
	17291				14764.21	0.81	11959.01	–

Table D-10 DA-4 DCV Calculations for LID BMPs

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor			
	[A]		[B]	[C]	[A] x [C]			
DA-4 / DMA-A	*5785*	*Impervious*	*1.00*	*0.89*	*5148.65*	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DA-4 / DMA-A	*2612*	*Pervious*	*0.10*	*0.11*	*287.32*			
	8397				5435.97	0.81	4403.14	–

Table D-11 DA-5 DCV Calculations for LID BMPs

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor			
	[A]		[B]	[C]	[A] x [C]			
DA-5 / DMA-A	*1788*	*Impervious*	*1.00*	*0.89*	*1591.32*	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DA-5 / DMA-A	*4306*	*Pervious*	*0.10*	*0.11*	*430.60*			
	6094				2021.92	0.81	1637.76	–

Table D-12 DA-6 DCV Calculations for LID BMPs

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here*		
	[A]		[B]	[C]	[A] x [C]			
DA-6 / DMA-A	*7889*	*Impervious*	*1.00*	*0.89*	*7021.21*	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DA-6 / DMA-A	*817*	*Pervious*	*0.10*	*0.11*	*89.87*			
	8706				7111.08	0.81	5759.97	

Table D-13 DA-7 DCV Calculations for LID BMPs

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor			
	[A]		[B]	[C]	[A] x [C]			
DA-7 / DMA-A	*4320*	*Impervious*	*1.00*	*0.89*	*3844.80*	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DA-7 / DMA-A	*1272*	*Pervious*	*0.10*	*0.11*	*139.92*			
	5592				3984.72	0.81	3227.62	_

Table D-14 DA-8 DCV Calculations for LID BMPs

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor			
	[A]		[B]	[C]	[A] x [C]			
DA-8 / DMA-A	*1853*	*Impervious*	*1.00*	*0.89*	*1649.17*	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DA-8 / DMA-A	*4555*	*Pervious*	*0.10*	*0.11*	*501.05*			
	6408				2150.22	0.81	1741.68	_

[B], [C] is obtained as described in Section 2.6.1.b of the SMR WQMP

[E] is obtained from Exhibit A in the SMR WQMP
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6.

Complete Table D-15 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. You can add rows to the table as needed. Alternatively, the Santa Margarita Hydrology Model (SMRHM) can be used to size LID BMPs to address the DCV and, if applicable, to size Hydrologic Control BMPs to meet the Hydrologic Performance Standard described in the SMR WQMP, as identified in Section E.

Table D-15 LID BMP Sizing

BMP Name / ID	DMA No.	BMP Type / Description	Design Capture Volume (ft^3)	Proposed Volume (ft^3)
Stormtech MC-3500 Subsurface Infiltration Chambers (#1)	DA-1	MC-3500 Stormtech Subsurface Infiltration Chambers	4,795 CF	7,726 CF
Bio-Clean Biofiltration System	DA-2	Bio-Clean Biofiltration System		

If bioretention will include a capped underdrain, then include sizing calculations demonstrating that the BMP will meet infiltration sizing requirements with the underdrain capped and also meet biofiltration sizing requirements if the underdrain is uncapped.

Section E: Implement Hydrologic Control BMPs and Sediment Supply BMPs

If a completed Table 1.2 demonstrates that the project is exempt from Hydromodification Performance Standards, specify N/A and proceed to Section G.

☐ N/A Project is Exempt from Hydromodification Performance Standards.

If a PDP is not exempt from hydromodification requirements than the PDP must satisfy the requirements of the performance standards for hydrologic control BMPs and Sediment Supply BMPs. The PDP may choose to satisfy hydrologic control requirements using onsite or offsite BMPs (i.e. Alternative Compliance). Sediment supply requirements cannot be met via alternative compliance. If N/A is not selected above, select one of the two options below and complete the applicable sections.

☒ Project is Not Hydromodification Exempt and chooses to implement Hydrologic Control and Sediment Supply BMPs Onsite (complete Section E).

☐ Project is Not Hydromodification Exempt and chooses to implement Hydrologic Control Requirements using Alternative Compliance (complete Section F). Selection of this option must be approved by the Copermittee.

E.1 Hydrologic Control BMP Selection

Capture of the DCV and achievement of the Hydrologic Performance Standard may be met by combined and/or separate structural BMPs. The user should consider the full suite of Hydrologic Control BMPs to manage runoff from the post-development condition and meet the Hydrologic Performance Standard identified in this section.

The Hydrologic Performance Standard consists of matching or reducing the flow duration curve of post-development conditions to that of pre-existing, naturally occurring conditions, for the range of geomorphically significant flows (10% of the 2-year runoff event up to the 10-year runoff event). Select each of the hydrologic control BMP types that are applied to meet the above performance standard on the site.

☒ LID principles as defined in Section 3.2 of the SMR WQMP.

☒ Structural LID BMPs that may be modified or enlarged, if necessary, beyond the DCV.

☐ Structural Hydrologic Control BMPs that are distinct from the LID BMPs above. The LID BMP Design Handbook provides information not only on Hydrologic Control BMP design, but also on BMP design to meet the combined LID requirement and Hydrologic Performance Standard. The Handbook specifies the type of BMPs that can be used to meet the Hydrologic Performance Standard.

E.2 Hydrologic Control BMP Sizing

Hydrologic Control BMPs must be designed to ensure that the flow duration curve of the post-development DMA will not exceed that of the pre-existing, naturally occurring, DMA for the range of geomorphically significant flows. Using SMRHM, (or another acceptable continuous simulation model if approved by the Copermittee) the applicant shall demonstrate that the performance of the Hydrologic Control BMPs complies with the Hydrologic Performance Standard. Complete Table E-1 below and identify, for each DMA, the type of Hydrologic Control BMP, if the SMRHM model confirmed the management (Identified as "passed" in SMRHM), the total volume capacity of the Hydrologic Control BMP, the Hydrologic Control BMP footprint at top floor elevation, and the drawdown time of the Hydrologic Control BMP. SMRHM summary reports should be documented in Appendix 7. Refer to the SMRHM Guidance Document for additional information on SMRHM. You can add rows to the table as needed.

Table E-1 Hydrologic Control BMP Sizing

BMP Name / ID	DMA No.	BMP Type / Description	SMRHM Passed	BMP Volume (ac-ft)	BMP Footprint (ac)	Drawdown time (hr)
Basin	DA-1	Biofiltration with Partial Infiltration	☒	0.18	0.06	62.76
Bio-Clean Biofiltrati on System	DA-2	Bio-Clean Biofiltration System	☒			

If a bioretention BMP with capped underdrain is used and hydromodification requirements apply, then sizing calculations must demonstrate that the BMP meets flow duration control criteria with the underdrain capped and uncapped. Both calculations must be included.

E.3 Implement Sediment Supply BMPs

The sediment supply performance standard applies to PDPs for which hydromodification applied that have the potential to impact Potential Critical Coarse Sediment Yield Areas. Refer to Exhibit G of the WQMP to determine if there are onsite Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas. Select one of the two options below and include the Potential Critical Coarse Sediment Yield Area Exhibit showing your project location in Appendix 7.

☒ There are no mapped Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas on the site. The Sediment Supply Performance Standard is met with no further action.

☐ There are mapped Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas on the site, the Sediment Supply Performance Standard will be met through Option 1 or Option 2 below.

The applicant may refer to Section 3.6.4 of the SMR WQMP for a description of the methodology to meet the Sediment Supply Performance Standard. Select the applicable compliance pathway and complete the appropriate sections to demonstrate compliance with the Sediment Supply Performance Standard if the second box is selected above:

☐ Avoid impacts related to any PDP activities to Potential Critical Coarse Sediment Yield Areas. Proceed to Section E.3.1.

☐ Complete a Site-Specific Critical Coarse Sediment Analysis. Proceed to Section E.3.2.

E.3.1 Option 1: Avoid Potential Critical Coarse Sediment Yield Areas and Potential Sediment Source Areas

The simplest approach for complying with the Sediment Supply Performance Standard is to avoid impacts to areas identified as Potential Critical Coarse Sediment Yield Areas or Potential Sediment Supply Areas. If a portion of PDP is identified as a Potential Critical Coarse Sediment Yield Area or a Potential Sediment Source Area, that PDP may still achieve compliance with the Sediment Supply Performance Standards if Potential Critical Coarse Sediment Yield Areas and Potential Sediment Supply Areas are avoided, i.e. areas are not developed and thereby delivery of Critical Coarse Sediment to the receiving waters is not impeded by site developments.

Provide a narrative describing how the PDP has avoided impacts to Potential Critical Coarse Sediment Yield Areas and/or Potential Sediment Source Areas below.

N/A

If it is not feasible to avoid these areas, proceed to Option 2 to complete a Site-Specific Critical Coarse Sediment Analysis.

E.3.2 Option 2: Site-Specific Critical Coarse Sediment Analysis

Perform a stepwise assessment to ensure the maintenance of the pre-project source(s) of Critical Coarse Sediment (i.e., Bed Sediment Supply):

1. Determine whether the site or a portion of the site is a Significant Source of Bed Sediment Supply to the Receiving Channel (i.e., an actual verified Critical Coarse Sediment Yield Area);
2. Avoid areas identified as actual verified Critical Coarse Sediment Yield Areas in the PDP design and maintain pathways for discharge of Bed Sediment Supply from these areas to receiving waters.

Step 1: Identify if the site is an actual verified Critical Coarse Sediment Yield Area supplying Bed Sediment Supply to the receiving channel

☐ **Step 1.A** – Is the Bed Sediment of onsite streams similar to that of receiving streams?

Rate the similarity: ☐ High
☐ Medium
☐ Low

Results from the geotechnical and sieve analysis to be performed both onsite and in the receiving channel should be documented in Appendix 7. Of particular interest, the results of the sieve analysis, the soil erodibility factor, a description of the topographic relief of the project area, and the lithology of onsite soils should be reported in Appendix 7.

☐ **Step 1.B** – Are onsite streams capable of delivering Bed Sediment Supply from the site, if any, to the receiving channel?

Rate the potential: ☐ High
☐ Medium
☐ Low

Results from the analyses of the sediment delivery potential to the receiving channel should be documented in Appendix 7 and identify, at a minimum, the Sediment Source, the distance to the receiving channel, the onsite channel density, the project watershed area, the slope, length, land use, and rainfall intensity.

☐ **Step 1.C** – Will the receiving channel adversely respond to a change in Bed Sediment Load?

Rate the need for bed sediment supply:
☐ High
☐ Medium
☐ Low

Results from the in-stream analysis to be performed both onsite should be documented in Appendix 7. The analysis should, at a minimum, quantify the bank stability and the degree of incision, provide a gradation of the Bed Sediment within the receiving channel, and identify if the channel is sediment supply-limited.

☐ **Step 1.D** – Summary of Step 1

Summarize in Table E.3 the findings of Step 1 and associate a score (in parenthesis) to each step. The sum of the three individual scores determines if a stream is a significant contributor to the receiving stream.

- Sum is equal to or greater than eight - Site is a significant source of sediment bed material – all on-site streams must be preserved or by-passed within the site plan. The applicant shall proceed to Step 2 for all onsite streams.
- Sum is greater than five but lower than eight. Site is a source of sediment bed material – some of the on-site streams must be preserved (with identified streams noted). The applicant shall proceed to Step 2 for the identified streams only.
- Sum is equal to or lower than five. Site is not a significant source of sediment bed material. The applicant may advance to Section F.

Table E-2 Triad Assessment Summary

Step	Rating			Total Score
1.A	☐ High (3)	☐ Medium (2)	☐ Low (1)	
1.B	☐ High (3)	☐ Medium (2)	☐ Low (1)	
1.C	☐ High (3)	☐ Medium (2)	☐ Low (1)	
Significant Source Rating of Bed Sediment to the receiving channel(s)				

Step 2: Avoid Development of Critical Coarse Sediment Yield Areas, Potential Sediment Sources Areas, and Preserve Pathways for Transport of Bed Sediment Supply to Receiving Waters

Onsite streams identified as a actual verified Critical Coarse Sediment Yield Areas should be avoided in the site design and transport pathways for Critical Coarse Sediment should be preserved

Check those that apply:

☐ The site design does avoid all onsite channels identified as actual verified Critical Coarse Sediment Yield Areas

AND

☐ The drainage design bypasses flow and sediment from onsite upstream drainages identified as actual verified Critical Coarse Sediment Yield Areas to maintain Critical Coarse Sediment supply to receiving waters

(If both are yes, the applicant may disregard subsequent steps of Section E.3 and directly advance directly to Section G).

\- *Or* -

☐ The site design **does NOT avoid** all onsite channels identified as actual verified Critical Coarse Sediment Yield Areas

OR

☐ The project impacts transport pathways of Critical Coarse Sediment from onsite upstream drainages.

(If either of these are the case, the applicant may proceed with the subsequent steps of Section E.3).

Provide in Appendix 7 a site map that identifies all onsite channels and highlights those onsite channels that were identified as a Significant Source of Bed Sediment. The site map shall demonstrate, if feasible, that the site design avoids those onsite channels identified as a Significant Source of Bed Sediment. In addition, the applicant shall describe the characteristics of each onsite channel identified as a Significant Source of Bed Sediment. If the design plan cannot avoid the onsite channels, please provide a rationale for each channel individually.

The site map shall demonstrate that the drainage design bypasses those onsite channels that supply Critical Coarse Sediment to the receiving channel(s). In addition, the applicant shall describe the characteristics of each onsite channel identified as an actual verified Critical Coarse Sediment Yield Area.

N/A

N/A

N/A

E.3.3 Sediment Supply BMPs to Result in No Net Impact to Downstream Receiving Waters

If impacts to Critical Coarse Sediment Yield Areas cannot be avoided, sediment supply BMPs must be implemented such there is no net impact to receiving waters. Sediment supply BMPs may consist of approaches that permit flux of bed sediment supply from Critical Coarse Sediment Yield Areas within the project boundary. This approach is subject to acceptance by the [Insert Jurisdiction]. It may require extensive documentation and analysis by qualified professionals to support this demonstration.

Appendix H of the San Diego Model BMP Design Manual provides additional information on site-specific investigation of Critical Coarse Sediment Supply areas.

http://www.projectcleanwater.org/download/2018-model-bmp-design-manual/

N/A

Documentation of sediment supply BMPs should be detailed in Appendix 7.

Section F: Alternative Compliance

Alternative Compliance may be used to achieve compliance with pollutant control and/or hydromodification requirements for a given PDP. Alternative Compliance may be used under two scenarios, check the applicable box if the PDP is proposing to use Alternative Compliance to satisfy all or a portion of the Pollutant Control and/or Hydrologic Control requirements (but not sediment supply requirements)

☐ If it is not feasible to fully implement Infiltration or Biofiltration BMPs at a PDP site, Flow-Through Treatment Control BMPs may be used to treat pollutants contained in the portion of DCV not reliably retained on site and Alternative Compliance measures must also be implemented to mitigate for those pollutants in the DCV that are not retained or removed on site prior to discharging to a receiving water.

☐ Alternative Compliance is selected to comply with either pollutant control or hydromodification flow control requirements even if complying with these requirements is potentially feasible on-site. If such voluntary Alternative Compliance is implemented, Flow-Through Treatment Control BMPs must still be used to treat those pollutants in the portion of the DCV not reliably retained on site prior to discharging to a receiving water.

Refer to Section 2.7 of the SMR WQMP and consult the Local Jurisdiction for currently available Alternative Compliance pathways. Coordinate with the Copermittee if electing to participate in Alternative Compliance and complete the sections below to document implementation of the Flow-Through BMP component of the program.

F.1 Identify Pollutants of Concern

The purpose of this section is to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs and to document compliance and.

Utilize Table A-1 from Section A, which noted your project's Receiving Waters, to identify impairments for Receiving Waters (including downstream receiving waters) by completing Table F-1. Table F-1 includes the watersheds identified as impaired in the Approved 2010 303(d) list; check box corresponding with the PDP's receiving water. The most recent 303(d) lists are available from the State Water Resources Control Board website:
https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml).https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml.

Table F-1 Summary of Approved 2010 303(d) listed waterbodies and associated pollutants of concern for the Riverside County SMR Region and downstream waterbodies.

	Water Body	Nutrients[1]	Metals[2]	Toxicity	Bacteria and Pathogens	Pesticides and Herbicides	Sulfate	Total Dissolved Solids
☐	De Luz Creek	X	X				X	
☐	Long Canyon Creek		X		X	X		
☒	Murrieta Creek	X	X	X		X		
☐	Redhawk Channel	X	X		X	X		X
☐	Santa Gertudis Creek	X	X		X	X		
☐	Santa Margarita Estuary	X						
☒	Santa Margarita River (Lower)	X			X			
☒	Santa Margarita River (Upper)	X		X				
☐	Temecula Creek	X	X	X		X		X
☐	Warm Springs Creek	X	X		X	X		

[1] Nutrients include nitrogen, phosphorus and eutrophic conditions caused by excess nutrients.

[2] Metals includes copper, iron, and manganese.

Use Table F-2 to identify the pollutants identified with the project site. Indicate the applicable PDP Categories and/or Project Features by checking the boxes that apply. If the identified General Pollutant Categories are the same as those listed for your Receiving Waters, then these will be your Pollutants of Concern; check the appropriate box or boxes in the last row.

Table F-2 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)		General Pollutant Categories									
		Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease	Total Dissolved Solids	Sulfate
☐	Detached Residential Development	P	N	P	P	N	P	P	P	N	N
☐	Attached Residential Development	P	N	P	P	N	P	P	P(2)	N	N
☒	Commercial/Industrial Development	P(3)	P(7)	P(1)	P(1)	P	P(1)	P	P	N	N
☐	Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P	N	N
☐	Restaurants (>5,000 ft²)	P	N	N	P(1)	N	N	P	P	N	N
☐	Hillside Development (>5,000 ft²)	P	N	P	P	N	P	P	P	N	N
☒	Parking Lots (>5,000 ft²)	P(6)	P(7)	P(1)	P(1)	P(4)	P	P	P	N	N
☐	Streets, Highways, and Freeways	P(6)	P(7)	P(1)	P(1)	P(4)	P	P	P	N	N
☐	Retail Gasoline Outlets	N	P(7)	N	N	P(4)	N	P	P	N	N
Project Priority Pollutant(s) of Concern		☒	☒	☐	☐	☒	☒	☒	☒	☐	☐

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste products; otherwise not expected

(4) Including petroleum hydrocarbons

(5) Including solvents

(6) Bacterial indicators are routinely detected in pavement runoff

(7) A potential source of metals, primarily copper and zinc. Iron, magnesium, and aluminum are commonly found in the environment and are commonly associated with soils, but are not primarily of anthropogenic stormwater origin in the municipal environment.

F.2 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential Pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must be selected to address the Project Priority Pollutants of Concern (identified above) and meet the acceptance criteria described in Section 2.3.7 of the SMR WQMP. Documentation of acceptance criteria must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table F-3 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.
[2] Cross Reference Table E.1 above to populate this column.
[3] As documented in a Copermittee Approved Study and provided in Appendix 6.

F.3 Sizing Criteria

Utilize Table F-4 below to appropriately size flow-through BMPs to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.1 of the SMR WQMP for further information.

Table F-4 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***Enter BMP Name / Identifier Here***	
	[A]		[B]	[C]	[A] x [C]		
						Design Storm (in)	*Design Flow Rate (cfs)*
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x[E]}{[G]}$

[B], [C] is obtained as described in Section 2.6.1.b from the SMR WQMP
[E] either 0.2 inches or 2 times the 85th percentile hourly rainfall intensity
[G] = 43,560,.

F.4 Hydrologic Performance Standard – Alternative Compliance Approach

Alternative compliance options are only available if the governing Copermittee has acknowledged the infeasibility of onsite Hydrologic Control BMPs and approved an alternative compliance approach. See Section 3.5 and 3.6 of the SMR WQMP.

Select the pursued alternative and describe the specifics of the alternative:

☐ Offsite Hydrologic Control Management within the same channel system

N/A

☐ In-Stream Restoration Project

N/A

For Offsite Hydrologic Control BMP Option

Each Hydrologic Control BMP must be designed to ensure that the flow duration curve of the post-development DMA will not exceed that of the pre-existing, naturally occurring, DMA by more than ten percent over a one-year period. Using SMRHM, the applicant shall demonstrate that the performance of each designed Hydrologic Control BMP is equivalent with the Hydrologic Performance Standard for onsite conditions. Complete Table F-5 below and identify, for each Hydrologic Control BMP, the equivalent DMA the Hydrologic Control BMP mitigates, that the SMRHM model passed, the total volume capacity of the BMP, the BMP footprint at top floor elevation, and the drawdown time of the BMP. SMRHM summary reports for the alternative approach should be documented in Appendix 7. Refer to the SMRHM Guidance Document for additional information on SMRHM. You can add rows to the table as needed.

Table F-5 Offsite Hydrologic Control BMP Sizing

BMP Name / Type	Equivalent DMA (ac)	SMRHM Passed	BMP Volume (ac-ft)	BMP Footprint (ac)	Drawdown time (hr)
		☐			
		☐			
		☐			
		☐			

For Instream Restoration Option

Attach to Appendix 7 the technical report detailing the condition of the receiving channel subject to the proposed hydrologic and sediment regimes. Provide the full design plans for the in-stream restoration project that have been approved by the Copermittee. Utilize the San Diego Regional Water Quality Equivalency Guidance Document.

Section G: Implement Trash Capture BMPs

The Local Jurisdiction may require full trash capture BMPs to be installed as part of the project. Consult with the Local Jurisdiction to determine applicability.

Trash Capture BMPs may be applicable to Type 'D' DMAs, as defined in Section 2.3.4 of the SMR WQMP. Trash Capture BMPs are designed to treat Q_{TRASH}, the runoff flow rate generated during the 1-year 1-hour precipitation depth. Utilize Table G-1 to size Trash Capture BMP. Refer to Table G-2 to determine the Trash Capture Design Storm Intensity (E).

Table G-1 Sizing Trash Capture BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***Enter BMP Name / Identifier Here***	
	[A]		[B]	[C]	[A] x [C]		
						Trash Capture Design Storm Intensity (in)	*Trash Capture Design Flow Rate (cubic feet or cfs)*
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x[E]}{[G]}$

[B], [C] is obtained as described in Section 2.6.1.b from the SMR WQMP
[G] = 43,560

Table G-2 Approximate precipitation depth/intensity values for calculation of the Trash Capture Design Storm

City	1-year 1-hour Precipitation Depth/Intensity (inches/hr)
Murrieta	0.47
Temecula	0.50
Wildomar	0.37

Use Table G-3 to summarize and document the selection and sizing of Trash Capture BMPs.

Table G-3 Trash Capture BMPs

BMP Name / ID	DMA No(s)	BMP Type / Description	Required Trash Capture Flowrate (cfs)	Provided Trash Capture Flowrate (cfs)

Section H: Source Control BMPs

Source Control BMPs include permanent, structural features that may be required in your Project plans, such as roofs over and berms around trash and recycling areas, and Operational BMPs, such as regular sweeping and "housekeeping," that must be implemented by the site's occupant or user. The Maximum Extent Practicable (MEP) standard typically requires both types of BMPs. In general, Operational Source Control BMPs cannot be substituted for a feasible and effective Structural Source Control BMP. Complete checklist below to determine applicable Source Control BMPs for your site.

Project-Specific WQMP Source Control BMP Checklist

All development projects must implement Source Control BMPs. Source Control BMPs are used to minimize pollutants that may discharge to the MS4. Refer to Chapter 3 (Section 3.8) of the SMR WQMP for additional information. Complete Steps 1 and 2 below to identify Source Control BMPs for the project site.

STEP 1: IDENTIFY POLLUTANT SOURCES

Review project site plans and identify the applicable pollutant sources. "Yes" indicates that the pollutant source is applicable to project site. "No" indicates that the pollutant source is not applicable to project site.

☒ Yes ☐ No	Storm Drain Inlets	☐ Yes ☒ No	Outdoor storage areas
☐ Yes ☒ No	Floor Drains	☐ Yes ☒ No	Material storage areas
☐ Yes ☒ No	Sump Pumps	☐ Yes ☒ No	Fueling areas
☒ Yes ☐ No	Pets Control/Herbicide Application	☐ Yes ☒ No	Loading Docks
☒ Yes ☐ No	Food Service Areas	☐ Yes ☒ No	Fire Sprinkler Test/Maintenance water
☒ Yes ☐ No	Trash Storage Areas	☒ Yes ☐ No	Plazas, Sidewalks and Parking Lots
☐ Yes ☒ No	Industrial Processes	☐ Yes ☒ No	Pools, Spas, Fountains and other water features
☐ Yes ☒ No	Vehicle and Equipment Cleaning and Maintenance/Repair Areas		

STEP 2: REQUIRED SOURCE CONTROL BMPS

List each Pollutant source identified above in column 1 and fill in the corresponding Structural Source Control BMPs and Operational Control BMPs by referring to the Stormwater Pollutant Sources/Source Control Checklist included in Appendix 8. The resulting list of structural and operational source control BMPs must be implemented as long as the associated sources are present on the project site. Add additional rows as needed.

Pollutant Source	Structural Source Control BMP	Operational Source Control BMP
Storm Drain Inlets	Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation	Maintain and periodically repaint or replace inlet markings. Provide stormwater pollution prevention information to new site owners, lessees, or operators.

	District, call 951.955.1200 to verify.	See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
Indoor & Structural Pest Control	Note building design features that discourage entry of pests.	Provide integrated pest management information to owners, lessees, and operators.
Landscape/Outdoor Pesticide Use	Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Where the landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, especially adjacent to hardscape. To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun wind, rain, land use, air movement, ecological consistency, and plant interactions.	Maintain landscaping using minimum or no pesticides See applicable operational BMPs in "What you should know for landscaping and gardening" at: www.rcwatershed.org/about/materials-library/#1450469138395-bb76dd39-d810 Provide IPM information to new owners, lessees and operators.
Food Service Areas	---	See the brochure, "The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries"
Refuse Areas	State how site refuse will be handled and provide supporting detail to what is shown on plans State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact sheet SC-34, "Waste Handling and Disposal" in

		the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Fire Sprinkler Test Water	Provide a means to drain fire sprinkler test water to the sanitary sewer.	See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Miscellaneous Drain or Wash Water or Other Sources (Condensate drain lines, rooftop equipment, and roofing gutters)	Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. Rooftop equipment with potential to produce pollutants shall be roofed and / or have secondary containment. Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	
Plazas, Sidewalks, and Parking Lots		Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect wash-water containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.
Food Service		See the brochure, "The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://www.rcwatershed.org/about/materials-library/#1450389926766-61e8af0b-53a9

Section I: Coordinate Submittal with Other Site Plans

Populate Table I-1 below to assist the plan checker in an expeditious review of your project. During construction and at completion, [Insert Jurisdiction] inspectors will verify the installation of BMPs against the approved plans. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table I-1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
Biofiltration Basin with Partial Infiltration	Biofiltration Basin with Partial Infiltration	C3.1, C4.1, & C5.1
Bio-Clean Biofiltration System	Bio-Clean Biofiltration System	C3.1, C4.1, & C5.1

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. The Copermittee with jurisdiction over the Project site can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Use Table I-2 to identify other applicable permits that may impact design of the site. If yes is answered to any of the items below, the Copermittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Table I-2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act Section 401 Water Quality Certification	☐ Y	☒ N
US Army Corps of Engineers, Clean Water Act Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)*	☐ Y	☒ N

Section J: Operation, Maintenance and Funding

The Copermittee with jurisdiction over the Project site will periodically verify that BMPs on your Project are maintained and continue to operate as designed. To make this possible, the Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement maintenance of BMPs in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized Operations and Maintenance or inspections but will require typical landscape maintenance as noted in Chapter 5, in the SMR WQMP. Include a brief description of typical landscape maintenance for these areas.

The Copermittee with jurisdiction over the Project site will also require that you prepare and submit a detailed BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a BMP Operation and Maintenance Plan are in Chapter 5 of the SMR WQMP.

Maintenance Mechanism: Murrieta Valley Unified School District

Will the proposed BMPs be maintained by a Homeowners' Association (HOA) or Property Owners Association (POA)?

☐ Y ☒ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Section K: Acronyms, Abbreviations and Definitions

Regional MS4 Permit	Order No. R9-2013-0001 as amended by Order No. R9-2015-0001 and Order No. R9-2015-0100 an NPDES Permit issued by the San Diego Regional Water Quality Control Board.
Applicant	Public or private entity seeking the discretionary approval of new or replaced improvements from the Copermittee with jurisdiction over the project site. The Applicant has overall responsibility for the implementation and the approval of a Priority Development Project. The WQMP uses consistently the term "user" to refer to the applicant such as developer or project proponent. The WQMP employs also the designation "user" to identify the Registered Professional Civil Engineer responsible for submitting the Project-Specific WQMP, and designing the required BMPs.
Best Management Practice (BMP)	Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.
BMP Fact Sheets	BMP Fact Sheets are available in the LID BMP Design Handbook. Individual BMP Fact Sheets include sitting considerations, and design and sizing guidelines for seven types of structural BMPs (infiltration basin, infiltration trench, permeable pavement, harvest-and-use, bioretention, extended detention basin, and sand filter).
California Stormwater Quality Association (CASQA)	Publisher of the California Stormwater Best Management Practices Handbooks, available at www.cabmphandbooks.com.
Conventional Treatment Control BMP	A type of BMP that provides treatment of stormwater runoff. Conventional treatment control BMPs, while designed to treat particular Pollutants, typically do not provide the same level of volume reduction as LID BMPs, and commonly require more specialized maintenance than LID BMPs. As such, the Regional MS4 Permit and this WQMP require the use of LID BMPs wherever feasible, before Conventional Treatment BMPs can be considered or implemented.
Copermittees	The Regional MS4 Permit identifies the Cities of Murrieta, Temecula, and Wildomar, the County, and the District, as Copermittees for the SMR.
County	The abbreviation refers to the County of Riverside in this document.

CEQA	California Environmental Quality Act - a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.
CIMIS	California Irrigation Management Information System - an integrated network of 118 automated active weather stations all over California managed by the California Department of Water Resources.
CWA	Clean Water Act - is the primary federal law governing water pollution. Passed in 1972, the CWA established the goals of eliminating releases of high amounts of toxic substances into water, eliminating additional water pollution by 1985, and ensuring that surface waters would meet standards necessary for human sports and recreation by 1983. CWA Section 402(p) is the federal statute requiring NPDES permits for discharges from MS4s.
CWA Section 303(d) Waterbody	Impaired water in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of urban runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.
Design Storm	The Regional MS4 Permit has established the 85th percentile, 24-hour storm event as the "Design Storm". The applicant may refer to Exhibit A to identify the applicable Design Storm Depth (D85) to the project.
DCV	Design Capture Volume (DCV) is the volume of runoff produced from the Design Storm to be mitigated through LID Retention BMPs, Other LID BMPs and Volume Based Conventional Treatment BMPs, as appropriate.
Design Flow Rate	The design flow rate represents the minimum flow rate capacity that flow-based conventional treatment control BMPs should treat to the MEP, when considered.
DCIA	Directly Connected Impervious Areas - those impervious areas that are hydraulically connected to the MS4 (i.e. street curbs, catch basins, storm drains, etc.) and thence to the structural BMP without flowing over pervious areas.
Discretionary Approval	A decision in which a Copermittee uses its judgment in deciding whether and how to carry out or approve a project.
District	Riverside County Flood Control and Water Conservation District.
DMA	A Drainage Management Area - a delineated portion of a project site that is hydraulically connected to a common structural BMP or conveyance point. The Applicant may refer to Section 3.3 for further guidelines on how to delineate DMAs.

Drawdown Time	Refers to the amount of time the design volume takes to pass through the BMP. The specified or incorporated drawdown times are to ensure that adequate contact or detention time has occurred for treatment, while not creating vector or other nuisance issues. It is important to abide by the drawdown time requirements stated in the fact sheet for each specific BMP.
Effective Area	Area which 1) is suitable for a BMP (for example, if infiltration is potentially feasible for the site based on infeasibility criteria, infiltration must be allowed over this area) and 2) receives runoff from impervious areas.
ESA	An Environmental Sensitive Area (ESA) designates an area "in which plants or animals life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments". (Reference: California Public Resources Code § 30107.5).
ET	Evapotranspiration (ET) is the loss of water to the atmosphere by the combined processes of evaporation (from soil and plant surfaces) and transpiration (from plant tissues). It is also an indicator of how much water crops, lawn, garden, and trees need for healthy growth and productivity
FAR	The Floor Area Ratio (FAR) is the total square feet of a building divided by the total square feet of the lot the building is located on.
Flow-Based BMP	Flow-based BMPs are conventional treatment control BMPs that are sized to treat the design flow rate.
FPPP	Facility Pollution Prevention Plan
HCOC	Hydrologic Condition of Concern - Exists when the alteration of a site's hydrologic regime caused by development would cause significant impacts on downstream channels and aquatic habitats, alone or in conjunction with impacts of other projects.
HMP	Hydromodification Management Plan – Plan defining Performance Standards for PDPs to manage increases in runoff discharge rates and durations.
Hydrologic Control BMP	BMP to mitigate the increases in runoff discharge rates and durations and meet the Performance Standards set forth in the HMP.
HSG	Hydrologic Soil Groups – soil classification to indicate the minimum rate of infiltration obtained for bare soil after prolonged wetting. The HSGs are A (very low runoff potential/high infiltration rate), B, C, and D (high runoff potential/very low infiltration rate)
Hydromodification	The Regional MS4 Permit identifies that increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses.

JRMP	A separate Jurisdictional Runoff Management Plan (JRMP) has been developed by each Copermittee and identifies the local programs and activities that the Copermittee is implementing to meet the Regional MS4 Permit requirements.
LID	Low Impact Development (LID) is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff.
LID BMP	A type of stormwater BMP that is based upon Low Impact Development concepts. LID BMPs not only provide highly effective treatment of stormwater runoff, but also yield potentially significant reductions in runoff volume – helping to mimic the pre-project hydrologic regime, and also require less ongoing maintenance than Treatment Control BMPs. The applicant may refer to Chapter 2.
LID BMP Design Handbook	The LID BMP Design Handbook was developed by the Copermittees to provide guidance for the planning, design and maintenance of LID BMPs which may be used to mitigate the water quality impacts of PDPs within the County.
LID Bioretention BMP	LID Bioretention BMPs are bioretention areas are vegetated (i.e., landscaped) shallow depressions that provide storage, infiltration, and evapotranspiration, and provide for pollutant removal (e.g., filtration, adsorption, nutrient uptake) by filtering stormwater through the vegetation and soils. In bioretention areas, pore spaces and organic material in the soils help to retain water in the form of soil moisture and to promote the adsorption of pollutants (e.g., dissolved metals and petroleum hydrocarbons) into the soil matrix. Plants use soil moisture and promote the drying of the soil through transpiration. The Regional MS4 Permit defines "retain" as to keep or hold in a particular place, condition, or position without discharge to surface waters.
LID Biofiltration BMP	BMPs that reduce stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration, and other biological and chemical processes. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and plants, and collected through an underdrain.
LID Harvest and Reuse BMP	BMPs used to facilitate capturing Stormwater Runoff for later use without negatively impacting downstream water rights or other Beneficial Uses.

LID Infiltration BMP	BMPs to reduce stormwater runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Typical LID Infiltration BMPs include infiltration basins, infiltration trenches and pervious pavements.
LID Retention BMP	BMPs to ensure full onsite retention without runoff of the DCV such as infiltration basins, bioretention, chambers, trenches, permeable pavement and pavers, harvest and reuse.
LID Principles	Site design concepts that prevent or minimize the causes (or drivers) of post-construction impacts, and help mimic the pre-development hydrologic regime.
MEP	Maximum Extent Practicable - standard established by the 1987 amendments to the CWA for the reduction of Pollutant discharges from MS4s. Refer to Attachment C of the Regional MS4 Permit for a complete definition of MEP.
MF	Multi-family – zoning classification for parcels having 2 or more living residential units.
MS4	Municipal Separate Storm Sewer System (MS4) is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.
New Development Project	Defined by the Regional MS4 Permit as 'Priority Development Projects' if the project, or a component of the project meets the categories and thresholds described in Section 1.1.1.
NPDES	National Pollution Discharge Elimination System - Federal program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project - Includes New Development and Redevelopment project categories listed in Provision E.3.b of the Regional MS4 Permit.

Priority Pollutants of Concern	Pollutants expected to be present on the project site and for which a downstream water body is also listed as Impaired under the CWA Section 303(d) list or by a TMDL.
Project-Specific WQMP	A plan specifying and documenting permanent LID Principles and Stormwater BMPs to control post-construction Pollutants and stormwater runoff for the life of the PDP, and the plans for operation and maintenance of those BMPs for the life of the project.
Receiving Waters	Waters of the United States.
Redevelopment Project	The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair. Project that meets the criteria described in Section 1.
Runoff Fund	Runoff Funds have not been established by the Copermittees and are not available to the Applicant. If established, a Runoff Fund will develop regional mitigation projects where PDPs will be able to buy mitigation credits if it is determined that implementing onsite controls is infeasible.
San Diego Regional Board	San Diego Regional Water Quality Control Board - The term "Regional Board", as defined in Water Code section 13050(b), is intended to refer to the California Regional Water Quality Control Board for the San Diego Region as specified in Water Code Section 13200. State agency responsible for managing and regulating water quality in the SMR.
SCCWRP	Southern California Coastal Water Research Project
Site Design BMP	Site design BMPs prevent or minimize the causes (or drivers) of post-construction impacts, and help mimic the pre-development hydrologic regime.
SF	Parcels with a zoning classification for a single residential unit.
SMC	Southern California Stormwater Monitoring Coalition
SMR	The Santa Margarita Region (SMR) represents the portion of the Santa Margarita Watershed that is included within the County of Riverside.

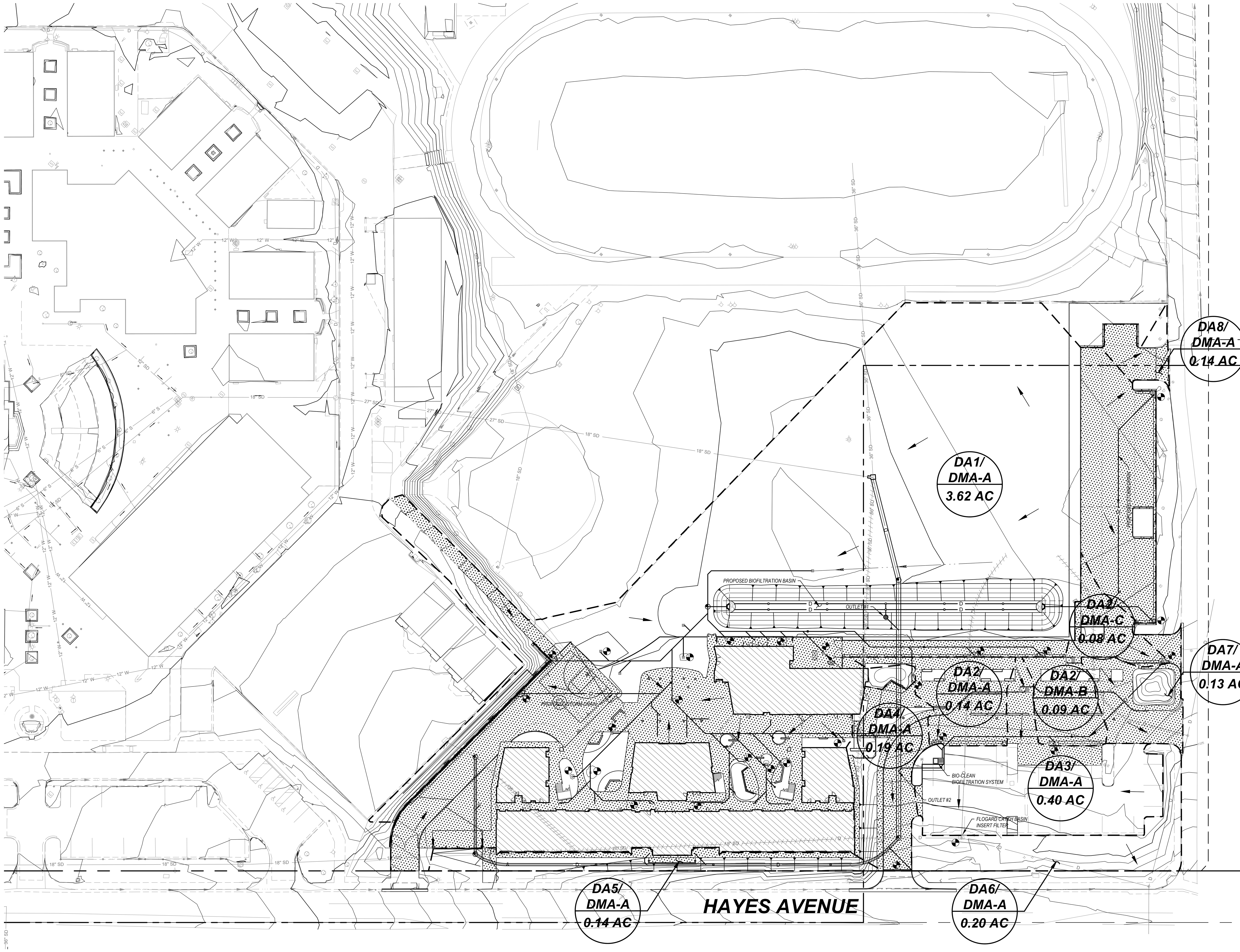
Source Control BMP	Source Control BMPs land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between Pollutants and runoff.
Structural BMP	Structures designed to remove pollutants from stormwater runoff and mitigate hydromodification impacts.
SWPPP	Storm Water Pollution Prevention Plan
Tentative Tract Map	Tentative Tract Maps are required for all subdivision creating five (5) or more parcels, five (5) or more condominiums as defined in Section 783 of the California Civil Code, a community apartment project containing five (5) or more parcels, or for the conversion of a dwelling to a stock cooperative containing five (5) or more dwelling units.
TMDL	Total Maximum Daily Load - the maximum amount of a Pollutant that can be discharged into a waterbody from all sources (point and non-point) and still maintain Water Quality Standards. Under CWA Section 303(d), TMDLs must be developed for all waterbodies that do not meet Water Quality Standards after application of technology-based controls.
USEPA	United States Environmental Protection Agency
Volume-Based BMP	Volume-Based BMPs applies to BMPs where the primary mode of pollutant removal depends upon the volumetric capacity such as detention, retention, and infiltration systems.
WQMP	Water Quality Management Plan
Wet Season	The Regional MS4 Permit defines the wet season from October 1 through April 30.

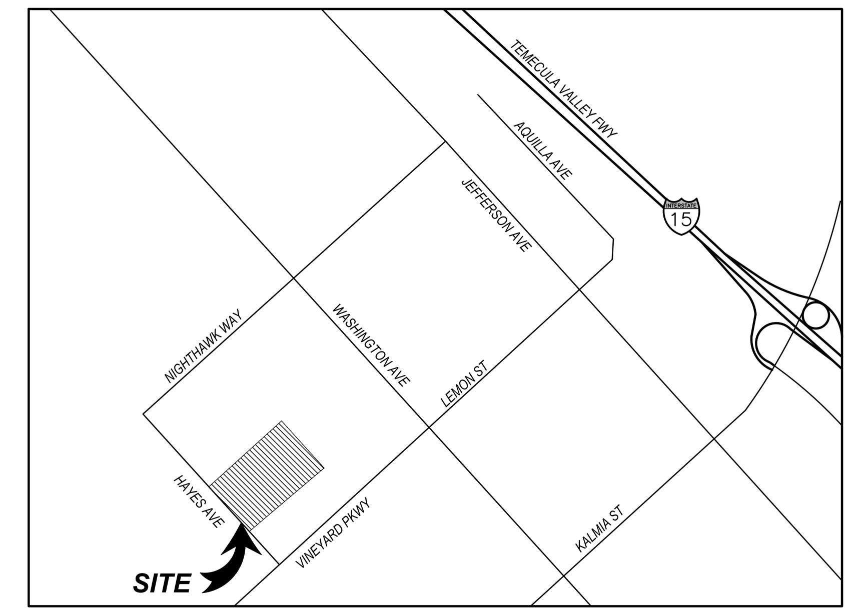
Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

Complete the checklist below to verify all exhibits and components are included in the Project-Specific WQMP. Refer Section 4 of the SMR WQMP and Section D of this Template.

Map and Site Plan Checklist
Indicate all Maps and Site Plans are included in your Project-Specific WQMP by checking the boxes below.
☒ Vicinity and Location Map
☒ Existing Site Map (unless exiting conditions are included in WQMP Site Plan)
☒ WQMP Site Plan
☒ Parcel Boundary and Project Footprint
☒ Existing and Proposed Topography
☒ Drainage Management Areas (DMAs)
☒ Proposed Structural Best Management Practices (BMPs)
☒ Drainage Paths
☒ Drainage infrastructure, inlets, overflows
☒ Source Control BMPs
☒ Site Design BMPs
☒ Buildings, Roof Lines, Downspouts
☒ Impervious Surfaces
☒ Pervious Surfaces (i.e. Landscaping)
☒ Standard Labeling





VICINITY MAP

NOT TO SCALE

LICENSED ARCHITECT
NO. C28042
EXP. 9-30-21
STATE OF CALIFORNIA

IDENTIFICATION STAMP
DIVISION OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES

APPL #

AC ____ F/LS ____ SS ____

DATE:

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT
MURRIETA CANYON ACADEMY

24150 HAYES AVENUE, MURRIETA, CA 92562

LEGEND:

KEYNOTES:

IMPERVIOUS AREA

DIRECTION OF SURFACE FLOW

PROPOSED STORM DRAIN PIPE PER UTILITY PLAN

LIMITS OF CONSTRUCTION DRAINAGE AREA BOUNDARY

L/A LANDSCAPED AREA

XX-X / X.XX AC — DENOTES DRAINAGE AREA AND ACERAGE

RECEIVING WATER BODIES

- MURRIETA CREEK
- UPPER SANTA MARGARITA RIVER
- LOWER SANTA MARGARITA RIVER

PROJECT AREA

TOTAL PROJECT AREA: 223,780 SQ. FT. (5.14 ACRES)
IMPERVIOUS AREA: 111,513 SQ. FT. (2.56 ACRES)
PERVIOUS AREA: 112,267 SQ. FT. (2.58 ACRES)

NOTE

THE PROPOSED PROJECT HAS EIGHT DRAINAGE AREAS (DA). STORMWATER RUNOFF FROM DA-1 SHEET FLOWS INTO PROPOSED CATCH BASINS THROUGHOUT THE DRAINAGE AREA. STORMWATER RUNOFF WILL BE CONVEYED THROUGH PROPOSED STORM DRAIN LINES INTO THE PROPOSED BMP, A BIOFILTRATION WITH PARTIAL INFILTRATION BASIN. THE STORMWATER WILL FILTER THROUGH 3" OF NON-FLOATING HARDWOOD MULCH, 36" OF ENGINEERED MEDIA SOIL, PER THE RIVERSIDE COUNTY - LOW IMPACT DEVELOPMENT BMP DESIGN HANDBOOK, AND 18" OF AN OPEN GRADED ASTM #57 STONE LAYER, BEFORE OUTLETTING THROUGH A PERFORATED PIPE AND INTO OUTLET #1. THE DCV FOR DA-1 IS 4,795 CUBIC FEET. THE DESIGN VOLUME FOR THE PROPOSED BIOFILTRATION WITH PARTIAL INFILTRATION BASIN IS 7,725 CUBIC FEET. STORMWATER GREATER THAN THE DCV WILL OUTLET THROUGH A TYPE X INLET PER RCFCWCD STANDARD. THE DESIGN FOR THE BIOFILTRATION BASIN MEETS HYDROMOD REQUIREMENTS.

STORMWATER RUNOFF FROM DA-2 SHEET FLOWS SOUTH INTO PROPOSED CATCH BASINS IN THE DRAINAGE AREA. STORMWATER RUNOFF WILL BE CONVEYED THROUGH PROPOSED STORM DRAIN LINES INTO THE PROPOSED BMP, A BIO-CLEAN BIOFILTRATION SYSTEM.

STORMWATER RUNOFF FROM DA-3 SHEET FLOWS SOUTH INTO AN EXISTING CURB INLET. THIS DRAINAGE AREA CANNOT BE COLLECTED INTO THE PROPOSED BMP, SO WE PROPOSED A CATCH BASIN INSERT FILTER TO TREAT THE FLOWS. THE DESIGN FLOW RATE FOR DA-3 IS 0.1 CFS AND THE FILTERED FLOW RATE OF THE CATCH BASIN INSERT FILTER IS 1.76 CFS.

STORMWATER RUNOFF FROM DA-4 CANNOT BE COLLECTED INTO ONSITE BMPS. STORMWATER RUNOFF FLOWS SOUTH TOWARDS HAYES AVENUE AND GETS CAPTURED BY A TRENCH DRAIN ONSITE BEFORE IT HAS A CHANCE TO OUTLET ONTO HAYES AVENUE. STORMWATER RUNOFF WILL BE CONVEYED INTO THE EXISTING STORM DRAIN PIPE VIA A PROPOSED STORM DRAIN LINE.

STORMWATER RUNOFF FROM DA-5 CANNOT BE COLLECTED INTO ONSITE BMPS. STORMWATER RUNOFF WILL SHEET FLOW SOUTH DOWN THE SLOPE ONTO HAYES AVENUE AS IT DID IN THE EXISTING CONDITION.

STORMWATER RUNOFF FROM DA-6 CANNOT BE COLLECTED INTO ONSITE BMPS. STORMWATER RUNOFF WILL SHEET FLOW SOUTH DOWN THE SLOPE ONTO HAYES AVENUE AS IT DID IN THE EXISTING CONDITION.

STORMWATER RUNOFF FROM DA-7 CANNOT BE COLLECTED INTO ONSITE BMPS. STORMWATER RUNOFF WILL SHEET FLOW ONTO THE ONSITE ALLEY WAY AS IT DID IN THE EXISTING CONDITION.

STORMWATER RUNOFF FROM DA-8 CANNOT BE COLLECTED INTO ONSITE BMPS. STORMWATER RUNOFF WILL SHEET FLOW ONTO THE ONSITE ALLEY WAY AS IT DID IN THE EXISTING CONDITION.

DRAINAGE AREAS

AREA	PERVIOUS	IMPERVIOUS	TOTAL ACREAGE
DA-1	2.04 ACRES	1.58 ACRES	3.62 ACRES
DA-2	0.04 ACRES	0.27 ACRES	0.31 ACRES
DA-3	0.02 ACRES	0.38 ACRES	0.40 ACRES
DA-4	0.06 ACRES	0.13 ACRES	0.19 ACRES
DA-5	0.10 ACRES	0.04 ACRES	0.14 ACRES
DA-6	0.18 ACRES	0.02 ACRES	0.20 ACRES
DA-7	0.03 ACRES	0.10 ACRES	0.13 ACRES
DA-8	0.10 ACRES	0.04 ACRES	0.14 ACRES

REGISTERED PROFESSIONAL ENGINEER
TROY DAVID MOLAUG
No. C 59118
CIVIL
STATE OF CALIFORNIA

DIGALERT
Call 2 Working Days Before You Dig!
811

EPIC ENGINEERS
CIVIL ENGINEERING | LAND SURVEYING | PLANNING | STORMWATER MANAGEMENT
101 E. REDLANDS BOULEVARD SUITE 144 REDLANDS, CA 92373
TEL : 909.792.5949
www.epicce.com

BakerNowicki design studio
731 Ninth Avenue, Suite A, San Diego, California 92101
619.795.2450
www.bndesignstudio.com

NO.	DATE	ISSUE

PROJECT NO: 104.13
DATE: 12/5/2019
DRAWING

SITE SPECIFIC DATA

PROJECT NUMBER		104.13	
PROJECT NAME		MCA	
PROJECT LOCATION		Murrieta, CA	
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.115	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	24.49	SDR-35	8"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	23.21	SDR-35	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	27.10		
SURFACE LOAD	INDIRECT TRAFFIC		
FRAME & COVER	36" X 36"	UNDERGRO	N/A
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION

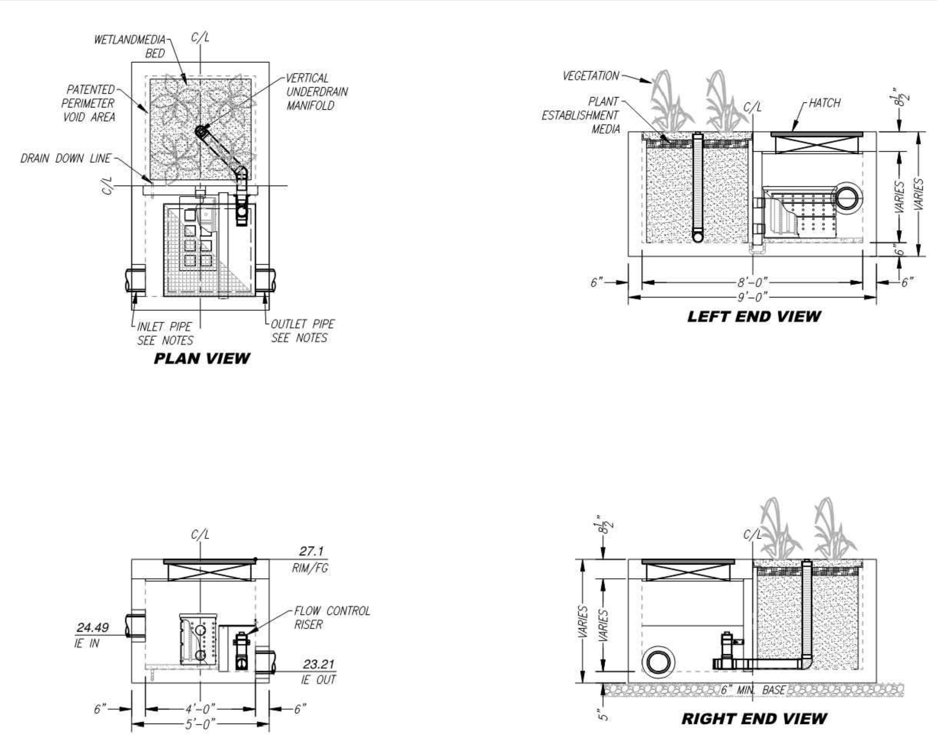
INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.

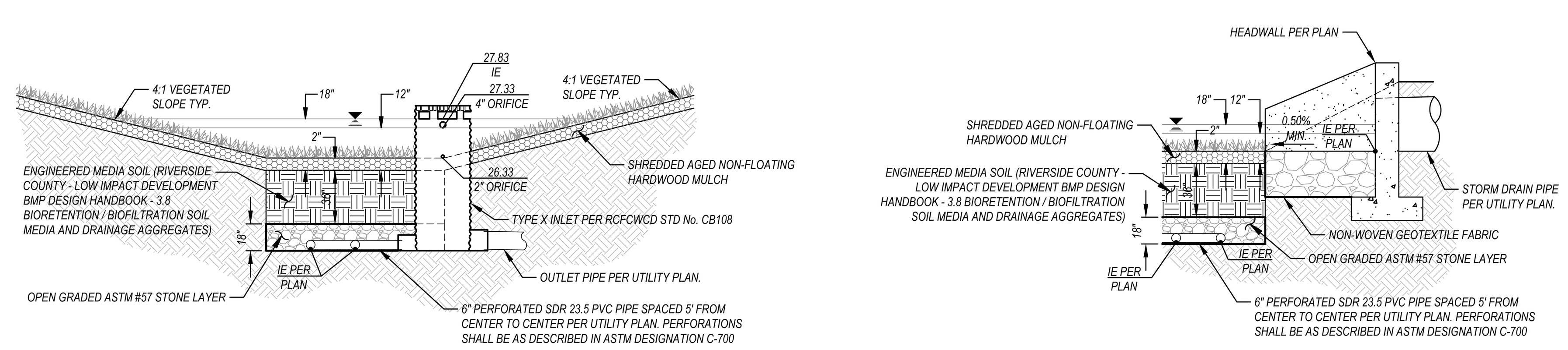
5/23/19TOLEE



TREATMENT FLOW (CFS)	0.115
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

Bio Clean A Forterra Company

MWS-L-4-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

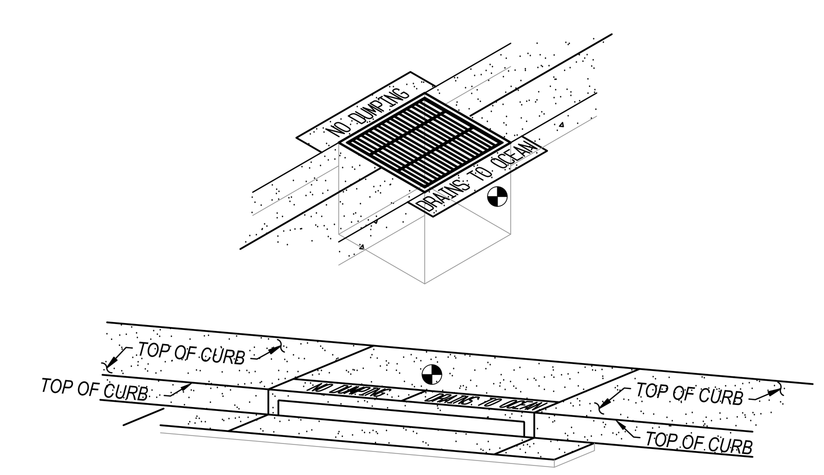


MEDIA SOIL MINERAL COMPONENT RANGE REQUIRMENTS	
WITH OUTLET CONTROL	COMPONENT
WASHED	SAND TYPE
80%	SAND FRACTION, BY VOLUME
COCONUT COIR PITH, PEAT, OR LOW NUTRIENT COMPOST	ORGANIC TYPE
20%	ORGANIC FRACTION, BY VOLUME

30 **BIO-FILTRATION BASIN**

WITH PARTIAL INFILTRATION

NOT TO SCALE



1. STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING DRAINS TO OCEAN".
2. PLACE BOTH STENCILS CENTERED WITHIN THE CATCHBASIN OPENING AND WITHIN THE TOP OF THE CURB.
3. SPRAY BOTH STENCILS WITH WHITE PAINT.
4. REMOVE STENCILS WHEN PAINT IS DRY.

CATCH BASIN STENCILING DETAIL

NOT TO SCALE

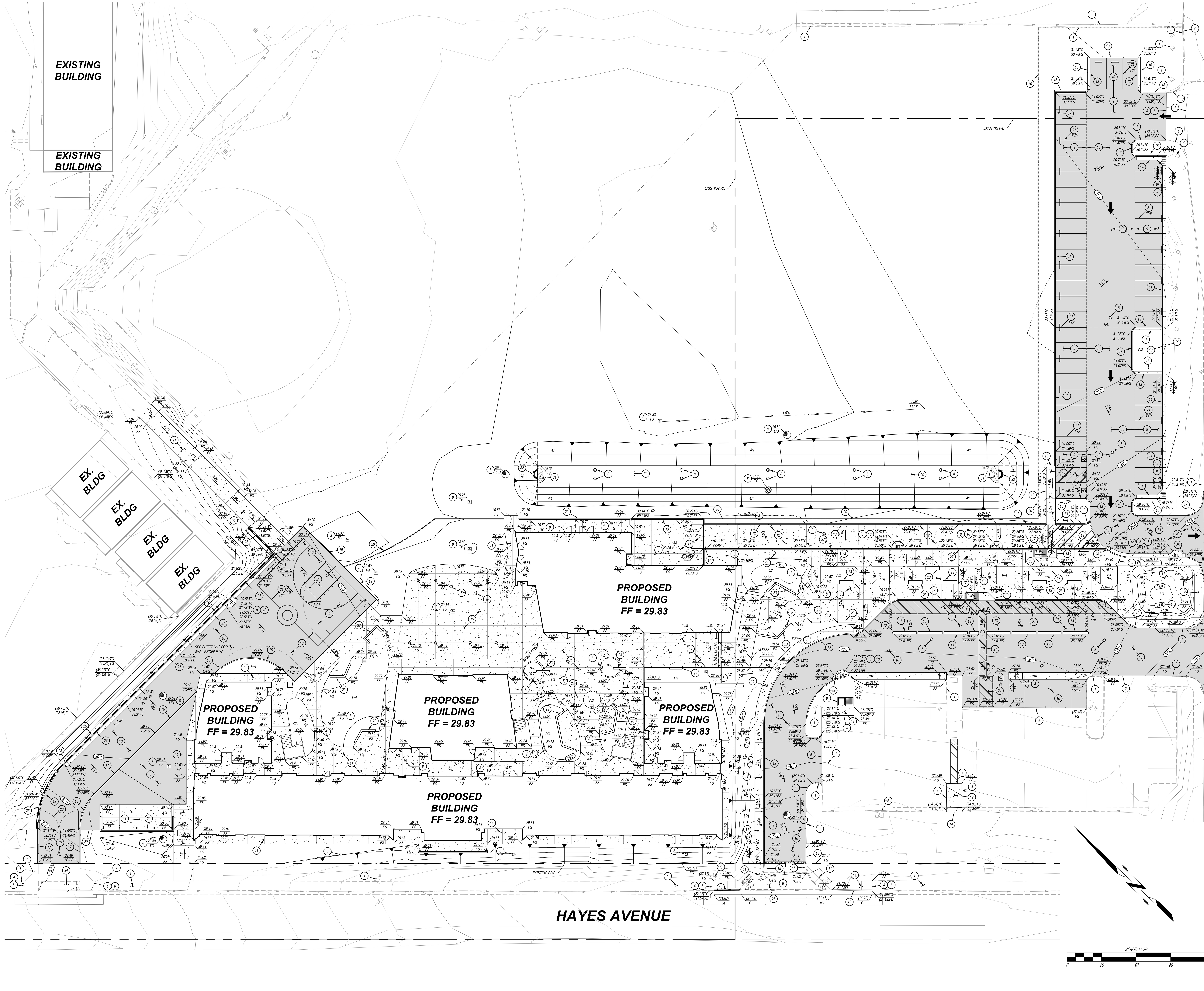
Appendix 2: Construction Plans

Grading and Drainage Plans

Examples of material to provide in Appendix 2 may include but are not limited to the following:

- Site grading plans from the Project's Civil Plan Set,
- Drainage plans showing the exiting condition and proposed drainage system from the project's drainage report,
- Other plan sheets containing elements that impact site grading and drainage.

Refer to Section 4 of the SMR WQMP and Section I of this Template.



IDENTIFICATION STAMP
DIVISION OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES

APPL #

AC ____ F/LS ____ SS ____

DATE:

LICENSED ARCHITECT
RICHARD E. NOWICKI
NO.C28042
EXP 9-30-21
STATE OF CALIFORNIA

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT
MURRIETA CANYON ACADEMY

24150 HAYES AVENUE, MURRIETA, CA 92562

KEYNOTES

LEGEND:

AC	ASPHALT CONCRETE
ADA	AMERICAN DISABILITIES ACT
BFD	BACK FLOW DEVICE
CLF	CHAIN LINK FENCE
CO	CLEAN OUT
CONC	CONCRETE
DCDA	DOUBLE CHECK DETECTOR ASSEMBLY
ELEC	ELECTRIC
EOC	EDGE OF CONCRETE
EP	EDGE OF PAVEMENT
FF	FINISHED FLOOR
FG	FINISHED GROUND
FH	FIRE HYDRANT
FL	FLOWLINE
FDC	FIRE DEPARTMENT CONNECTION
FS	FINISHED SURFACE
GB	GRADE BREAK
HP	HIGH POINT
IE	INVERT (SEWER)
INV	INVERT (SD)
L/A	LANDSCAPE AREA
P/A	PLANTER AREA
PIV	POST INDICATOR VALVE
PP	POWER POLE
RL	RIDGELINE
R/W	RIGHT OF WAY
SW	SIDEWALK
TB	TOP OF BERM
TC	TOP OF CURB
TF	TOP OF FOOTING
TG	TOP OF GRATE
TP	TOP OF PAVEMENT
TW	TOP OF WALL
UTIL	UTILITY
WM	WATER METER
WV	WATER VALVE

PROPOSED CLEANOUT
PROPOSED MANHOLE
POWER POLE
SIGN
TREE
CONTROL POINT
DRAIN BOX
EGDE OF PAVEMENT
GRADED SWALE
EDGE OF CONCRETE
PROPOSED CURB
PROPOSED CURB BACK
PROPOSED WALL
PROPOSED FENCE
GRADE BREAK/RIDGE LINE
PROPOSED AC PAVEMENT
PROPOSED PCC SURFACE
GRIND AND OVERLAY

GRADING CONSTRUCTION NOTES

1. PROTECT IN PLACE SPECIFIED ITEM
2. ADJUST EXISTING ITEM TO PROPOSED FINISHED GRADE
3. REMOVE/RELOCATE SPECIFIED ITEM PER APPROPRIATE CONSULTANT'S PLAN
4. JOIN PROPOSED SURFACE TO EXISTING SURFACE PER DETAIL "A" ON SHEET C6.1 WITH FLUSH TRANSITION, MATCH GRADE. DOWELING FOR PCC ONLY
5. SAWCUT, REMOVE AND DISPOSE OF EXISTING AC PAVEMENT
6. SAWCUT, REMOVE AND DISPOSE OF PCC SURFACE
7. GRIND AND OVERLAY EXISTING ASPHALT SURFACE 0.17' MINIMUM
8. SEE SITE UTILITY PLAN FOR IDENTIFICATION OF OBJECT
9. CONSTRUCT 3" AC OVER 9" CRUSHED AGGREGATE BASE COMPACTED TO 95% RELATIVE COMPACTION, AND 12" SUBGRADE COMPACTED TO 90% RELATIVE COMPACTION.
10. CONSTRUCT 4" AC OVER 12" CRUSHED AGGREGATE BASE COMPACTED TO 95% RELATIVE COMPACTION, AND 12" SUBGRADE COMPACTED TO 90% RELATIVE COMPACTION.
11. CONSTRUCT 4" PCC (520-C-2500) WITH #4 BARS 18" O.C. BOTH WAYS, OVER 2" SAND COMPACTED TO MINIMUM 90% RELATIVE COMPACTION; WITH THICKENED EDGE PER DETAIL "B" ON SHEET C6.1 SCORING PATTERNS, COLOR AND FINISH PER ARCHITECT'S PLANS AND SPECIFICATIONS
12. CONSTRUCT 4" PCC (560-C-3250) OVER 6" CLASS II BASE, COMPACTED TO MINIMUM 95% RELATIVE COMPACTION, WITH #4 BARS 18" O.C. BOTH WAYS, OVER 18" SUBGRADE COMPACTED TO MINIMUM 90% RELATIVE COMPACTION; WITH THICKENED EDGE PER DETAIL "B" ON SHEET C6.1 SCORING PATTERNS, COLOR AND FINISH PER ARCHITECT'S PLANS AND SPECIFICATIONS
13. CONSTRUCT CURB TYPE A1-6 PER SPPWC STANDARD PLAN 120-2 ON SHEET C6.2
14. CONSTRUCT CURB & GUTTER TYPE A2-6 PER SPPWC STANDARD PLAN 120-2 ON SHEET C6.2
15. CONSTRUCT 0" PCC (520-C-2500) CURB ONLY PER DETAIL "C" ON SHEET C6.1
16. CONSTRUCT PCC CURB EXTENSION PER DETAIL "D" ON SHEET C6.1
17. CONSTRUCT 0"- 6" PCC (520-C-2500) CURB TRANSITION PER DETAIL "E" ON SHEET C6.1
18. CONSTRUCT CURB DRAIN INLET APRON PER DETAIL "G" ON SHEET C6.1
19. CONSTRUCT REDWOOD HEADER PER DETAIL "F" ON SHEET C6.1
20. FURNISH AND INSTALL SITE FENCING / RAILING / GATES PER ARCHITECT'S PLANS AND SPECIFICATIONS
21. PAINT / APPLY ACCESSIBLE SIGNING / STRIPING / PAVEMENT MARKINGS PER ARCHITECT'S PLANS AND SPECIFICATIONS
22. CONSTRUCT FREE STANDING WALL PER STRUCTURAL ENGINEER'S DETAILS
23. CONSTRUCT SEATWALL PER ARCHITECT'S PLANS AND SPECIFICATIONS
24. CONSTRUCT CONCRETE DRIVEWAY PER CITY OF MURRIETA STD. NO. "308a" ON SHEET C6.2
25. CONSTRUCT COMMERCIAL DRIVEWAY ENTRANCE ALTERNATE PER CITY OF MURRIETA STD. NO. "310c" ON SHEET C6.2
26. CONSTRUCT RETAINING WALL PER STRUCTURAL ENGINEER'S DETAILS
27. CONSTRUCT CURB TYPE A2-8 PER SPPWC STANDARD PLAN 120-2 ON SHEET C6.2
28. CONSTRUCT 6" CURB TO 8" CURB & GUTTER TRANSITION PER DETAIL "J" ON SHEET C6.1
29. CONSTRUCT 2' WIDE PCC V-DITCH PER DETAIL "K" ON SHEET C6.1
30. CONSTRUCT BIORETENTION BASIN PER SECTION 3.5 OF THE RIVERSIDE COUNTY - LOW IMPACT DEVELOPMENT BMP DESIGN HANDBOOK AND THE BIORETENTION BASIN DETAIL ON SHEET C6.2
31. FURNISH AND INSTALL FACING ROCK SLOPE PROTECTION PER 2015 CALTRANS STANDARD SPECIFICATIONS, METHOD "B" PLACEMENT
32. CONSTRUCT "WING" TYPE HEADWALL PER SAN DIEGO REGIONAL STANDARD DRAWING D-34 ON SHEET C6.2

REGISTERED PROFESSIONAL ENGINEER
TROY DAVID MOLAUG
No. C 59118
CIVIL
STATE OF CALIFORNIA

DIGALERT
Call 2 Working Days Before You Dig!
811

EPIC ENGINEERS
CIVIL ENGINEERING | LAND SURVEYING | PLANNING | STORMWATER MANAGEMENT
101 E. REDLANDS BOULEVARD SUITE 144 REDLANDS, CA 92373
TEL: 909.792.5969
www.epicrcs.com

BakerNowicki design studio
731 Ninth Avenue, Suite A, San Diego, California 92101
619.795.2450
www.bndesignstudio.com

PRECISE GRADING PLAN

NO.	DATE	ISSUE

PROJECT NO: 104.13
DATE: 12/5/2019

DRAWING
C3.1

SEWER LINE DATA TABLE			
NAME	BEARING	LENGTH	SLOPE
S1	S86° 32' 58"E	6.13	S=6.87%
S2	N48° 36' 40"E	35.81	S=6.87%
S3	S86° 32' 58"E	48.97	S=6.87%
S4	S41° 23' 20"E	237.61	S=3.95%
S5	S3° 40' 19"W	8.45	S=3.95%
S6	S41° 42' 52"E	19.62	S=0.56%
S7	S3° 17' 08"W	3.47	S=0.56%

WATER LINE LINE DATA TABLE		
NAME	BEARING	LENGTH
Pipe - (183)	S41° 41' 04"E	9.63
Pipe - (192)	N86° 41' 50"W	7.07
W1	S86° 23' 20"E	61.09
W2	N48° 36' 40"E	28.84
W3	S03° 17' 27"W	41.55
W4	S41° 42' 36"E	123.44
W5	N48° 36' 40"E	7.48
W6	S86° 19' 41"E	29.78
W7	S41° 42' 36"E	5.26
W8	N86° 42' 36"W	31.91
W9	N48° 17' 24"E	2.49
W10	N48° 17' 24"E	44.51
W11	N03° 17' 24"E	8.38
W12	N41° 41' 04"W	25.97
W13	S48° 18' 56"W	3.00
W14	S41° 41' 04"E	2.00
W15	S48° 17' 24"W	1.00
W16	N48° 18' 56"E	4.75
W17	S41° 42' 37"E	30.90
W18	S03° 17' 24"W	32.95
W19	S48° 17' 24"W	7.41

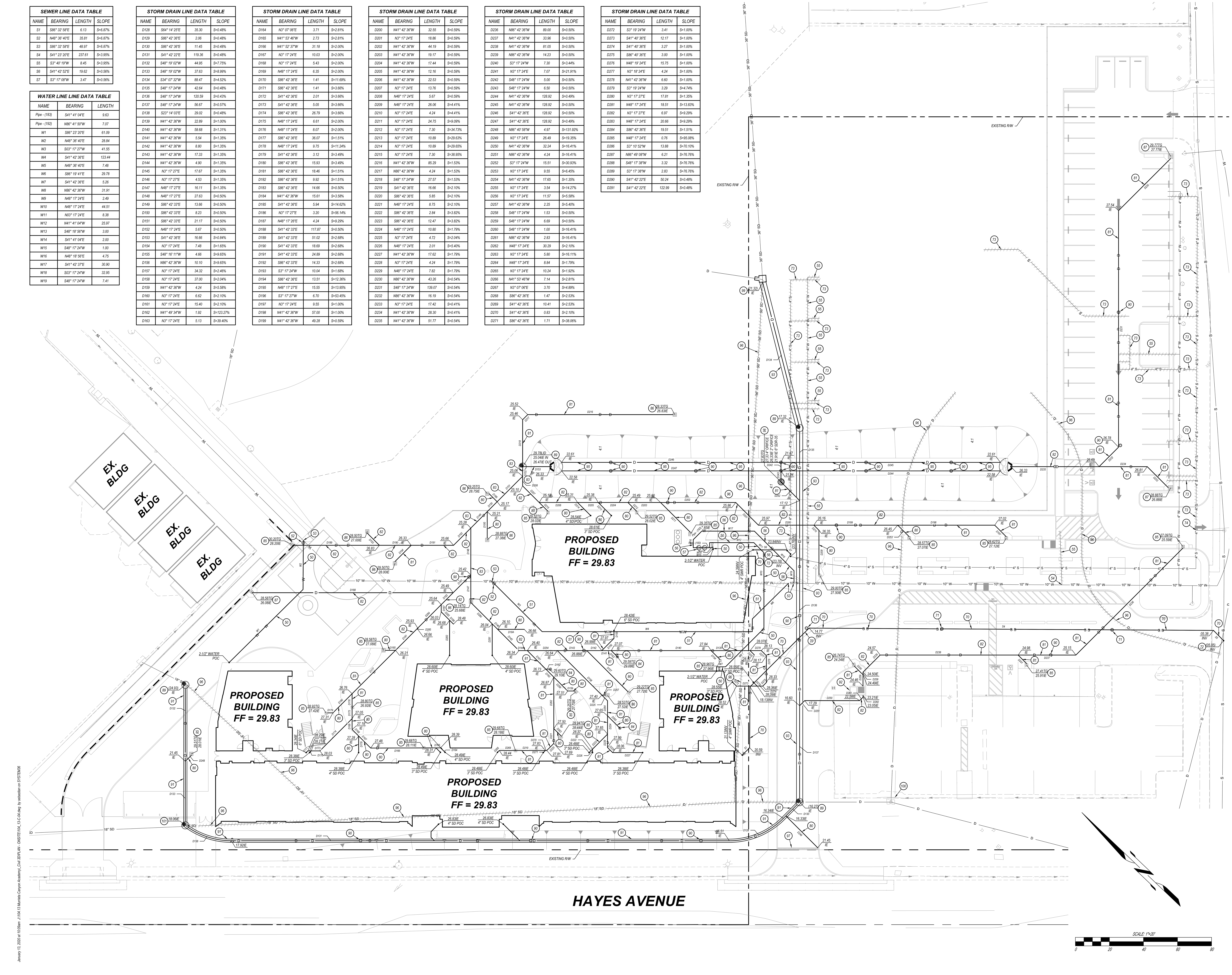
STORM DRAIN LINE DATA TABLE			
NAME	BEARING	LENGTH	SLOPE
D128	S64° 14' 25"E	35.30	S=0.48%
D129	S86° 42' 36"E	2.06	S=0.48%
D130	S86° 42' 36"E	11.45	S=0.48%
D131	S41° 42' 22"E	119.36	S=0.48%
D132	S48° 19' 02"W	44.95	S=7.75%
D133	S48° 19' 02"W	37.63	S=8.99%
D134	S34° 07' 32"W	88.47	S=4.52%
D135	S48° 17' 24"W	42.64	S=0.48%
D136	S48° 17' 24"W	120.59	S=0.43%
D137	S48° 17' 24"W	56.67	S=0.57%
D138	S23° 14' 03"E	29.02	S=0.48%
D139	N41° 42' 36"W	22.89	S=1.00%
D140	N41° 42' 36"W	58.68	S=1.31%
D141	N41° 42' 36"W	5.54	S=1.35%
D142	N41° 42' 36"W	8.80	S=1.35%
D143	N41° 42' 36"W	17.33	S=1.35%
D144	N41° 42' 36"W	4.90	S=1.35%
D145	N3° 17' 27"E	17.67	S=1.35%
D146	N3° 17' 27"E	4.53	S=1.35%
D147	N48° 17' 27"E	16.11	S=1.35%
D148	N48° 17' 27"E	27.63	S=0.50%
D149	S86° 42' 33"E	13.66	S=0.50%
D150	S86° 42' 33"E	8.23	S=0.50%
D151	S86° 42' 33"E	21.17	S=0.50%
D152	N48° 17' 24"E	5.67	S=0.50%
D153	S41° 42' 36"E	16.66	S=0.84%
D154	N3° 17' 24"E	7.48	S=1.65%
D155	S48° 16' 11"W	4.66	S=9.65%
D156	N86° 42' 36"W	10.10	S=9.65%
D157	N3° 17' 24"E	34.32	S=2.46%
D158	N3° 17' 24"E	37.00	S=2.04%
D159	N41° 42' 36"W	4.24	S=5.58%
D160	N3° 17' 24"E	6.62	S=2.10%
D161	N3° 17' 24"E	15.40	S=2.10%
D162	N41° 49' 34"W	1.92	S=123.27%
D163	N3° 17' 24"E	5.13	S=39.40%

STORM DRAIN LINE DATA TABLE			
NAME	BEARING	LENGTH	SLOPE
D164	N3° 07' 06"E	3.71	S=2.81%
D165	N41° 53' 46"W	2.73	S=2.81%
D166	N41° 52' 37"W	31.18	S=2.00%
D167	N3° 17' 24"E	10.03	S=2.00%
D168	N3° 17' 24"E	5.43	S=2.00%
D169	N48° 17' 24"E	6.35	S=2.00%
D170	S86° 42' 36"E	1.41	S=11.69%
D171	S86° 42' 36"E	1.41	S=3.66%
D172	S41° 42' 36"E	2.01	S=3.66%
D173	S41° 42' 36"E	5.05	S=3.66%
D174	S86° 42' 36"E	26.79	S=3.66%
D175	N48° 17' 24"E	6.61	S=2.00%
D176	N48° 17' 24"E	8.07	S=2.00%
D177	S86° 42' 36"E	36.07	S=1.51%
D178	N48° 17' 24"E	9.75	S=11.24%
D179	S41° 42' 36"E	3.12	S=3.49%
D180	S86° 42' 36"E	15.93	S=3.49%
D181	S86° 42' 36"E	18.46	S=1.51%
D182	S86° 42' 36"E	9.92	S=1.51%
D183	S86° 42' 36"E	14.66	S=0.50%
D184	N41° 42' 36"W	15.61	S=3.58%
D185	S41° 42' 36"E	5.94	S=14.62%
D186	N3° 17' 27"E	3.20	S=56.14%
D187	N48° 17' 26"E	4.24	S=9.29%
D188	S41° 42' 33"E	117.87	S=0.50%
D189	S41° 42' 33"E	51.02	S=2.68%
D190	S41° 42' 33"E	18.69	S=2.68%
D191	S41° 42' 33"E	24.89	S=2.68%
D192	S86° 42' 33"E	14.33	S=2.68%
D193	S3° 17' 24"W	10.04	S=1.68%
D194	S86° 42' 36"E	13.51	S=12.36%
D195	N48° 17' 27"E	15.55	S=13.95%
D196	S3° 17' 27"W	6.70	S=53.45%
D197	N3° 17' 24"E	9.55	S=1.00%
D198	N41° 42' 36"W	57.00	S=1.00%
D199	N41° 42' 36"W	49.28	S=0.59%

STORM DRAIN LINE DATA TABLE			
NAME	BEARING	LENGTH	SLOPE
D200	N41° 42' 36"W	32.55	S=0.59%
D201	N3° 17' 24"E	18.86	S=0.59%
D202	N41° 42' 36"W	44.19	S=0.59%
D203	N41° 42' 36"W	19.17	S=0.59%
D204	N41° 42' 36"W	17.44	S=0.59%
D205	N41° 42' 36"W	12.16	S=0.59%
D206	N41° 42' 36"W	22.53	S=0.59%
D207	N3° 17' 24"E	13.76	S=0.59%
D208	N48° 17' 24"E	5.67	S=0.59%
D209	N48° 17' 24"E	26.06	S=4.41%
D210	N3° 17' 24"E	4.24	S=4.41%
D211	N3° 17' 24"E	24.75	S=9.09%
D212	N3° 17' 24"E	7.30	S=34.73%
D213	N3° 17' 24"E	10.89	S=29.63%
D214	N3° 17' 24"E	10.89	S=29.65%
D215	N3° 17' 24"E	7.30	S=38.95%
D216	N41° 42' 36"W	85.29	S=1.53%
D217	N86° 42' 36"W	4.24	S=1.53%
D218	S48° 17' 24"W	27.57	S=1.53%
D219	S41° 42' 36"E	16.66	S=2.10%
D220	S86° 42' 36"E	5.85	S=2.10%
D221	N48° 17' 24"E	8.75	S=2.10%
D222	S86° 42' 36"E	2.84	S=3.82%
D223	S86° 42' 36"E	12.47	S=3.82%
D224	N48° 17' 24"E	10.80	S=1.79%
D225	N3° 17' 24"E	4.72	S=2.04%
D226	N48° 17' 24"E	2.01	S=5.40%
D227	N41° 42' 36"W	17.62	S=1.79%
D228	N3° 17' 24"E	4.24	S=1.79%
D229	N48° 17' 24"E	7.82	S=1.79%
D230	N86° 42' 36"W	43.26	S=0.54%
D231	S48° 17' 24"W	139.07	S=0.54%
D232	N86° 42' 36"W	16.19	S=0.54%
D233	N3° 17' 24"E	17.42	S=0.41%
D234	N41° 42' 36"W	28.30	S=0.41%
D235	N41° 42' 36"W	51.77	S=0.54%

STORM DRAIN LINE DATA TABLE			
NAME	BEARING	LENGTH	SLOPE
D236	N86° 42' 36"W	89.00	S=0.50%
D237	N41° 42' 36"W	33.96	S=0.50%
D238	N41° 42' 36"W	81.05	S=0.50%
D239	N86° 42' 36"W	14.23	S=0.50%
D240	S3° 17' 24"W	7.30	S=3.44%
D241	N3° 17' 24"E	7.07	S=21.91%
D242	S48° 17' 24"W	5.00	S=0.50%
D243	S48° 17' 24"W	6.50	S=0.50%
D244	N41° 42' 36"W	128.92	S=0.49%
D245	N41° 42' 36"W	128.92	S=0.50%
D246	S41° 42' 36"E	128.92	S=0.50%
D247	S41° 42' 36"E	128.92	S=0.49%
D248	N86° 40' 58"W	4.97	S=131.92%
D249	N3° 17' 24"E	26.49	S=19.35%
D250	N41° 42' 36"W	32.24	S=16.41%
D251	N86° 42' 36"W	4.24	S=16.41%
D252	S3° 17' 24"W	15.51	S=30.93%
D253	N3° 17' 24"E	9.55	S=6.45%
D254	N41° 42' 36"W	17.65	S=1.35%
D255	N3° 17' 24"E	3.54	S=14.27%
D256	N3° 17' 24"E	11.57	S=5.58%
D257	N41° 42' 36"W	2.25	S=5.40%
D258	S48° 17' 24"W	1.53	S=0.50%
D259	S48° 17' 24"W	6.69	S=0.50%
D260	S48° 17' 24"W	1.00	S=16.41%
D261	N86° 42' 36"W	2.83	S=16.41%
D262	N48° 17' 24"E	30.29	S=2.10%
D263	N3° 17' 24"E	5.80	S=16.11%
D264	N48° 17' 24"E	8.84	S=1.79%
D265	N3° 17' 24"E	10.24	S=1.92%
D266	N41° 53' 46"W	7.14	S=2.81%
D267	N3° 07' 06"E	3.70	S=4.89%
D268	S86° 42' 36"E	1.47	S=2.53%
D269	S41° 42' 36"E	10.41	S=2.53%
D270	S41° 42' 36"E	0.83	S=2.10%
D271	S86° 42' 36"E	1.71	S=38.06%

STORM DRAIN LINE DATA TABLE			
NAME	BEARING	LENGTH	SLOPE
D272	S3° 19' 24"W	3.41	S=1.00%
D273	S41° 40' 36"E	12.17	S=1.00%
D274	S41° 40' 36"E	3.27	S=1.00%
D275	S86° 40' 36"E	3.00	S=1.00%
D276	N48° 19' 24"E	15.75	S=1.00%
D277	N3° 18' 24"E	4.24	S=1.00%
D278	N41° 42' 36"W	6.60	S=1.00%
D279	S3° 19' 24"W	3.29	S=4.74%
D280	N3° 17' 27"E	17.81	S=1.35%
D281	N48° 17' 24"E	18.51	S=13.83%
D282	N3° 17' 27"E	6.97	S=9.29%
D283	N48° 17' 24"E	20.66	S=9.29%
D284	S86° 42' 36"E	19.51	S=1.51%
D285	N48° 17' 24"E	0.76	S=95.08%
D286	S3° 10' 52"W	13.88	S=70.10%
D287	N86° 49' 08"W	6.21	S=76.76%
D288	S48° 17' 38"W	3.32	S=76.76%
D289	S3° 17' 38"W	2.83	S=76.76%
D290	S41° 42' 22"E	50.24	S=0.48%
D291	S41° 42' 22"E	122.99	S=0.48%



LICENSED ARCHITECT
RICHARD E. NOWICKI
NO.C28042
EXP 9-30-21
STATE OF CALIFORNIA

IDENTIFICATION STAMP
DIVISION OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES

APPL #

AC ______ F/LS ______ SS ______

DATE:

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT
MURRIETA CANYON ACADEMY

24150 HAYES AVENUE, MURRIETA, CA 92562

KEYNOTES

UTILITY CONSTRUCTION NOTES

DOMESTIC WATER

50 FURNISH & INSTALL 2-1/2" SCHEDULE 80 WATER LINE
51 FURNISH & INSTALL 10" WATER LINE, MATCH WATER LINE IN KIND AS RESPECTIVE PIPE
52 FURNISH & INSTALL BRASS BODY BALL VALVE, SAME SIZE AS RESPECTIVE PIPE
53 CONNECT TO EXISTING WATER LINE
54 CAP EXISTING WATER LINE
55 REMOVE AND DISPOSE EXISTING WATER LINE
56 FURNISH & INSTALL 4" C900 PVC WATER LINE
57 FURNISH & INSTALL 4" DETECTOR CHECK ASSEMBLY (FEBCO LF856 OR APPROVED EQUAL) ON SHEET C6.2

SEWER

70 FURNISH & INSTALL 4" SDR 35 PVC SEWER LINE
71 CONSTRUCT PVC SEWER/STORM DRAIN CLEANOUT PER DETAIL "H" ON SHEET C6.1
72 CONNECT TO EXISTING SEWER LINE. CONTRACTOR TO FIELD VERIFY THE VERTICAL AND HORIZONTAL LOCATION AND CONTACT EPIC ENGINEERS WITH RESULTS FOR VERIFICATION TO PROCEED PRIOR TO ANY CONSTRUCTION
73 REMOVE AND DISPOSE EXISTING SEWER LINE
74 CAP EXISTING SEWER LINE

STORM DRAIN

80 FURNISH & INSTALL 4" SDR 35 PVC STORM DRAIN PIPE
81 FURNISH & INSTALL 6" SDR 35 PVC STORM DRAIN PIPE
82 FURNISH & INSTALL 8" SDR 35 PVC STORM DRAIN PIPE
83 FURNISH & INSTALL 12" SDR 35 PVC STORM DRAIN PIPE
84 FURNISH & INSTALL PLANTER AREA DRAIN (SMITH 2673T-U OR CIVIL ENGINEER APPROVED EQUAL) ON SHEET C6.2
85 FURNISH & INSTALL 12" X 12" PREFABRICATED CATCH BASIN (J&R CB1212 OR APPROVED EQUAL) PER DETAIL "I" ON SHEET C6.1
86 FURNISH & INSTALL 18" X 18" PREFABRICATED CATCH BASIN (J&R CB1818 OR APPROVED EQUAL) PER DETAIL "I" ON SHEET C6.1
87 FURNISH & INSTALL 24" X 24" PREFABRICATED CATCH BASIN (J&R CB2424 OR APPROVED EQUAL) PER DETAIL "I" ON SHEET C6.1
88 FURNISH & INSTALL 36" X 36" PREFABRICATED CATCH BASIN (J&R CB3636 OR APPROVED EQUAL) PER DETAIL "I" ON SHEET C6.1
89 CONSTRUCT STORM DRAIN MANHOLE PER SPPWC 2009 ED. STD. PLAN 321-2 ON SHEET C6.2
90 CONSTRUCT PVC SEWER/STORM DRAIN CLEANOUT PER DETAIL "H" ON SHEET C6.1
91 FURNISH & INSTALL 18" RCP STORM DRAIN PIPE
92 FURNISH AND INSTALL BIO-CLEAN (MWS-L-4-8-V) BIOFILTRATION SYSTEM PER MANUFACTURER'S STANDARD DRAWING ON SHEET C6.2
93 FURNISH & INSTALL 36" RCP STORM DRAIN PIPE
94 CONNECT TO EXISTING STORM DRAIN
95 FURNISH & INSTALL 6" SDR 23.5 PERFORATED PVC STORM PIPE. PERFORATIONS SHALL BE AS DESCRIBED IN ASTM DESIGNATION C-700
96 REMOVE AND DISPOSE EXISTING STORM DRAIN LINE
97 CONSTRUCT ACO POWER DRAIN S200K WITH S200K CLASS F 4-BOLT DUCTILE IRON GRATES ON SHEET C6.2
98 CONSTRUCT INLET TYPE X WITH DEBRIS RACK CAGE PER RCFC&WCD STANDARD No. CB108 ON SHEET C6.2. ORIFICES PER PLAN.
99 CONSTRUCT JUNCTION STRUCTURE No.2 PER RCFC&WCD STANDARD DRAWING No. JS227
100 FURNISH AND INSTALL FLOGARD CATCH BASIN INSERT FILTER (MODEL No. FGP-48CI) PER MANUFACTURER'S DETAILS AND SPECIFICATIONS
101 CONSTRUCT STORM DRAIN MANHOLE PER SPPWC 2009 ED. STD. PLAN 321-2 ON SHEET C6.2. MANHOLE LID TO BE GRATED.

REGISTERED PROFESSIONAL ENGINEER
No. C 59118
CIVIL
STATE OF CALIFORNIA

DIGALERT
Call 2 Working Days Before You Dig!
811

EPIC ENGINEERS
CIVIL ENGINEERING | LAND SURVEYING | PLANNING | STORMWATER MANAGEMENT

BakerNowicki design studio
731 Ninth Avenue, Suite A, San Diego, California 92101
619.795.2450
www.bndesignstudio.com

COMPOSITE UTILITIES

NO. DATE ISSUE

PROJECT NO: 104.13
DATE: 12/5/2019

DRAWING
C4.1

Appendix 3: Soils Information

Geotechnical Study, Other Infiltration Testing Data, and/or Other Documentation

Examples of material to provide in Appendix 3 may include but are not limited to the following:

- Geotechnical Study/Report prepared for the project,
- Additional soils testing data (if not included in the Geotechnical Study),
- Exhibits/Maps/Other Documentation of the Hydrologic Soils Groups (HSG)s at the project site.

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 2.3 of the SMR WQMP and Sections A and D of this Template.

GEOTECHNICAL/GEOLOGIC HAZARD REPORT
PROPOSED NEW CLASSROOM BUILDINGS
MURRIETA CANYON ACADEMY
24150 HAYES AVENUE, MURRIETA, CALIFORNIA

Prepared for

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT
41870 McAlby Court
Murrieta, California 92562

Project No. 12393.001

August 20, 2019

Leighton Consulting, Inc.
A LEIGHTON GROUP COMPANY

Leighton Consulting, Inc.
A LEIGHTON GROUP COMPANY

August 20, 2019
Project No. 12393.001

Murrieta Valley Unified School District
41870 McAlby Court
Murrieta, California 92562

Attention: Mr. Randy White

Subject: Geotechnical/Geologic Hazard Report
Proposed New Classroom Buildings
Murrieta Canyon Academy
24150 Hayes Avenue, Murrieta, California

In accordance with your request and authorization, we have performed a geotechnical/ geologic exploration for the proposed Classroom Buildings located within the existing Murrieta Canyon Academy/Thompson Middle School campuses in the City of Murrieta, California. This report summarizes our geotechnical findings, conclusions and recommendations regarding the proposed building. Although this is an existing school site, our report is prepared in general accordance with California Geologic Survey (CGS), Note 48. It should be noted that Leighton previously performed a subsurface fault investigation for the overall property that included also Murrieta Valley HS and Thompson MS (see references) and determined that active faulting does not exist at this site. Further, Leighton also performed compaction testing during grading.

If you have any questions regarding this report, please do not hesitate to contact the undersigned. We appreciate this opportunity to be of service on this project.

Respectfully submitted,

LEIGHTON CONSULTING, INC.

PROFESSIONAL ENGINEER SIMON I SAIID 2641 GEOTECHNICAL STATE OF CALIFORNIA

Simon I. Saiid, GE 2641
Principal Engineer

Mitch Bornyasz CEG 2416
Senior Project Geologist

PROFESSIONAL GEOLOGIST MITCHEL S. BORNYASZ No. 2416 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

Distribution: (1) Addressee
(1) BND, Attn: Eric Schulz

TABLE OF CONTENTS

Section Page

Leighton

Accompanying Tables, Figures, Plates and Appendices

Tables

Figures (end of text)

Appendices

Leighton

1.0 INTRODUCTION

1.1 Purpose and Scope

This geotechnical/geologic hazard report is for the proposed Classroom Buildings at the Murrieta Canyon Academy/Thompson Middle School campuses located at 24150 Hayes Avenue, City of Murrieta, California (*see Figure 1, Site Location Map*). Our scope of services included the following:

- Review of available site-specific geologic information, including previous geotechnical reports listed in the references at the end of this report.
- A site reconnaissance and excavation of fourteen (14) exploratory borings and two percolation tests. Approximate locations of these exploratory borings are depicted on Figure 2.
- Geotechnical laboratory testing of selected soil samples obtained from this exploration. Test procedures and results are presented in Appendix B.
- Geotechnical engineering analyses performed or as directed by a California registered Geotechnical Engineer (GE) and reviewed by a California Certified Engineering Geologist (CEG).
- Preparation of this report which presents our geotechnical conclusions and recommendations regarding the proposed structures.

This report is not intended to be used as an environmental assessment (Phase I or other), or foundation and/or grading plan review.

1.2 Site and Project Description

The Murrieta Canyon Academy located at 24150 Hayes Avenue, Murrieta, California, is a fully functioning adult education school campus constructed during various phases. As depicted on Figure 2, the proposed buildings are generally located within the existing softball fields located immediately north of the existing campus and south of Thompson Middle School. The existing Murrieta Canyon Academy buildings are to be demolished and new parking/landscape to be constructed. Access to all portions of the site was through a locked gate along the south side of the campus.

Our understanding of this project is based on our review of a conceptual site plan prepared by Baker-Nowicki Design Studio (see Figure 2). The project will generally include the design of a new campus (Buildings A through D) with approximately 33,000 square-feet footprint total and associated parking lot, and other site improvements. More specifically, the new campus will include construction of a single-story laboratory and classroom building, student pavilion, administration office, various academic and activity courts with additional parking and landscape at the existing campus. The proposed buildings will contain various classrooms, a library, restrooms, and storage rooms. Details of the proposed grading and construction are not known at this time. The proposed buildings are expected to be single-story structures founded on isolated/spread or continuous wall footings with typical structural loads near existing grades.

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 Field Exploration

Our field exploration for the proposed buildings and parking areas consisted of the excavation of fourteen (14) borings within accessible areas of the site to explore subsurface conditions and provide basis for ground preparation and foundation design. During excavation, in-situ undisturbed (Cal Ring) and disturbed/bulk samples were collected from the exploration borings for further laboratory testing and evaluation. Approximate locations of these exploratory borings are depicted on the *Boring Location Plan* (Figure 2). Sampling was conducted by a staff geologist/engineer from our firm. After logging and sampling, the excavations were loosely backfilled with spoils generated during excavation and cold patch asphalt or rapid-set concrete was used where drilled in existing concrete pavement. The exploration logs from this and previous explorations are included in Appendix A.

2.2 Laboratory Testing

Laboratory tests were performed on representative bulk samples to provide a basis for development of remedial earthwork and geotechnical design parameters. Selected samples were tested to determine the following parameters: maximum dry density and optimum moisture, particle size, expansion index, swell or collapse potential, in-situ moisture and density, and soluble sulfate content. The results of our laboratory testing are presented in Appendix B.

3.0 GEOTECHNICAL AND GEOLOGIC FINDINGS

3.1 Regional Geology

The site is located within a prominent natural geomorphic province in southwestern California known as the Peninsular Ranges. This province is characterized by steep, elongated ranges and valleys that trend northwestward. More specifically, the site is situated within the southern portion of the Perris Block, an eroded mass of Cretaceous and older crystalline rock.

The Perris Block is approximately 20 miles by 50 miles in extent, is bounded by the San Jacinto Fault Zone to the northeast, the Elsinore Fault Zone to the southwest, the Cucamonga Fault Zone to the northwest, and the Temecula Basin to the south. The Perris Block has had a complex tectonic history, apparently undergoing relative vertical land-movements of several thousand feet in response to movement on the Elsinore and San Jacinto Fault Zones. Thin sedimentary and volcanic materials locally mantle crystalline bedrock. Young and older alluvial deposits fill the lower valley areas, as mapped regionally on Figure 4, *Regional Geology Map*.

3.2 Site Specific Geology

3.2.1 Earth Materials

Our field exploration, observations, and review of the pertinent literature indicate that the site is underlain by alluvial deposits and dense formational materials locally known as Pauba Formation. Artificial fill associated with previous site grading mantles the site. The following is a summary of the geologic conditions based on our borings.

- **Artificial Fill:** Artificial fill soils were generally observed within the upper 10 feet below ground surface. As encountered, these fills consist of moist, medium dense to dense, silty to clayey sand and sandy clay. Based on the results of our laboratory testing, these materials are expected to possess low to medium expansion potential (EI<91).

- **Pauba Formation:** Pleistocene aged Pauba Formation materials were encountered in our borings below the artificial fill. As encountered in the exploratory excavations, these materials consist of damp to moist, very stiff to dense, silty to clayey sand and sandy to silty clay. These materials are expected to possess similar expansion potential as the artificial fill.

3.3 Groundwater and Surface Water

No standing or surface water was observed on the site at the time of our field exploration. In addition, no groundwater was encountered during this investigation to the total depth explored of 31.5 feet. Historic groundwater data is not available for this site or nearby sites.

3.4 Faulting

The subject site, like the rest of Southern California, is located within a seismically active region as a result of being located near the active margin between the North American and Pacific tectonic plates. The principal source of seismic activity is movement along the northwest-trending regional fault systems such as the San Andreas, San Jacinto, and Elsinore Fault Zones. Based on published geologic maps, this site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone, but located within Riverside County Fault Hazard Zone (see Figure 5). However, this site was cleared of any active faulting based on previous fault studies (Leighton, 1989). Moreover, no indications of faulting or fault related fissuring or fracturing was observed onsite during this investigation. The nearest known active fault is the Temecula Segment of the Elsinore Fault Zone located approximately 0.6 miles (0.97 kilometers) northeast of the site.

Historically, the Elsinore fault zone has produced earthquakes in the magnitude range of 6.5Mw to 7.1Mw (‘Mw’ is the Moment Magnitude as defined by the U.S.G.S). A table of major quakes (>5.5 Mw) within 30 miles of the site in the last 150 years (per CGS Website, December 2017), is presented in table below:

Table 1. Major Quakes (>5.5 Mw) in the last 150 years

Date	Moment Magnitude (Mw)	Approx. Distance from Site (km)	General Location
1880-12-19	6.0	37.8	East San Bernardino
1899-12-25	6.4	34.2	San Jacinto / Hemet
1910-05-15	6.0	21.8	Glen Ivy Hot Springs
1918-04-21	6.8	30.1	San Jacinto

3.5 Ground Shaking / Site-Specific Ground Motion Analysis

A site-specific ground motion analysis was performed in accordance with the 2016 California Building Code (CBC) following the procedures of ASCE 7-10 Publication, Section 21.2, as presented in Appendix C.

The probabilistic seismic hazard analysis was performed using the computer program EZ-FRISK (Risk Engineering, 2011) to estimate peak horizontal ground acceleration (PHGA) that could occur at the site, and to develop design response spectra. Various probabilistic density functions were used in this analysis to assess uncertainty inherent in these calculations with respect to magnitude, distance and ground motion. An averaging of the following four next-generation attenuation relationships (NGAs) was used with equal weights to calculate site-specific PHGA and spectra:

- Abrahamson-Silva (2008)
- Boore-Atkinson (2008),
- Campbell-Bozorgnia (2008), and
- Chiou-Youngs (2007)

The design response spectrum shown on Figure C-1 is derived from a comparison of probabilistic Maximum Considered Earthquake (MCE) and the 150 percent of the deterministic MCE as presented in Figures C-2 through C-3. In accordance with the 2016 CBC, peak ground accelerations are estimated based on maximum considered earthquake ground motion having a 2 percent probability of exceedance in 50 years) or site specific seismic hazard analysis (ASCE, 2010). The site-specific seismic coefficients are presented in Table 2 below.

Table 2. Site-Specific Seismic Coefficients

CBC Categorization/Coefficient		USGS General Procedure (g)*	EZ-Frisk Procedure (g)
Site Longitude (decimal degrees)	-117.23306		
Site Latitude (decimal degrees)	33.56075		
Site Class Definition	**D**		
Mapped Spectral Response Acceleration at 0.2s Period, S_s		**2.02**	**2.05**
Mapped Spectral Response Acceleration at 1s Period, S_1		**0.81**	**0.71**
Short Period Site Coefficient at 0.2s Period, F_a		**1.00**	**1.00**
Long Period Site Coefficient at 1s Period, F_v		**1.50**	**1.50**
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS}		**2.02**	**2.05**
Adjusted Spectral Response Acceleration at 1s Period, S_{M1}		**1.22**	**1.07**
Design Spectral Response Acceleration at 0.2s Period, S_{DS}		**1.35**	**1.37**
Design Spectral Response Acceleration at 1s Period, S_{D1}		**0.81**	**0.71**

*g- Gravity acceleration, ***S_{D1} is calculated based on 2xSa* at 2s

The above listed seismic coefficients were calculated following the ASCE 7-10 procedures. We recommend the higher of the seismic coefficients be used in the design.

Leighton

3.6 Secondary Seismic Hazards

Ground shaking can induce “secondary” seismic hazards such as liquefaction, dynamic densification, and differential subsidence along ground fissures, seiches and tsunamis, as discussed in the following subsections:

3.6.1 Dynamic Settlement (Liquefaction and Dry Settlement)

Liquefaction-induced or dynamic dry settlement is not considered a hazard at this site due to the lack of shallow groundwater and dense underlying Pauba formation. The seismic differential settlement is expected to be less than 0.5 inch in a 40-foot horizontal distance within this site.

3.6.2 Lateral Spreading

The potential for lateral spreading is considered non-existent on this site.

3.6.3 Ground Rupture

Since no active faults are known to cross or trend into the site, the possibility of damage due to ground surface-fault-rupture at this site is considered very low.

3.6.4 Seiches, Tsunamis, Inundation Due to Large Water Storage Facilities

Due to the great distance to large bodies of water, the possibility of seiches and tsunamis impacting the site is considered remote. This report does not address conventional flood hazard risk.

3.6.5 Rock Falls

The potential for rock fall due to either erosion or seismic ground shaking is considered non-existent on this area.

3.6.6 Slope Stability and Landslides

Due to the relatively modest relief across the site, the risk of deep-seated slope failure on this site or adjacent sites is considered non-existent. The existing 2:1 fill slope along the south side of the campus is considered grossly stable. The site is not considered susceptible to seismically induced landslides.

3.6.7 Dam Inundation/Flood Hazard

This report does not address conventional flood hazard risk associated with this site. However, per the official FEMA Flood Hazard Areas Map (FIRM Panel 06065C2715G), this site is located in Zone X – “Area of minimal flood hazard” In accordance with Figure 8, the site is not located within Diamond Valley Saddle dam inundation zone (Riverside, 2019).

3.6.8 Subsidence

In accordance with County of Riverside Geologic Hazard Maps (Riverside, 2019), the site is located within an area susceptible to subsidence. However, based on the results of our subsurface evaluation and lack of evidence of differential subsidence and associated ground fissuring, we consider the potential for differential subsidence and ground fissuring on this site to be very low.

3.7 Percolation/Infiltration Test Results

Two percolation tests were performed within the proposed infiltration areas at the site in the existing playfield area (see Figure 2). The percolation tests were performed in accordance with procedures of Section 2.3 of the Riverside County Flood Control and Water Conservation District (RCFC&WCD) Design Handbook (RCFC, 2011). Results presented below are the most conservative reading in minutes per inch drop. The infiltration rates were estimated using the Porchet Method. No factor of Safety was applied to these values.

Table 3. Summary of Percolation/Infiltration Test Results

Test Hole #	Depth BGS (ft)	Percolation Rate (min/in)	Infiltration Rate (in/hr)	Soil Description
P-1	4	>120	<0.01	Silty/Clayey SAND (SC-SM) / Artificial Fill
P-2	4	27.8	0.20	Silty SAND (SM) / Artificial Fill

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 General

The proposed buildings/improvements appear feasible from a geotechnical viewpoint provided that the following recommendations are incorporated into the design and construction phases of development.

4.2 Earthwork

Earthwork should be performed in accordance with the following recommendations and the *Earthwork and Grading Specifications* included in Appendix D of this report. In case of conflict, the following recommendations should supersede those in Appendix D. The contract between the Owner and the earthwork contractor should be worded such that it is the responsibility of the contractor to place fill properly and in accordance with recommendations presented in this report, including the guide specifications in Appendix D, notwithstanding the testing and observation of the geotechnical consultant.

4.2.1 Site Preparation and Remedial Grading

Prior to grading, the proposed structural improvement areas (i.e. all-structural fill areas, pavement areas, buildings, etc.) of the site should be cleared of surface and subsurface obstructions. Heavy vegetation, roots and debris should be disposed of offsite. Although not anticipated, water wells, septic tanks and cesspools, if encountered, should be removed or abandoned in accordance with the Riverside County Department of Health Services guidelines. Voids created by removal of buried material should be backfilled with properly compacted soil in general accordance with the recommendations of this report. Area specific remedial grading recommendations are provided as follows:

- **Building Footprints:** Within the building footprint, the upper 3 feet of soils, or 2 feet below bottom of footings/slab-on-grade, whichever is deeper, should be removed/over-excavated and recompacted. If bottom of footings are deeper than 3 feet below existing grade, no over-excavation will be required provided the exposed bottom of excavation is scarified and recompacted to minimum of 90 percent of the ASTM D 1557 and approved by the geotechnical consultant. The over-excavation and recompaction should extend a minimum horizontal distance equal to the depth of removal. Localized areas of deeper removals/over-excavation may be required depending on the actual conditions encountered pending verification by our field representative during grading to confirm encountered soils are suitable.

- **Flatwork/Pavement:** In areas of proposed concrete flatwork or pavement, a minimum remedial removal and recompaction of 2-feet below existing grade or 12-inches below proposed subgrade elevation, whichever is deeper, should be performed. This remedial removal should be performed to a minimum of 2 feet beyond the limits of improvements. The bottom of the removal should be proof-rolled with heavy equipment to identify yielding subgrade conditions (for additional removal, if necessary) under the observation of the geotechnical consultant.

After completion of the recommended removal of existing fill soils and prior to fill placement, the exposed surface should be scarified to a minimum depth of 8-inches, moisture conditioned as necessary to near optimum moisture content and recompacted using heavy compaction equipment to an unyielding condition. All structural fill within the building footprints should be compacted throughout to 90 percent per ASTM D 1557.

4.2.2 Suitability of Site Soils for Fills

Topsoil and vegetation layers, root zones, and similar surface materials should be striped and stockpiled for either reuse in landscape surface areas or removed from the site. Site existing fill should be considered suitable for re-use as compacted fills provided the recommendations contained herein are followed. If cobbles/boulders larger than 6-inches in largest diameter or expansive soils (21<EI<91) are encountered, these materials should not be placed with the upper 5 feet of subgrade soils.

4.2.3 Import Soils

Import soils and/or borrow sites, if needed, should be evaluated by us prior to import. Import soils should be uncontaminated, granular in nature, free of organic material (loss on ignition less-than 2 percent), have low expansion potential (EI<91) and have a low corrosion impact to the proposed improvements.

4.2.4 Utility Trenches

Utility trenches should be backfilled with compacted fill in accordance with the *Standard Specifications for Public Works Construction,* ("Greenbook"), 2018 Edition. Fill material above the pipe zone should be placed in lifts not exceeding 8 inches in uncompacted thickness and should be compacted to at least 90 percent relative compaction (ASTM D 1557) by mechanical means only. Site soils may generally be suitable as trench backfill provided these soils are screened of rocks over 1½ inches in diameter and organic matter. The upper 6 inches of backfill in all pavement areas should be compacted to at least 95 percent relative compaction.

Where granular backfill is used in utility trenches adjacent moisture sensitive subgrades and foundation soils, we recommend that a cut-off "plug" of impermeable material be placed in these trenches at the perimeter of buildings, and at pavement edges adjacent to irrigated landscaped areas. A "plug" can consist of a 5-foot long section of clayey soils with more than 35-percent passing the No. 200 sieve, or a Controlled Low Strength Material (CLSM) consisting of one sack of Portland-cement plus one sack of bentonite per cubic-yard of sand. CLSM should generally conform to "Greenbook", latest edition. This is intended to reduce the likelihood of water permeating trenches from landscaped areas, then seeping along permeable trench backfill into the building and pavement subgrades, resulting in wetting of moisture sensitive subgrade earth materials under buildings and pavements.

Excavation of utility trenches should be performed in accordance with the project plans, specifications and the *California Construction Safety Orders*. The contractor should be responsible for providing a "competent person" as defined in Article 6 of the *California Construction Safety Orders*. Contractors should be advised that sandy soils (such as fills generated from the onsite alluvium) could make excavations particularly unsafe if all safety precautions are not properly implemented. In addition, excavations at or near the toe of slopes and/or parallel to slopes may be highly unstable due to the increased driving force and load on the trench wall. Spoil piles from the excavation(s) and construction equipment should be kept away from the sides of the trenches. Leighton Consulting, Inc. does not consult in the area of safety engineering.

4.2.5 Shrinkage

The volume change of excavated onsite soils upon recompaction is expected to vary with materials, density, insitu moisture content, and location and compaction effort. The in-place and compacted densities of soil materials vary and accurate overall determination of shrinkage and bulking cannot be made. Therefore, we recommend site grading include, if possible, a balance area or ability to adjust grades slightly to accommodate some variation. Based on our geotechnical laboratory results, we expect a recompaction shrinkage (when recompacted at 90 to 95 percent of ASTM D 1557) of 5- to 15-percent by volume, for the onsite fill or alluvium. Subsidence due solely to scarification, moisture conditioning and recompaction of the exposed bottom of over-excavation, is expected to be on the order of 0.10 foot. This should be added to the above shrinkage value for the recompacted fill zone, to calculate overall recompaction subsidence.

4.2.6 Drainage

All drainage should be directed away from structures and pavements by means of approved permanent/temporary drainage devices. Adequate storm drainage of any proposed pad should be provided to avoid wetting of foundation soils. Irrigation adjacent to buildings should be avoided when possible. As an option, sealed-bottom planter boxes and/or drought resistant vegetation should be used within 5-feet of buildings.

4.3 Foundation Design

Shallow spread footings bearing on a newly placed and properly compacted fill are anticipated for the proposed structures.

4.3.1 Design Parameters – Spread/Continuous Shallow Footings

Conventional spread/continuous shallow footings appear to be feasible to support the proposed structures. Footings should be embedded at least 12-inches below lowest adjacent grade for the proposed structure. Footing embedments should be measured from lowest adjacent finished grade, considered as the top of interior slabs-on-grade or the finished exterior grade, excluding landscape topsoil, whichever is lower. Footings located adjacent to utility trenches or vaults should be embedded below an imaginary 1:1 (horizontal:vertical) plane projected upward and outward from the bottom edge of the trench or vault, up towards the footing.

- **Bearing Capacity**: A net allowable bearing capacity of 2,000 pounds per square foot (psf) may be used for design assuming that footings have a minimum base width of 18 inches for continuous wall footings and a minimum bearing area of 3 square feet (1.75-ft by 1.75-ft) for pad foundations. These bearing values may also be increased by one-third when considering short-term seismic or wind loads. All continuous perimeter or interior footings should be reinforced with at least one No. 5 bar placed both top and bottom.

- **Lateral loads**: Lateral loads may be resisted by friction between the footings and the supporting subgrade. A maximum allowable frictional resistance of 0.30 may be used for design. In addition, lateral resistance may be provided by passive pressures acting against foundations poured neat against properly compacted granular fill. We recommend that an allowable passive pressure based on an equivalent fluid pressure of 300 pounds-per-cubic-foot (pcf) be used in design. These friction and passive values have already been reduced by a factor-of-safety of 1.5.

Based on Section 1808.6.2 of the 2016 California Building Code, slab-on-grade design for expansive soils (EI>21) should be designed in accordance with *WRI/CRSI Design of Slab-On-Ground Foundations* or *PTI DC 10.5* taking into consideration the anticipated differential settlement. The following soil parameters may be used:

WRI/CRSI Design Method

- Effective Plasticity Index: 20
- Climatic Rating: Cw = 15
- Reinforcement: Per structural designer.
- Moisture condition subgrade soils to 100% of optimum moisture content to a depth of 12 inches prior to trenching for footings.

PTI DC 10.5 Design Method

The following PTI design parameters were derived using VOLFLO 1.5 computer program developed by Geostructural Tool Kit, Inc. and laboratory test results:

Table 4. PTI Design Parameters

Design Parameters	EI≤90
Thornthwaite Moisture Index	-20
Depth to Constant Soil Suction	9.0 feet
Constant Soil Suction	3.9 feet
Edge Moisture Variation Distance, e_m - Edge Lift - Center Lift	 4.8 feet 9.0 feet
Soil Differential Movement, y_m - Edge Lift - Swell - Center Lift – Shrink	 1.2 inches 0.7 inch

The differential settlements provided below should be considered in addition to the shrink/swell settlement given in table above.

4.3.2 Settlement Estimates

For settlement estimates, we assumed that column loads will be no larger than 100 kips, with bearing wall loads not exceeding 5 kips per foot of wall. If greater column or wall loads are required, we should re-evaluate our foundation recommendation, and re-calculate settlement estimates.

Buildings located on compacted fill soils (as recommended in Section 4.2.1) should be designed in anticipation of 1-inch of total static settlement and ½- inch of static differential settlement within a 40 foot horizontal run. The majority of this settlement is anticipated to occur during construction as the load is applied. The estimated differential dynamic settlement will be less than ½-inch within a 40 feet horizontal distance or between two similar structural elements. These settlement estimates should be reevaluated by this firm when foundation plans and actual loads for the proposed structure(s) become available. The structural engineer should consider the effects of both static and dynamic settlements.

4.4 Retaining Walls

The proposed building will require a large retaining wall up to approximately 10 feet in height. Retaining wall earth pressures are a function of the amount of wall yielding horizontally under load. If the wall can yield enough to mobilize full shear strength of backfill soils, then the wall can be designed for "active" pressure. If the wall cannot yield under the applied load, the shear strength of the soil cannot be mobilized and the earth pressure will be higher. Such walls should be designed for "at rest" conditions. If a structure moves toward the soils, the resulting resistance developed by the soil is the "passive" resistance. Retaining walls backfilled with non-expansive soils should be designed using the following equivalent fluid pressures:

Table 5. Retaining Wall Design Earth Pressures (Static, Drained)

Loading Conditions	Equivalent Fluid Density (pcf)	
	Level Backfill	2:1 Backfill
Active	36	50
At-Rest	55	85
Passive*	300	150 (2:1, sloping down)

* This assumes level condition in front of the wall will remain for the duration of the project, not to exceed 4,500 psf at depth.

Unrestrained (yielding) cantilever walls should be designed for the active equivalent-fluid weight value provided above for very low expansive soils that are free draining. In the design of walls restrained from movement at the top (non-yielding) such as basement or elevator pit/utility vaults, the at-rest equivalent fluid weight value should be used. Total depth of retained earth for design of cantilever walls should be measured as the vertical distance below the ground surface measured at the wall face for stem design, or measured at the heel of the footing for overturning and sliding calculations. Should a sloping backfill other than a 2:1 (horizontal:vertical) be constructed above the wall (or a backfill is loaded by an adjacent surcharge load), the equivalent fluid weight values provided above should be re-evaluated on an individual case basis by us. Non-standard wall designs should also be reviewed by us prior to construction to check that the proper soil parameters have been incorporated into the wall design.

All retaining walls should be provided with appropriate drainage. The outlet pipe should be sloped to drain to a suitable outlet. Wall backfill should be non-expansive (EI $\leq$ 21) sands compacted by mechanical methods to a minimum of 90 percent relative compaction (ASTM D 1557). Clayey site soils should not be used as wall backfill. Walls should not be backfilled until wall concrete attains the 28-day compressive strength and/or as determined by the Structural Engineer that the wall is structurally capable of supporting backfill. Lightweight compaction equipment should be used, unless otherwise approved by the Engineer.

4.5 Vapor Retarder

It has been a standard of care to install a moisture retarder underneath all slabs where moisture condensation is undesirable. Moisture vapor retarders may retard but not totally eliminate moisture vapor movement from the underlying soils up through the slabs. Moisture vapor transmission may be additionally reduced by use of concrete additives. Leighton Consulting, Inc., does not practice in the field of moisture vapor transmission evaluation/mitigation. Therefore, we recommend that a qualified person/firm be engaged/consulted with to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. This person/firm should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structure as deemed appropriate.

4.6 Footing Setbacks

We recommend a minimum horizontal setback distance from the face of slopes for all structural footings (including retaining and decorative walls, building footings, etc.). This distance is measured from the outside bottom edge of the footing horizontally to the slope face (or to the face of a retaining wall) and should be a minimum of H/3, where H is the slope height (in feet). The setback should not be less than 7 feet and need not be greater than 15 feet.

The soils within the structural setback area may possess poor lateral stability and improvements (such as retaining walls, decks, sidewalks, fences, pavements, etc.) constructed within this setback area may be subject to lateral movement and/or differential settlement. Potential distress to such improvements may be mitigated by providing a deepened footing or a pier and grade-beam foundation system to support the improvement. The deepened footing should meet the setback as described above.

4.7 Sulfate Attack

The results of our laboratory testing indicate that the onsite soils have soluble sulfate content of less than 2,000 ppm. Type II cement or similar may be used for design of concrete structures in contact with the onsite soils.

4.8 Preliminary Pavement Design

Our preliminary pavement design is based on an assumed R-value of 17 and the guidelines included in Caltrans Highway Design Manual. For planning and estimating purposes, the pavement sections are calculated based on Traffic Indexes (TI) as indicated in Table below:

Table 6. Asphalt Pavement Sections

General Traffic Condition	Design Traffic Index (TI)	Asphalt Concrete (inches)	Aggregate Base* (inches)
Automobile Parking Lanes	4.5	3.0	6.0
	5.0	3.0	7.5
Truck Access & Driveways	6.0	4.0	9.0
	6.5	4.5	10.0

Appropriate Traffic Index (TI) should be selected or verified by the project civil engineer or traffic engineering consultant and appropriate R-value of the subgrade soils will need to be verified after completion of rough grading to finalize the pavement design. Pavement design and construction should also conform to applicable local, county and industry standards. The Caltrans pavement section design calculations were based on a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance

For preliminary planning purposes, fire lanes and truck loading areas may be constructed of Portland Cement Concrete (PCC) with a minimum thickness of 6.0 inches assuming light axle loads and an average daily truck traffic (ADTT) of less than 500. For medium/heavy axle loads and an ADT of 500 or more, a minimum PCC thickness of 8 inches should be used, such as for trash corrals and trash truck aprons, loading docks, etc. All PCC pavement should have a minimum 28-day concrete compressive strength of 3,250 psi and have appropriate joints and saw cuts in accordance with either Portland Cement Association (PCA) or American Concrete Institute (ACI) guidelines. PCC subgrade should be compacted to 95 percent relative compaction in the upper 6 inches. A 4-inch (minimum) layer of Class 2 aggregate base at 95 percent relative compaction should be considered beneath the PCC paving. The upper 6 inches of the underlying subgrade soils should also be compacted to at least 95 percent relative compaction (ASTM D1557). Minimum relative compaction requirements for aggregate base should be 95 percent of the maximum laboratory density as determined by ASTM D1557. If applicable, aggregate base should conform to the "Standard Specifications for Public Works Construction" (green book) current edition <u>or</u> Caltrans Class 2 aggregate base.

If pavement areas are adjacent to heavily watered landscape areas, some deterioration of the subgrade load bearing capacity may result. Moisture control measures such as deepened curbs or other moisture barrier materials may be used to prevent the subgrade soils from becoming saturated. The use of concrete cutoff or edge barriers should be considered when pavement is planned adjacent to either open (unfinished) or irrigated landscaped areas.

5.0 GEOTECHNICAL CONSTRUCTION SERVICES

Geotechnical review is of paramount importance in engineering practice. Poor performances of many foundation and earthwork projects have been attributed to inadequate construction review. We recommend that Leighton Consulting, Inc. be provided the opportunity to review the grading plan and foundation plan(s) prior to bid.

Reasonably-continuous construction observation and review during site grading and foundation installation allows for evaluation of the actual soil conditions and the ability to provide appropriate revisions where required during construction. Geotechnical conclusions and preliminary recommendations should be reviewed and verified by Leighton Consulting, Inc. during construction, and revised accordingly if geotechnical conditions encountered vary from our findings and interpretations. Geotechnical observation and testing should be provided:

- After completion of site demolition and clearing,
- During over-excavation of compressible soil,
- During compaction of all fill materials,
- After excavation of all footings and prior to placement of concrete,
- During utility trench backfilling and compaction, and
- When any unusual conditions are encountered.

Additional geotechnical exploration and analysis may be required based on final development plans, for reasons such as significant changes in proposed structure locations/footprints. We should review grading (civil) and foundation (structural) plans, and comment further on geotechnical aspects of this project.

Leighton

Project: 12393.001	Eng/Geol: SIS/RFR
Scale:1 " = 2,000 '	Date: August 2019

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton
Author: Leighton Geomatics (btran)

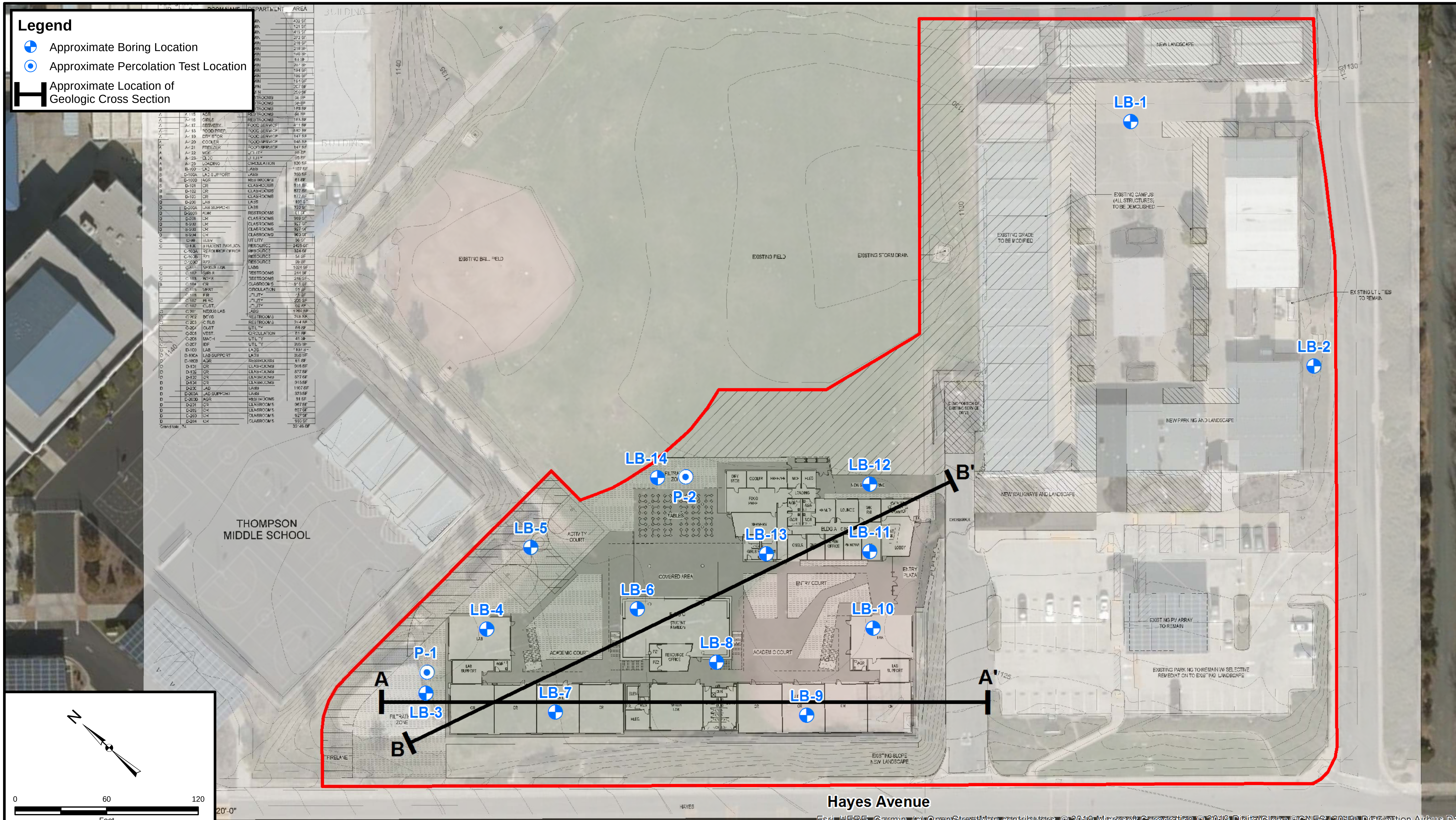
SITE LOCATION MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 1

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F01_SLM_2019-08-20.mxd on 8/20/2019 11:17:54 AM



Project: 12393.001	Eng/Geol: SIS/RFR
Scale:1 " = 60 '	Date: August 2019

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton
Author: Leighton Geomatics (btran)

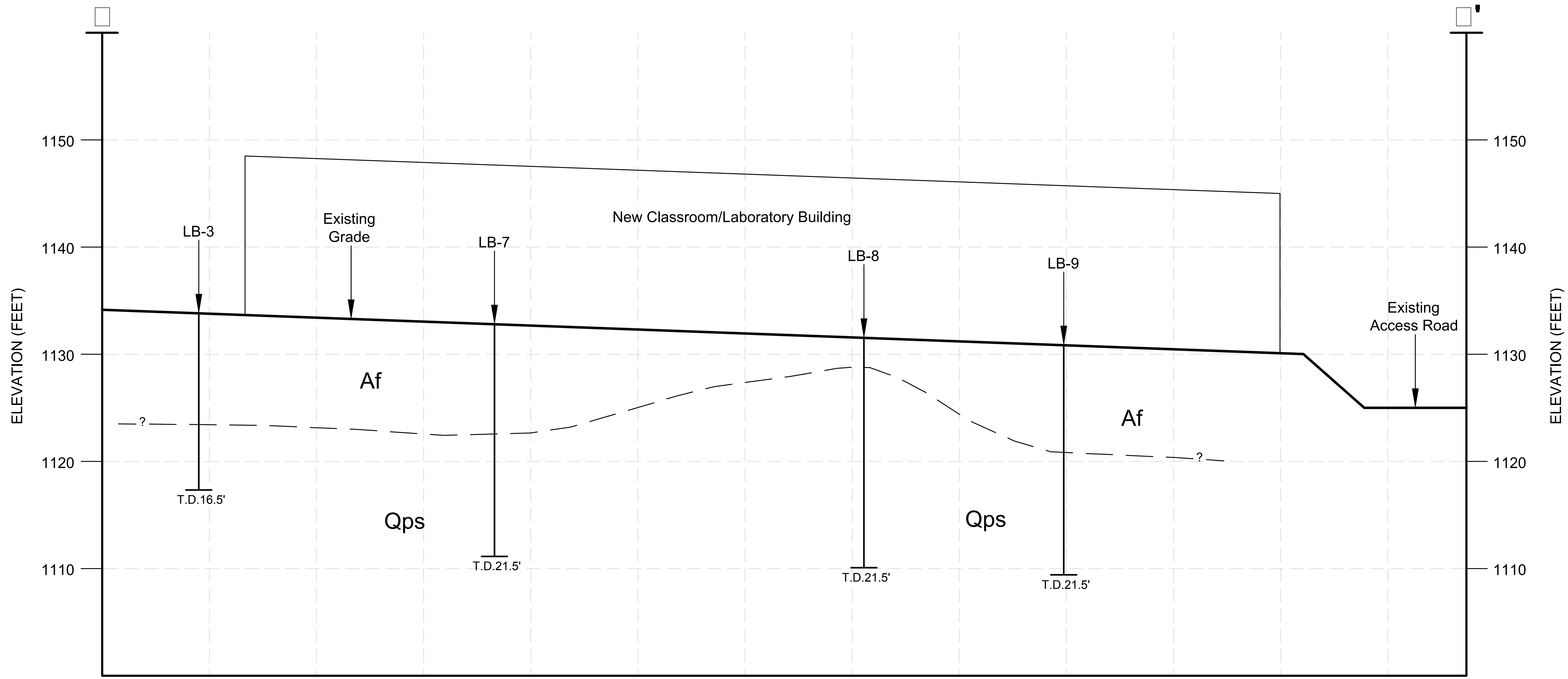
BORING LOCATION MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 2

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F02_BLM_2019-08-20.mxd on 8/20/2019 9:25:28 AM



GEOLOGIC CROSS SECTION □-□'

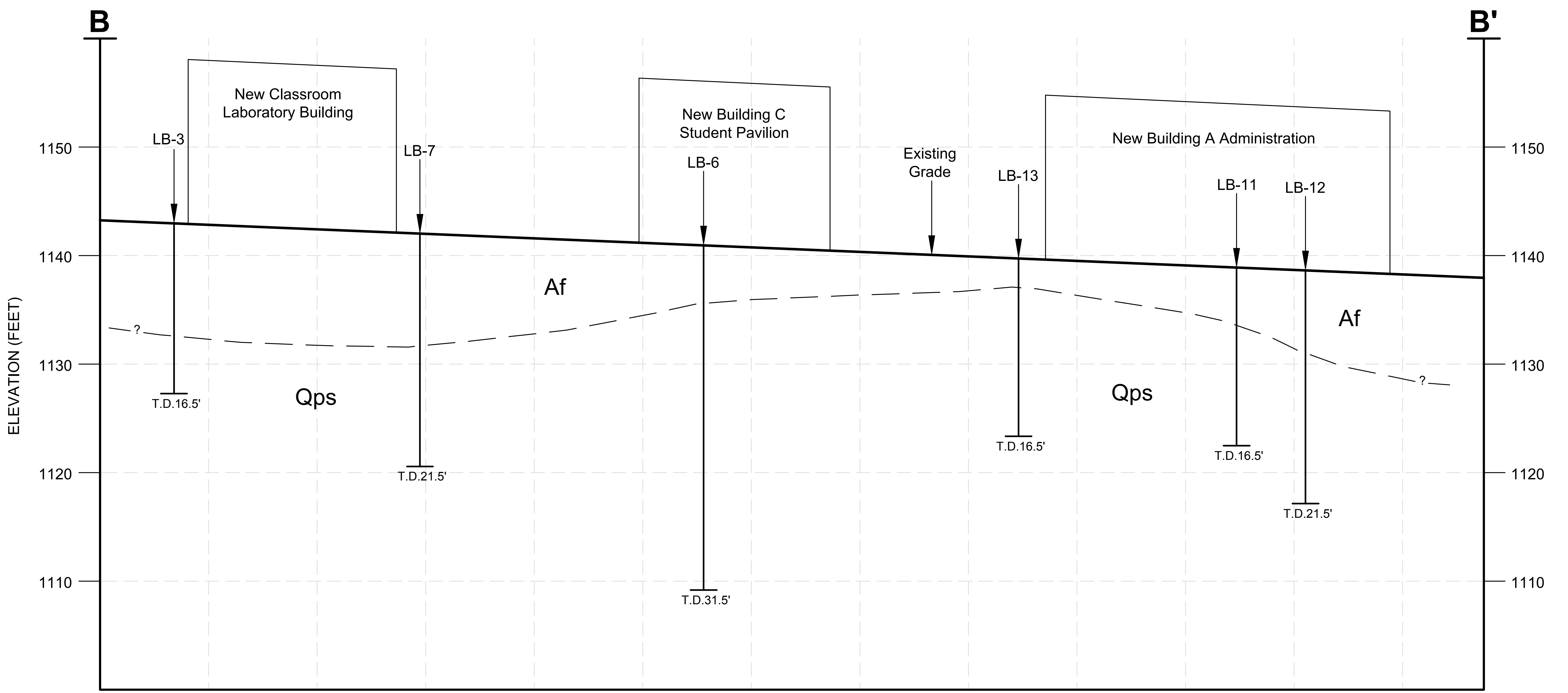
Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 3A

Leighton

Proj: 12393.001	Eng/Geol: SIS/RFR
Scale: V: 1"=10' H: 1"=30'	Date: August 2019

Drafted By: BQT | Checked By: BQT



GEOLOGIC CROSS SECTION B-B'

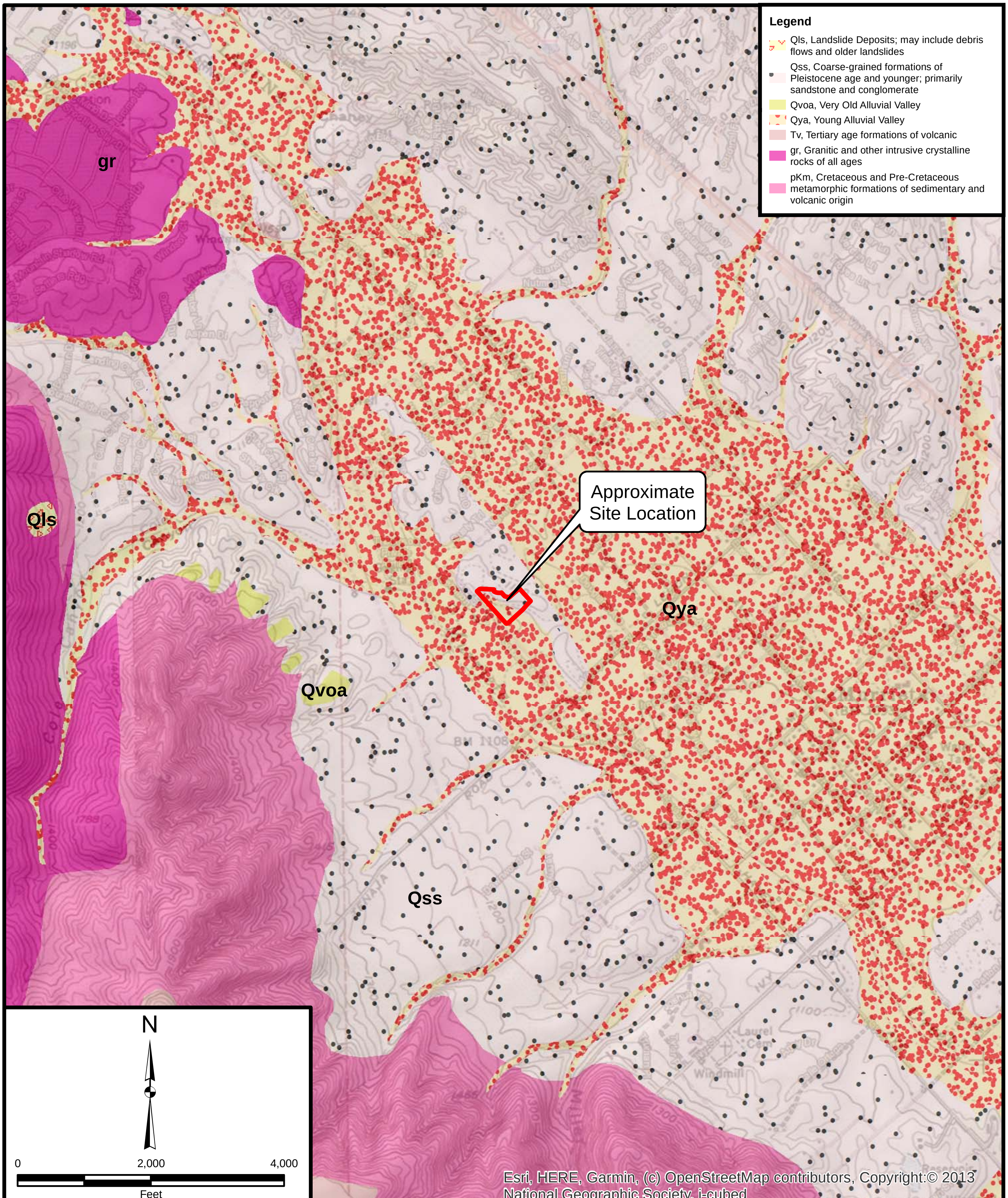
Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Proj: 12393.001	Eng/Geol: SIS/RFR
Scale: V: 1"=10' H: 1"=30'	Date: August 2019

Drafted By: BQT | Checked By: BQT | V:\DRAFTING\12393\001\CAD\2019-08-20\12393-001_FIGURES-3AB_2019-08-20.DWG (08-20-19 12:39:24PM) Plotted by: btran

Figure 3B

Leighton



Project: 12393.001

Eng/Geol: SIS/RFR

Scale:1 " = 2,000 '

Date: August 2019

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton, USGS
Author: Leighton Geomatics (btran)

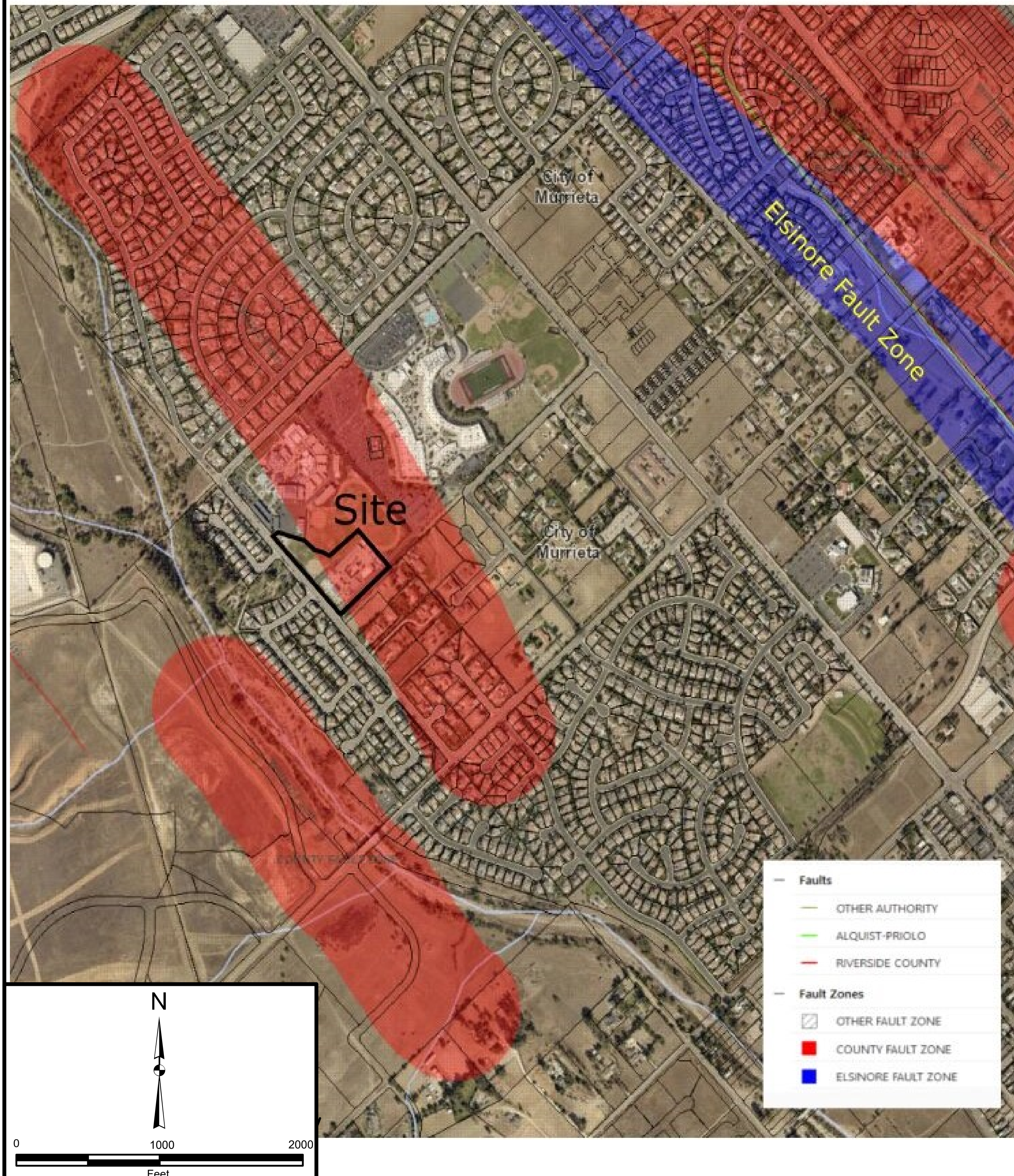
REGIONAL GEOLOGY MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 4

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F04_RGM_2019-07-11.mxd on 7/11/2019 2:39:37 PM



Project: 12393.001	Eng/Geol: SIS/RFR
Scale:1 " = 1000'	Date: August 2019

Base Map: ESRI Riverside Co RCIT 2019
Thematic Information: Leighton,
Author: Leighton Geomatics (msb)

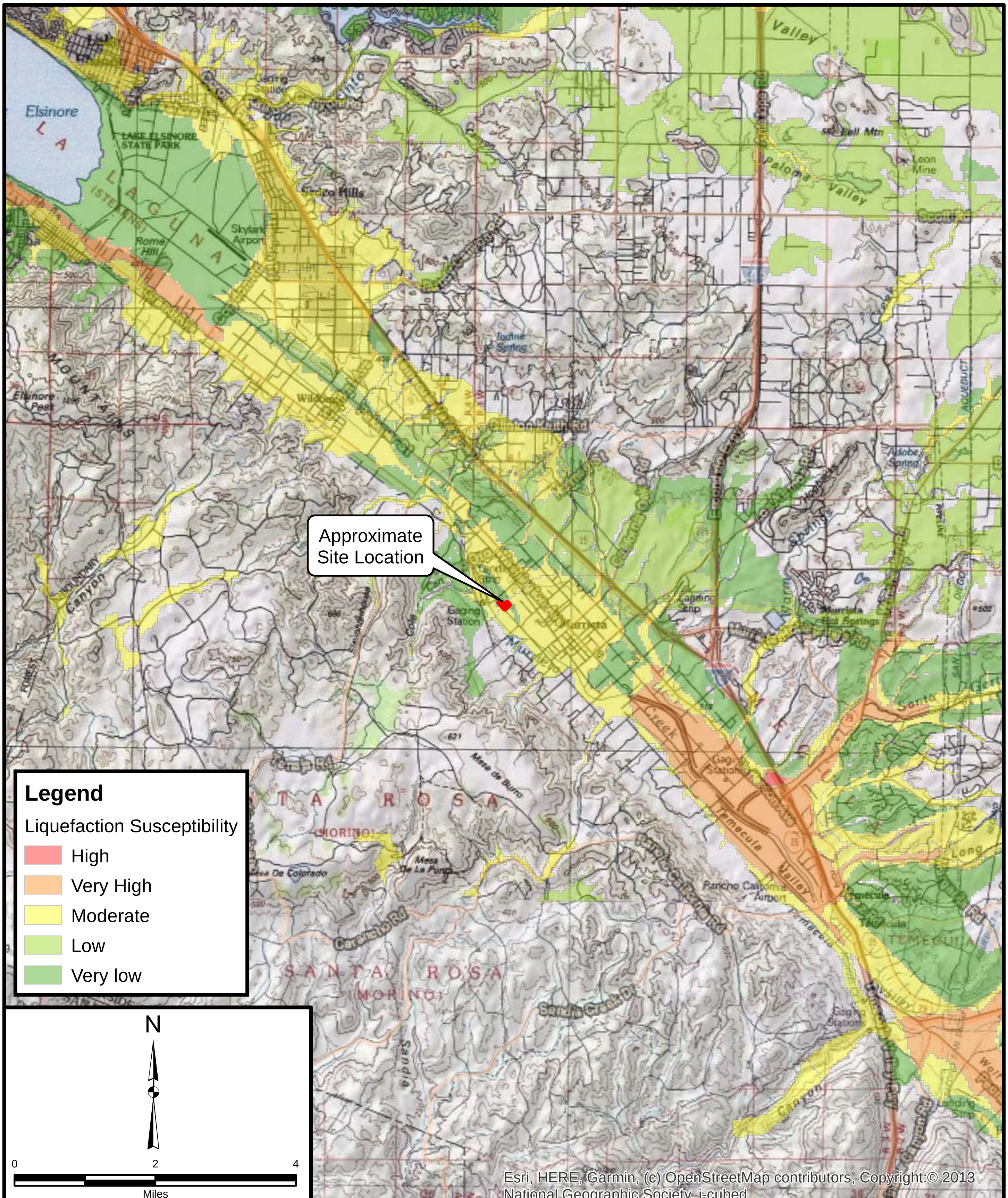
REGIONAL FAULT MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 5

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F05_RFM_2019-07-11.mxd on 7/11/2019 2:42:42 PM



Project: 12393.001	Eng/Geol: SIS/RFR
Scale:1 " = 2 miles	Date: August 2019

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton, CGS
Author: Leighton Geomatics (btran)

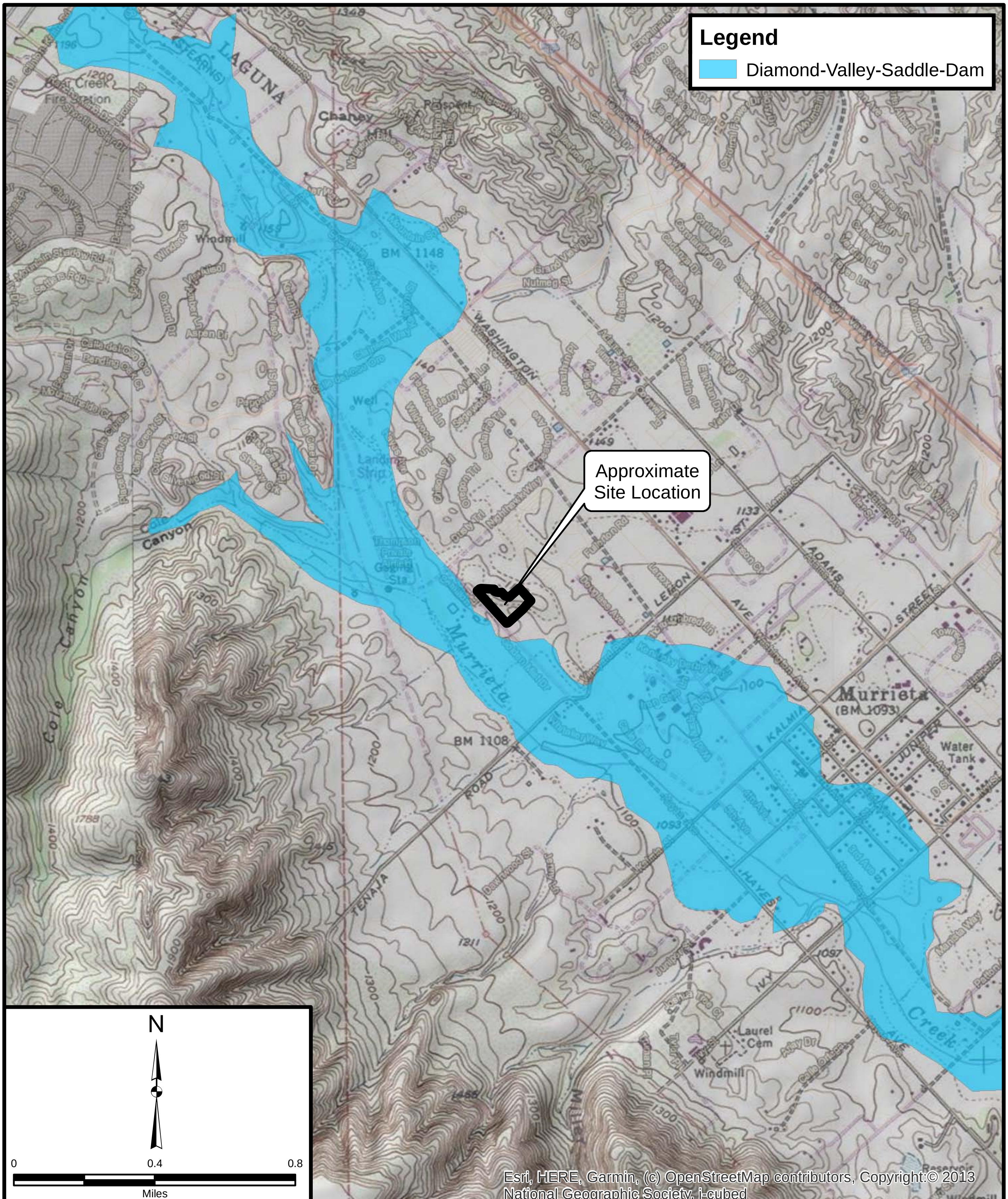
LIQUEFACTION MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 6

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F06_LM_2019-07-11.mxd on 7/11/2019 2:44:58 PM



Project: 12393.001	Eng/Geol: SIS/RFR
Scale:1 " = 0 miles	Date: August 2019

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton, CGS, Bryant 2010
Author: Leighton Geomatics (btran)

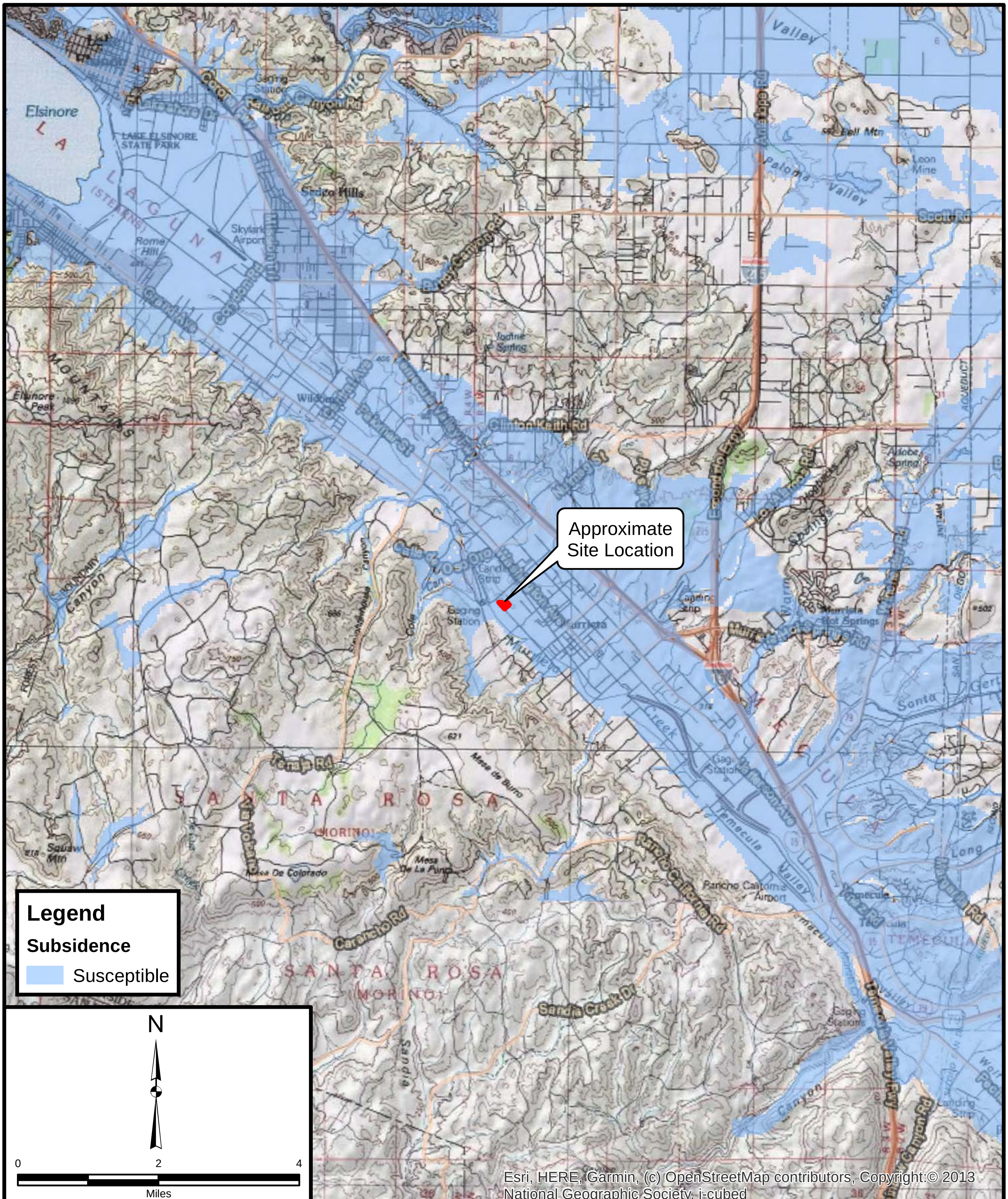
DAM INUNDATION MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 7

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F08_DIM_2019-07-11.mxd on 7/11/2019 2:51:55 PM



Project: 12393.001	Eng/Geol: SIS/RFR
Scale:1 " = 2 miles	Date: August 2019

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton, County of Riverside
Author: Leighton Geomatics (btran)

SUBSIDENCE MAP

Murrieta Valley Unified School District
Murrieta Canyon Academy New Buildings
24150 Hayes Avenue, Murrieta, California

Figure 8

Leighton

Map Saved as V:\Drafting\12393\001\Maps\12393-001_F07_SM_2019-07-11.mxd on 7/11/2019 2:47:24 PM

6.0 LIMITATIONS

This report was based in part on data obtained from a limited number of observations, site visits, soil excavations, samples and tests. Such information is, by necessity, incomplete. The nature of many sites is such that differing soil or geologic conditions can be present within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, our findings, conclusions and recommendations presented in this report are based on the assumption that we (Leighton Consulting, Inc.) will provide geotechnical observation and testing during construction as the Geotechnical Engineer of Record for this project.

This report was prepared for the sole use of Client and their design team, for application to design of the proposed Murrieta Canyon Academy, Proposed New Classroom Buildings, in accordance with generally accepted geotechnical engineering practices at this time in California. In addition, since this is a public school project, our report may be subject to review by the California Geological Survey (CGS) and/or the California Division of the State Architect (DSA). As such, we recommend that geologic/geotechnical data in this report be only used in the design of this project after review and approval by CGS. Any premature (before CGS approval) or unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify Leighton Consulting, Inc. from and against any liability which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of Leighton Consulting, Inc.

REFERENCES

Applied Technology Council (ATC), 2019 An Interactive Computer Program to Calculate Seismic Hazard Curves and Response and Design Parameters based on ASCE 7-10 (April): https://hazards.atcouncil.org#/

Army Corps of Engineers, Evaluation of Settlement for Dynamic and Transient Loads, Technical Engineering and Design Guides as Adapted from the US Army Corps of Engineers, No. 9, American Society of Civil Engineers Press.

ASCE, 2010, ASCE Standard 7-10, Minimum Design Loads for Buildings and Other Structures by Structural Engineering Institute, ISBN 0-7844-0809-2, Second Printing, Published in 2010.

Baker Nowicki Design Studio, Site Plan, MCA – Murrieta Canyon Academy, not dated.

Blake, T. F., 2000a, EQSEARCH, *A Computer Program for the Estimation of Peak Horizontal Acceleration from California Historical Earthquake Catalogs*, IBM-PC Compatible Version, User's Manual, January 1996.

Blake T.F., 2000b, EQFAULT, Version 3, A Computer Program for the Deterministic Prediction of Peak Horizontal Acceleration from Digitized California Faults, User's Manual, 77pp.

California Building Code, 2016, California Code of Regulations Title 24, Part 2, Volume 2 of 2.

California Geologic Survey (CGS), 2003. The Revised 2002 California Probabilistic Seismic Hazard Maps, June 2003. By Tianquing Cao, William A. Bryant, Badie Rowshandel, David Branum and Christopher J. Wills.

California Geological Survey, (CGS), 2006, Geologic Map of the San Bernardino and Santa Ana 30' X 60' Quadrangle, Southern California, Version 1.0, Compiled by Douglas M. Morton and Fred K. Miller, Open File Report 06-1217.

California Geological Survey, (CGS), 2007, Note 48, Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings, dated October 2007.

California Geologic Survey, 2007, Seismic Hazard Zone Report for the Murrieta 7.5 Minute Quadrangle, Riverside County, California, Seismic Hazard Zone Report 115.

California Geologic Survey, 2017, Earthquake Zones of Required Investigation, Murrieta Quadrangle, Preliminary Review Map, released Aug. 17, 2017.

Leighton

Gastil, G., et al, 1978, Mesozoic History of Peninsular California and Related Areas East of the Gulf of California, in: Mesozoic Paleogeography at the Western United States, D.G. Howell and K.A. McDougall, eds. Pacific Section of the S.E.P.M., Los Angeles, California.

Hart, E.W., Bryant, W. A., 2007, Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning with Index to Earthquake Zones Maps: Department of Conservation, Division of Mines and Geology, Special Publication 42. Interim Revision 2007.

Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas, California Division of Mines and Geology, Geologic Data Map Series, No. 6, Scale 1:750,000.

Kennedy, M.P., 1977, Recency and Character of Faulting Along the Elsinore Fault Zone in Southern Riverside County, California, CDMG Special Report 131.

Leighton, 1989, Geotechnical Investigation of Air Photo Lineaments, Liquefaction Potential, and General Geotechnical Parameters for the Proposed Murrieta High School, 80± Acre Site at the Southwest Corner of Washington and Magnolia Avenue, Murrieta, Riverside County, California, PN 892025-01, dated December 20.

Public Works Standard, Inc., 2018, *Greenbook, Standard Specifications for Public Works Construction: 2015 Edition*, BNI Building News, Anaheim, California.

Riverside County, 2019, *County of Riverside General Plan*, Riverside County Website. https://gis.countyofriverside.us/Html5Viewer/?viewer=MMC_Public, accessed 8/5/2019

Riverside County, 2011, Low Impact Development BMP Design Handbook, Riverside County Flood Control and Water Conservation District, Rev. 9/2011

Tokimatsu, K., and Seed, H.B., 1987, Evaluation of Settlements in Sands Due to Earthquake Shaking, ASCE Journal of Geotechnical Engineering, Vol. 113, No. 8, dated August.

Treiman, J.A., Compiler, 1998, Fault Number 126d, Elsinore Fault Zone, Temecula Section in Quaternary fault and fold database of the United States: U.S. Geological Website, http://earthquakes.usgs.gov/hazards/qfault, accessed 8/20/19.

APPENDIX A

LOGS OF EXPLORATORY BORINGS

Encountered earth materials were continuously logged and sampled in the field by our representative and described in accordance with the Unified Soil Classification System (ASTM D 2488). During drilling, bulk and relatively undisturbed ring-lined split-barrel driven earth material samples were obtained from our borings for geotechnical laboratory testing and classification. Drive-samples were driven with a 140-pound auto-hammer falling 30-inches. Samples were transported to our in-house Temecula laboratory for geotechnical testing. After logging and sampling, our borings were backfilled with spoils generated during drilling.

The attached subsurface exploration logs and related information depict subsurface conditions only at the locations indicated and at the particular date designated on these logs. Subsurface conditions at other locations may differ from conditions occurring at these logged locations. Passage of time may result in altered subsurface conditions due to environmental changes. In addition, any stratification lines on these logs represent an approximate boundary between sampling intervals and soil types; and transitions may be gradual.

GEOTECHNICAL BORING LOG LB-1

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0			B-1			21.3	CONCRETE	4" Concrete/4" Sand	MD, EI, RV
								CL	**Artificial Fill (Af)**; SANDY Lean CLAY, olive brown, moist, fine grained sand	
									Lean CLAY, brown, moist	
	5			R-1	5 11 18	114	15	SC	CLAYEY SAND, medium dense, brown, moist, fine grained sand	
	10			R-2	6 10 22	113	18	CL	**Pauba Formation (Qps)**; SANDY Lean CLAY, stiff, dark yellowish brown, moist, fine to medium grained sand	
									Drilled to 11.5' Sampled to 11.5' Groundwater not encountered Backfilled with cuttings	
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-2

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	4"
Drilling Method	Hand Auger - Hand Sampling	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0			B-1			15.1	CL	**Artificial Fill (Af)**; Lean CLAY, dark brown, moist to wet	
									SANDY Lean CLAY, brown, moist, fine to medium grained sand	
									Drilled to 3' Sampled to 3' Groundwater not encountered Backfilled with cuttings	
	5									
	10									
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG LB-3

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0								@ Surface: Grass	
								SM	**Artificial Fill (Af)**; SILTY SAND, grayish brown, moist, fine to medium grained sand	
								SC-SM	SILTY, CLAYEY SAND, reddish brown, moist, fine to medium grained sand	
	5			R-1	5 12 16	126	10	SC	CLAYEY SAND with GRAVEL, medium dense, dark brown, moist, fine to coarse grained sand with fine gravel	
	10			R-2	5 14 23	112	18	ML	**Pauba Formation (Qps)**; SANDY SILT, stiff, olive brown, moist, very fine to fine grained sand	CO
	15			R-3	15 22 24			SM	SILTY SAND, medium dense, olive brown, moist, fine grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-4

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1			7.6		@ Surface: Grass	
								SC-SM	**Artificial Fill (Af)**; SILTY, CLAYEY SAND, yellowish brown, moist, fine to coarse grained sand	
				R-1	5, 8, 11	114	8		SILTY, CLAYEY SAND, medium dense, yellowish brown, moist, fine to coarse grained sand	
	5			R-2	4, 9, 16	99	23	CL	**Pauba Formation (Qps)**; Lean CLAY, stiff, olive brown, moist	
	10			R-3	4, 10, 18				SANDY Lean CLAY, very stiff, yellowish brown, moist, fine grained sand	
	15			R-4	6, 13, 22			ML	SANDY SILT, very stiff, olive brown, moist, very fine to fine grained sand	
	20			R-5	9, 13, 21			CL-ML	SILTY CLAY with sand, very stiff, grayish brown to olive brown, moist, very fine to fine grained sand	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG LB-5

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1					@ Surface: Grass	CR, EI
								SC	**Artificial Fill (Af)**; CLAYEY SAND, dark grayish brown, moist, fine to coarse grained sand	
	5			R-1	5 10 12	90	30	CL-ML	**Pauba Formation (Qps)**; SILTY CLAY, stiff, olive, moist	
	10			R-2	8 16 26			SW-SM	Well-graded SAND with SILT, medium dense, yellowish brown, moist, fine to coarse grained sand	
									Drilled to 11.5' Sampled to 11.5' Groundwater not encountered Backfilled with cuttings	
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-6

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0								@ Surface: Grass	
								CL	**Artificial Fill (Af)**; SANDY Lean CLAY, dark grayish brown, moist, fine to medium grained sand	AL, MD, CR
	5			R-1 B-1	11 16 19			SC-SM	**Pauba Formation (Qps)**; SILTY, CLAYEY SAND, medium dense, dark yellowish brown, moist, fine grained sand	
								CL	SANDY Lean CLAY, stiff, dark yellowish brown and olive brown, moist, fine grained sand	
				R-2	8 17 29	78	58	SC	CLAYEY SAND, medium dense, olive brown, moist, fine grained sand	
	10			R-3	9 19 26			SW-SM	Well-graded SAND with SILT, medium dense, light gray to grayish brown, moist, fine to coarse grained sand	
	15			R-4	10 17 22			SM	SILTY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand	
	20			R-5	6 16 30			CL-ML	SILTY CLAY, hard, olive brown, moist	
	25			R-6	9 33 50			SM-ML	SILTY SAND to SANDY SILT, dense to hard, olive, moist, fine grained sand	
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG LB-6

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30			R-7	15 28 50			SC-SM	SILTY, CLAYEY SAND, dense, dark grayish brown, moist, very fine to fine grained sand	

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Drilled to 31.5' Sampled to 31.5' Groundwater not encountered Backfilled with cuttings

Depth scale: 30, 35, 40, 45, 50, 55, 60

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-7

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0								@ Surface: Grass	
								SC-SM	**Artificial Fill (Af)**; SILTY, CLAYEY SAND, gray, moist, fine to medium grained sand	
	5			R-1	9 11 17	120	13	CL	SANDY Lean CLAY, stiff, dark brown, moist, fine to coarse grained sand	
	10			R-2	6 9 31	118	14	SM	**Pauba Formation (Qps)**; SILTY SAND, medium dense, olive brown, moist, fine to medium grained sand	
	15			R-3	9 21 36			SC-SM	SILTY, CLAYEY SAND, dense, dark grayish brown to yellowish brown, moist, fine to coarse grained sand	
	20			R-4	5 12 23			CL	Lean CLAY, very stiff, olive, moist	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG LB-8

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1					@ Surface: Grass	EI
								SC	**Artificial Fill (Af)**; CLAYEY SAND, gray, moist, fine to medium grained sand	
				R-1	9 15 25	115	16	SC	**Pauba Formation (Qps)**; CLAYEY SAND, medium dense, olive brown, moist, fine grained sand	
	5			R-2	7 11 18	110	18	SM	SILTY SAND, medium dense, olive brown, moist, fine grained sand	
	10			R-3	7 12 18			CL-ML	SILTY CLAY, stiff, olive, moist	
	15			R-4	8 11 16	113	16		SILTY CLAY with sand, stiff, olive brown, moist, fine grained sand	
	20			R-5	6 17 19				SILTY CLAY, stiff, olive, moist	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG LB-9

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0								Well-graded SAND with SILT, reddish brown, dry, fine to coarse grained sand, softball infield crushed brick	
								SC	**Artificial Fill (Af)**; CLAYEY SAND with GRAVEL, dark grayish brown, moist, fine to coarse grained sand	
	5			R-1	20 38 43	165	7		CLAYEY SAND with GRAVEL, dense, yellowish brown, moist, fine to coarse grained sand with fine gravel	
	10			R-2	24 33 42	122	6	SC	**Pauba Formation (Qps)**; CLAYEY SAND, dense, olive gray, moist, fine to coarse grained sand	
	15			R-3	9 22 28			SM	SILTY SAND, dense, olive, moist, fine to coarse grained sand	
	20			R-4	5 18 22			SC	CLAYEY SAND, medium dense, olive gray, moist, fine to medium grained sand	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-10

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0			B-1				SW-SM	Well-graded SAND with SILT, reddish brown, dry, fine to coarse grained sand, softball infield crushed brick	
								SC	**Artificial Fill (Af)**; CLAYEY SAND with GRAVEL, dark grayish brown, moist, fine to coarse grained sand	
				R-1	5 6 11	116	14		CLAYEY SAND with GRAVEL, medium dense, dark grayish brown to olive brown, moist, fine to coarse grained sand with fine gravel	
	5			R-2	5 10 20	118	13		CLAYEY SAND with GRAVEL, medium dense, dark grayish brown, moist, fine to coarse grained sand with fine gravel	
	10			R-3	20 20 27			SC	**Pauba Formation (Qps)**; CLAYEY SAND with GRAVEL, medium dense, dark grayish brown and olive brown, moist, fine to coarse grained sand	
	15			R-4	9 31 50/5"			SM-ML	SILTY SAND to SANDY SILT, dense to hard, dark olive gray, moist, fine to medium grained sand	
									Drilled to 16.42' Sampled to 16.42' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-11

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0							SW-SM	Well graded SAND with Silt (SW-SM), reddish brown, dry, fine to coarse grained sand, softball inield crushed brick	
								SC-SM	**Artificial Fill (Af)**; SILTY, CLAYEY SAND, olive brown, moist, fine to coarse grained sand	
	5			R-1	20 37 48	128	10	SM	**Pauba Formation (Qps)**; SILTY SAND, dense, olive, moist, fine to medium grained sand	
	10			R-2	10 16 28			CL	Lean CLAY, very stiff, olive, moist	
	15			R-3	15 24 35			SM	SILTY SAND, dense, olive, moist, fine grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG LB-12

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0								@ Surface: Grass	
								CL	**Artificial Fill (Af)**; SANDY Lean CLAY, olive gray, moist, fine to medium grained sand	
	5			R-1 B-1	9 22 28	117	8	SW-SC	Well-graded SAND with CLAY (or SILTY CLAY), dense, reddish brown, moist, fine to coarse grained sand	
				R-2	5 9 15	104	21	CL	**Pauba Formation (Qps)**; SANDY Lean CLAY, stiff, dark grayish brown and olive gray, moist, very fine to fine grained sand	
	10			R-3	4 16 41			SM	SILTY SAND, dense, olive brown, moist, fine grained sand	
	15			R-4	7 12 22			SM-ML	SILTY SAND to SANDY SILT, medium dense to very stiff, olive gray, moist, very fine to fine grained sand	
	20			R-5	4 10 16			CL	SANDY Lean CLAY, stiff, olive, moist, very fine to fine grained sand	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-13

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1				SW-SM	Well-graded SAND with SILT, reddish brown, dry, fine to coarse grained sand, softball infield crushed brick	EI
								CL	**Artificial Fill (Af)**; Lean CLAY, olive, moist	
				R-1	4 9 21	113	17	CL	**Pauba Formation (Qps)**; SANDY Lean CLAY, stiff, olive brown, moist, very fine to fine grained sand	
	5			R-2	7 12 23	115	16	SM	SILTY SAND, medium dense, olive, moist, fine grained sand	
	10			R-3	5 9 14			CL	Lean CLAY, stiff, olive, moist	
	15			R-4	12 23 34			SM	SILTY SAND, dense, olive brown, moist, fine grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG LB-14

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0								@ Surface: Grass	
								CL	**Artificial Fill (Af)**; SANDY Lean CLAY, grayish brown, moist to wet, fine to coarse grained sand	
								SC	CLAYEY SAND, reddish brown, moist to wet, fine to coarse grained sand	
	5			R-1	5 16 20	117	7		CLAYEY SAND, medium dense, yellowish brown, moist, fine to coarse grained sand	
	10			R-2	4 8 18	104	21	CL	**Pauba Formation (Qps)**; SANDY Lean CLAY, stiff, olive brown, moist, fine to coarse grained sand	
	15			R-3	8 15 19				SANDY Lean CLAY, stiff, dark olive gray, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with Cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG P-1

Project No.	12393.001	**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0								@ Surface: Grass	
								SC-SM	**Artificial Fill (Af)**; SILTY, CLAYEY SAND with GRAVEL, grayish brown, moist, fine to coarse grained sand	
				S-1	3 6 13				SILTY, CLAYEY SAND, medium dense, dark yellowish brown, moist, fine grained sand	
	5								Drilled to 4' Sampled to 4' Groundwater not encountered Backfilled with cuttings	
	10									
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG P-2

Project No.	12393.001		**Date Drilled**	7-9-19
Project	MVUSD Murrieta Canyon Academy New Buildings		**Logged By**	JTD
Drilling Co.	Martini Drilling Corp		**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer		**Ground Elevation**	'
Location	See Boring Location Map		**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0								@ Surface: Grass	
								CL	**Artificial Fill (Af)**; SANDY Lean CLAY, gray, moist, fine to coarse grained sand	
				S-1	5 8 9			SM	SILTY SAND, medium dense, yellowish brown, moist, fine to coarse grained sand	SA
	5								Drilled to 4' Sampled to 4' Groundwater not encountered Backfilled with cuttings	
	10									
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

APPENDIX B

GEOTECHNICAL LABORATORY TEST RESULTS

Leighton

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS
ASTM D 6913

Project Name:	MCA New Buildings Geohazard	Tested By:	FLM	Date:	08/07/19
Project No.:	12393.001	Checked By:	MRV	Date:	08/13/19
Boring No.:	P-2	Depth (feet):	2.5		
Sample No.:	S-1				
Soil Identification:	Silty Sand (SM), Reddish Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	123	Wt. of Air-Dry Soil + Cont. (g)	1082.2
Wt. of Air-Dried Soil + Cont.(g)	1082.2	Wt. of Dry Soil + Cont. (g)	1049.8
Wt. of Container (g)	699.8	Wt. of Container No.______ (g)	699.8
Dry Wt. of Soil (g)	350.0	Moisture Content (%)	9.3

After Wet Sieve	Container No.	123
	Wt. of Dry Soil + Container (g)	1000.5
	Wt. of Container (g)	699.8
	Dry Wt. of Soil Retained on # 200 Sieve (g)	300.7

U. S. Sieve Size		Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
(in.)	(mm.)		
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500	0.0	100.0
#4	4.750	2.3	99.3
#8	2.360	27.6	92.1
#16	1.180	82.5	76.4
#30	0.600	146.2	58.2
#50	0.300	219.9	37.2
#100	0.150	276.8	20.9
#200	0.075	299.7	14.4
PAN			

GRAVEL: **1 %**

SAND: **85 %**

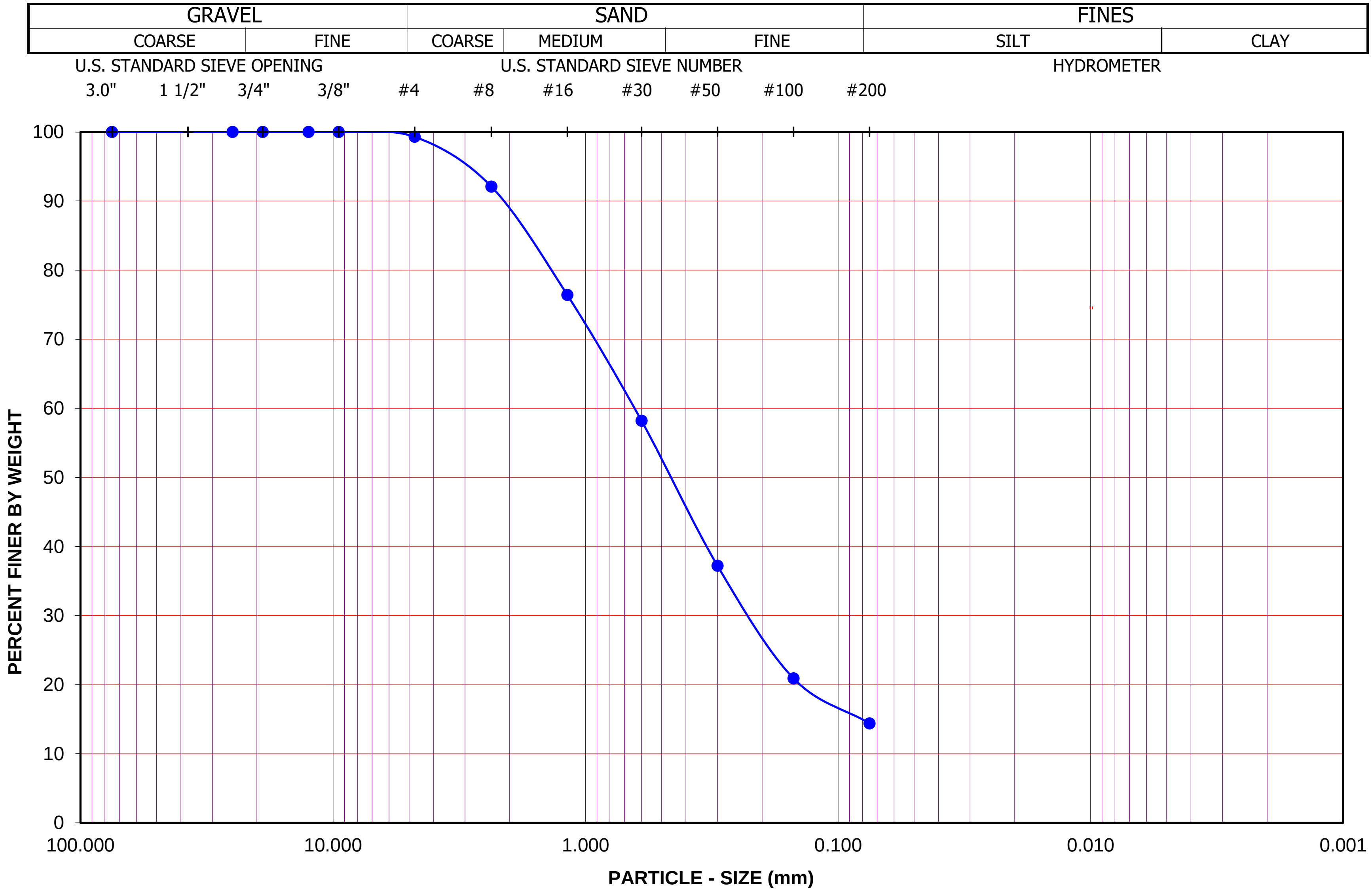
FINES: **14 %**

GROUP SYMBOL: **SM**

$Cu = D60/D10 =$ N/A

$Cc = (D30)^2/(D60*D10) =$ N/A

Remarks:



Project Name: MCA New Buildings Geohazard

Project No.: 12393.001

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Boring No.: P-2

Sample No.: S-1

Depth (feet): 2.5

Soil Type : SM

Soil Identification: Silty Sand (SM), Reddish Brown.

GR:SA:FI : (%) 1 : 85 : 14

Aug-19

Sieve; P-2, S-1 (07-09-19)

ATTERBERG LIMITS
ASTM D 4318

Leighton

Project Name:	MCA New Buildings Geohazard	Tested By:	F. Mina	Date:	8/12/19
Project No. :	12393.001	Input By:	M. Vinet	Date:	8/13/19
Boring No.:	LB-6	Checked By:	M. Vinet	Date:	8/13/19
Sample No.:	B-1	Depth (ft.)	5.0 - 10.0		

Sample Description: Sandy Lean Clay s(CL), Dark Yellowish Brown.

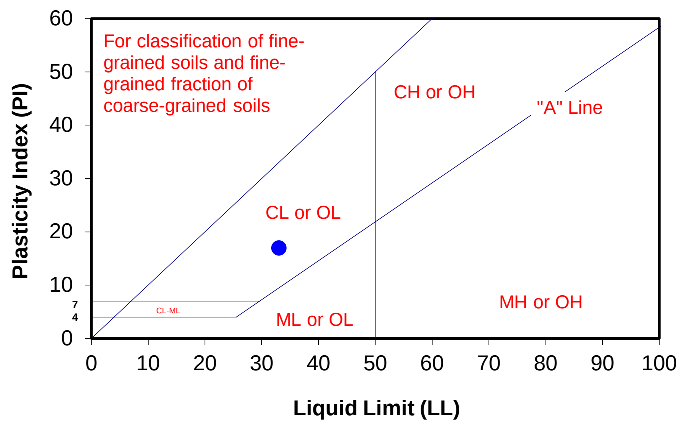
	PLASTIC LIMIT		LIQUID LIMIT			**IN-SITU
TEST NO.	1	2	1	2	3	MOISTURE
Number of Blows [N]			17	25	33	
Wet Wt. of Soil + Cont. (gm)	22.794	22.855	19.633	21.794	21.261	
Dry Wt. of Soil + Cont. (gm)	21.576	21.604	18.078	19.787	19.366	
Wt. of Container (gm)	13.601	13.697	13.602	13.734	13.539	
Moisture Content (%) [Wn]	15.3	15.8	34.7	33.2	32.5	

Liquid Limit	33
Plastic Limit	16
Plasticity Index	17
Classification	CL

PI at "A" - Line = 0.73(LL-20) = 9.49

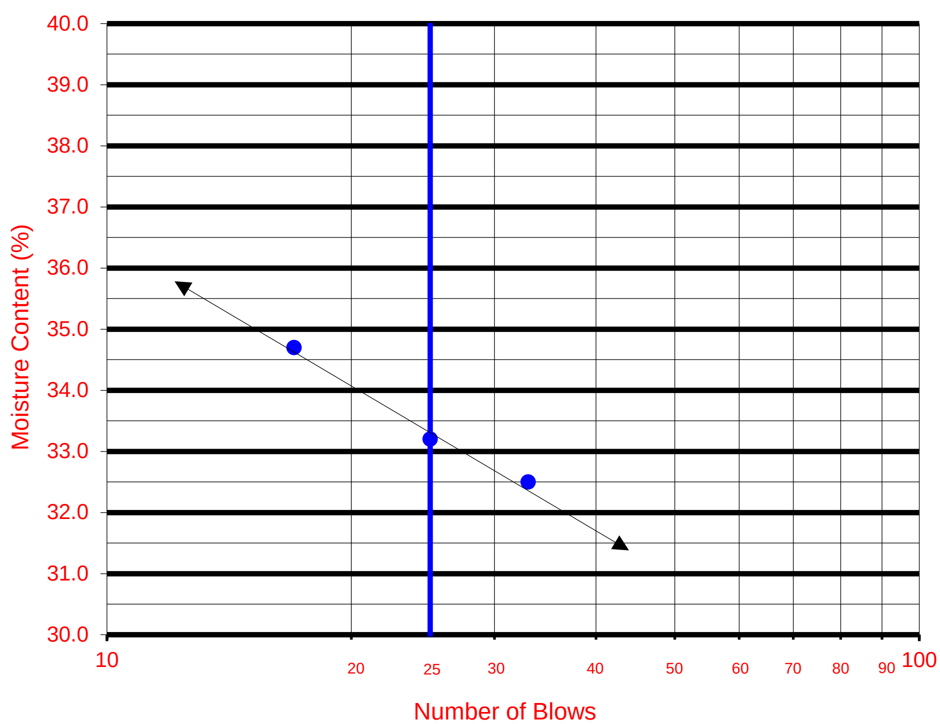
One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



PROCEDURES USED

- [ ] Wet Preparation — Multipoint - Wet
- [x] Dry Preparation — Multipoint - Dry
- [x] Procedure A — Multipoint Test
- [ ] Procedure B — One-point Test



Rev. 08-04

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Leighton

Project Name:	MCA New Buildings Geoharzard	Tested By:	F. Mina	Date:	08/08/19
Project No.:	12393.001	Input By:	M. Vinet	Date:	08/13/19
Boring No.:	LB-1	Depth (ft.):	0 - 5.0		
Sample No.:	B-1				
Soil Identification:	Sandy Lean Clay s(CL), Yellowish Brown.				

Preparation Method: [X] Moist [ ] Dry — [X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03340 — *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	5510	5570	5582	5554		
Weight of Mold (g)	3578	3578	3578	3578		
Net Weight of Soil (g)	1932	1992	2004	1976		
Wet Weight of Soil + Cont. (g)	693.2	674.9	565.5	441.2		
Dry Weight of Soil + Cont. (g)	653.5	635.3	515.9	401.8		
Weight of Container (g)	157.4	239.8	127.4	130.6		
Moisture Content (%)	8.0	10.0	12.8	14.5		
Wet Density (pcf)	127.5	131.5	132.3	130.4		
Dry Density (pcf)	118.1	119.5	117.3	113.9		

Maximum Dry Density (pcf) **119.5** **Optimum Moisture Content (%)** **10.0**

PROCEDURE USED

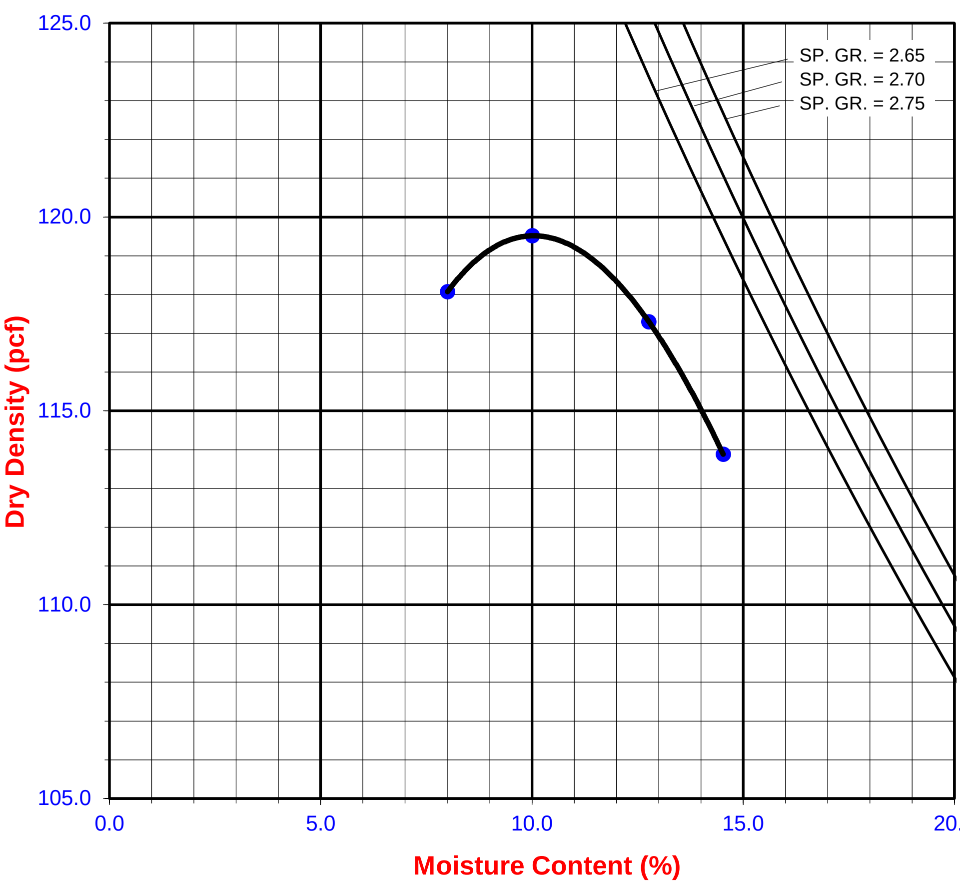
[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:
GR:SA:FI

Atterberg Limits:
LL,PL,PI



Compaction; LB-1, B-1 (07-09-19)

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Leighton

Project Name:	MCA New Buildings Geoharzard	Tested By:	F. Mina	Date:	08/08/19
Project No.:	12393.001	Input By:	M. Vinet	Date:	08/13/19
Boring No.:	LB-6	Depth (ft.):	5.0 - 10.0		
Sample No.:	B-1				
Soil Identification:	Sandy Lean Clay s(CL), Dark Yellowish Brown.				

Preparation Method: [X] Moist [ ] Dry — [X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03340 — *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	5540	5584	5557	5518		
Weight of Mold (g)	3578	3578	3578	3578		
Net Weight of Soil (g)	1962	2006	1979	1940		
Wet Weight of Soil + Cont. (g)	693.2	610.3	564.1	628.9		
Dry Weight of Soil + Cont. (g)	643.0	556.8	507.8	556.5		
Weight of Container (g)	201.2	159.6	152.2	163.4		
Moisture Content (%)	11.4	13.5	15.8	18.4		
Wet Density (pcf)	129.5	132.4	130.6	128.1		
Dry Density (pcf)	116.3	116.7	112.8	108.1		

Maximum Dry Density (pcf) 117.1 **Optimum Moisture Content (%)** 12.5

PROCEDURE USED

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

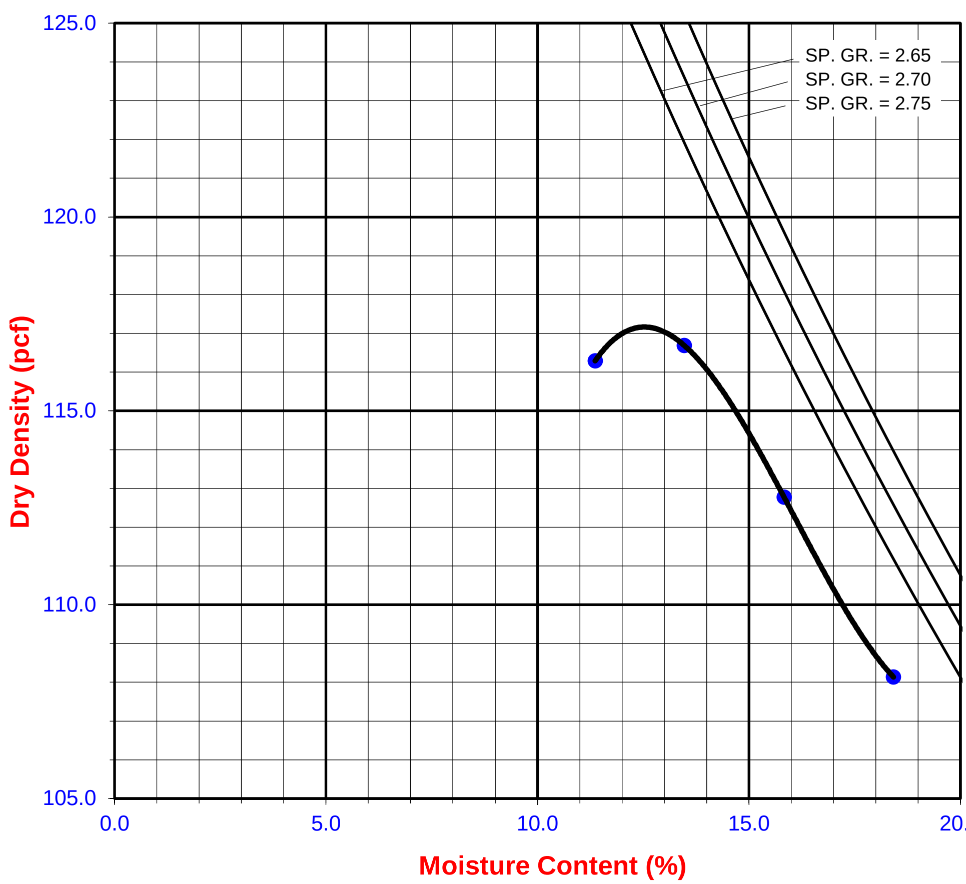
Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

33:16:17

LL,PL,PI



Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	MCA New Buildings Geohazard	Tested By:	F. Mina	Date:	8/8/19
Project No. :	12393.001	Checked By:	M. Vinet	Date:	8/13/19
Boring No.:	LB-1	Depth:	0 - 5.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Sandy Lean Clay s(CL), Yellowish Brown.				

Dry Wt. of Soil + Cont. (gm.)	1883.8
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	1883.8
Weight Soil Retained on #4 Sieve	6.7
Percent Passing # 4	99.6

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0756
Wt. Comp. Soil + Mold (gm.)	590.1	633.1
Wt. of Mold (gm.)	208.7	208.7
Specific Gravity (Assumed)	2.70	2.70
Container No.	7	7
Wet Wt. of Soil + Cont. (gm.)	350.5	633.1
Dry Wt. of Soil + Cont. (gm.)	319.6	342.1
Wt. of Container (gm.)	50.5	208.7
Moisture Content (%)	11.5	24.1
Wet Density (pcf)	115.0	119.0
Dry Density (pcf)	103.2	95.9
Void Ratio	0.634	0.757
Total Porosity	0.388	0.431
Pore Volume (cc)	80.3	96.0
Degree of Saturation (%) [S meas]	**49.0**	**85.8**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/8/19	11:30	1.0	0	0.5000
8/8/19	11:40	1.0	10	0.5000
	Add Distilled Water to the Specimen			
8/9/19	8:00	1.0	1220	0.5756
8/9/19	9:00	1.0	1280	0.5756

Expansion Index (EI meas) =	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	75.6
Expansion Index (Report) =	Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**76**

Rev. 03-08

EXPANSION INDEX of SOILS
ASTM D 4829

Leighton

Project Name:	MCA New Buildings Geohazard	Tested By:	F. Mina	Date:	8/8/19
Project No. :	12393.001	Checked By:	M. Vinet	Date:	8/13/19
Boring No.:	LB-5	Depth:	0 - 5.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Sandy Lean Clay s(CL), Dark Yellowish Brown.				

Dry Wt. of Soil + Cont. (gm.)	2938.8
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	2938.8
Weight Soil Retained on #4 Sieve	11.1
Percent Passing # 4	99.6

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0609
Wt. Comp. Soil + Mold (gm.)	595.7	642.5
Wt. of Mold (gm.)	188.3	188.3
Specific Gravity (Assumed)	2.70	2.70
Container No.	8	8
Wet Wt. of Soil + Cont. (gm.)	350.3	642.5
Dry Wt. of Soil + Cont. (gm.)	324.3	372.1
Wt. of Container (gm.)	50.3	188.3
Moisture Content (%)	9.5	22.1
Wet Density (pcf)	122.9	129.1
Dry Density (pcf)	112.2	105.8
Void Ratio	0.502	0.594
Total Porosity	0.334	0.373
Pore Volume (cc)	69.2	81.8
Degree of Saturation (%) [S meas]	**51.1**	**100.4**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/8/19	10:30	1.0	0	0.5000
8/8/19	10:40	1.0	10	0.5000
	Add Distilled Water to the Specimen			
8/9/19	8:00	1.0	1280	0.5609
8/9/19	9:00	1.0	1340	0.5609

Expansion Index (EI meas) =	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	60.9
Expansion Index (Report) =	Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**61**

Rev. 03-08

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	MCA New Buildings Geohazard	Tested By:	F. Mina	Date:	8/8/19
Project No. :	12393.001	Checked By:	M. Vinet	Date:	8/13/19
Boring No.:	LB-8	Depth:	0 - 5.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Lean Clay (CL), Dark Yellowish Brown.				

Dry Wt. of Soil + Cont. (gm.)	2241.1
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	2241.1
Weight Soil Retained on #4 Sieve	5.0
Percent Passing # 4	99.8

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0874
Wt. Comp. Soil + Mold (gm.)	597.8	646.7
Wt. of Mold (gm.)	208.7	208.7
Specific Gravity (Assumed)	2.70	2.70
Container No.	9	9
Wet Wt. of Soil + Cont. (gm.)	350.3	646.7
Dry Wt. of Soil + Cont. (gm.)	319.8	349.6
Wt. of Container (gm.)	50.3	208.7
Moisture Content (%)	11.3	25.3
Wet Density (pcf)	117.4	121.5
Dry Density (pcf)	105.5	97.0
Void Ratio	0.599	0.738
Total Porosity	0.374	0.425
Pore Volume (cc)	77.5	95.6
Degree of Saturation (%) [S meas]	**51.0**	**92.5**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/8/19	10:00	1.0	0	0.5000
8/8/19	10:10	1.0	10	0.5000
	Add Distilled Water to the Specimen			
8/9/19	8:00	1.0	1310	0.5874
8/9/19	9:00	1.0	1370	0.5874

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	87.4
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**87**

Rev. 03-08

Leighton

EXPANSION INDEX of SOILS
ASTM D 4829

Project Name:	MCA New Buildings Geohazard	Tested By:	F. Mina	Date:	8/8/19
Project No. :	12393.001	Checked By:	M. Vinet	Date:	8/13/19
Boring No.:	LB-13	Depth:	0 - 5.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Sandy Lean Clay s(CL), Yellowish Brown.				

Dry Wt. of Soil + Cont. (gm.)	2122.6
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	2122.6
Weight Soil Retained on #4 Sieve	18.3
Percent Passing # 4	99.1

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0554
Wt. Comp. Soil + Mold (gm.)	602.5	630.0
Wt. of Mold (gm.)	208.7	208.7
Specific Gravity (Assumed)	2.70	2.70
Container No.	11	11
Wet Wt. of Soil + Cont. (gm.)	350.3	630.0
Dry Wt. of Soil + Cont. (gm.)	323.0	358.0
Wt. of Container (gm.)	50.3	208.7
Moisture Content (%)	10.0	17.7
Wet Density (pcf)	118.8	120.4
Dry Density (pcf)	108.0	102.3
Void Ratio	0.561	0.648
Total Porosity	0.359	0.393
Pore Volume (cc)	74.4	85.9
Degree of Saturation (%) [S meas]	**48.1**	**73.7**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/8/19	9:00	1.0	0	0.5000
8/8/19	9:10	1.0	10	0.5000
	Add Distilled Water to the Specimen			
8/9/19	8:00	1.0	1370	0.5554
8/9/19	9:00	1.0	1430	0.5554

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	55.4
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**55**

Rev. 03-08

One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

Leighton

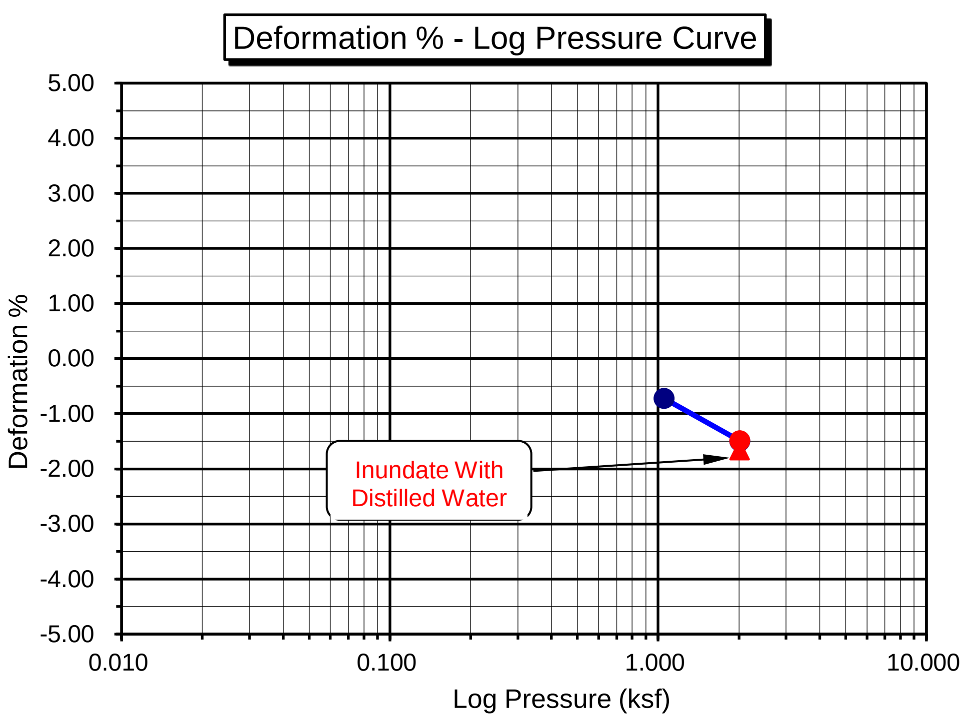
Project Name: MCA New Buildings Geohazard — Tested By: M. Vinet — Date: 8/12/19
Project No.: 12393.001 — Checked By: M. Vinet — Date: 8/13/19
Boring No.: **LB-3** — Sample Type: IN SITU
Sample No.: **R-2** — Depth (ft.) 10.0
Sample Description: Silty Clay (CL-ML), Dark Olive Brown.
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	110.9
Initial Moisture (%):	16.9
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	112.8
Final Moisture (%) :	18.7
Initial Void ratio:	0.5194
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	87.6

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0072	0.9928	0.00	-0.72	0.5085	-0.72
2.013	0.0149	0.9851	0.00	-1.49	0.4968	-1.49
H2O	0.0166	0.9834	0.00	-1.66	0.4942	-1.66

Percent Swell / Settlement After Inundation = -0.17



Rev. 01-10

R-VALUE TEST RESULTS
ASTM D 2844

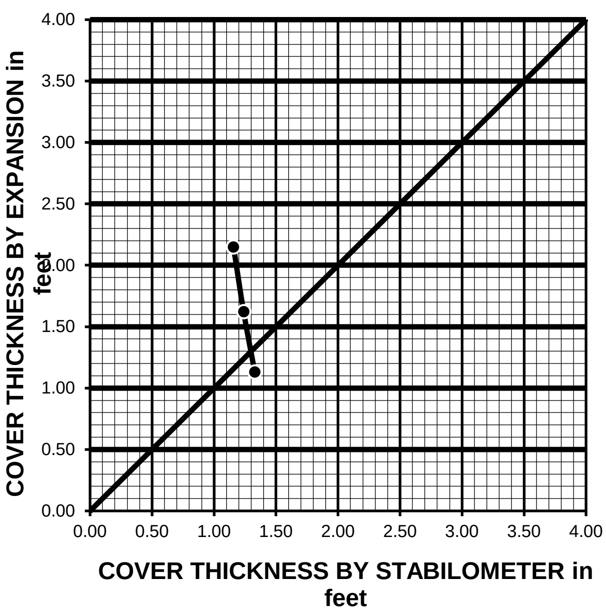
Leighton

Project Name:	MCA New Buildings Geohazard	Date:	8/9/19
Project Number:	12393.001	Technician:	F. Mina
Boring Number:	LB-1	Depth (ft.):	0 - 5.0
Sample Number:	B-1	Sample Location:	N/A
Sample Description:	Sandy Lean Clay s(CL), Dark Yellowish Brown.		

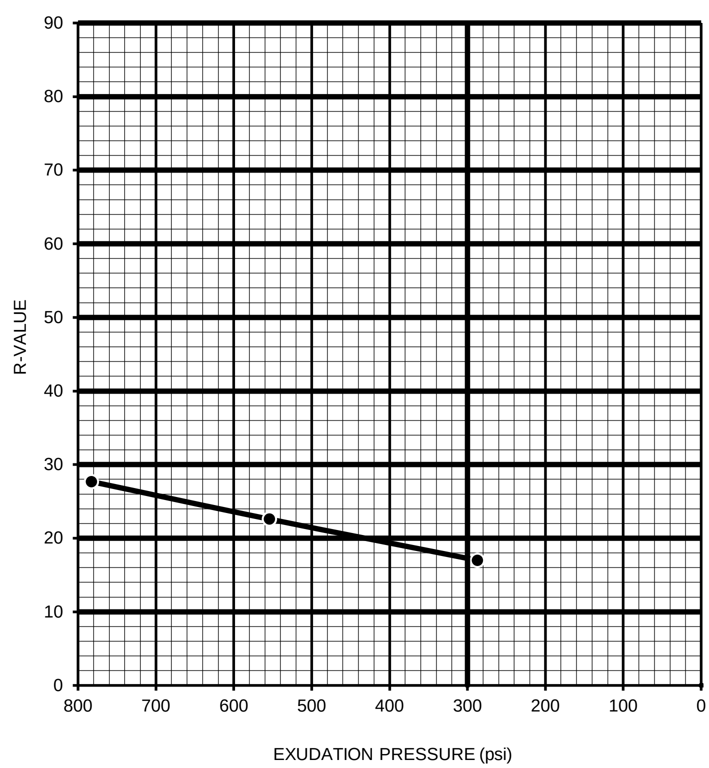
TEST SPECIMEN	A	B	C
MOISTURE AT COMPACTION %	13.8	15.8	17.9
HEIGHT OF SAMPLE, Inches	2.48	2.51	2.47
DRY DENSITY, pcf	102.0	104.3	98.4
COMPACTOR AIR PRESSURE, psi	125	75	25
EXUDATION PRESSURE, psi	783	554	287
EXPANSION, Inches x 10exp-4	57	43	30
STABILITY Ph 2,000 lbs (160 psi)	105	112	120
TURNS DISPLACEMENT	3.42	3.67	4.07
R-VALUE UNCORRECTED	28	23	17
R-VALUE CORRECTED	28	23	17

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	1.16	1.24	1.33
EXPANSION PRESSURE THICKNESS, ft.	2.15	1.62	1.13

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	19
R-VALUE BY EXUDATION:	17
EQUILIBRIUM R-VALUE:	17

Leighton

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: MCA New Buildings Geohazard　　Tested By : F. Mina　　Date: 08/12/19

Project No. : 12393.001　　Data Input By: M. Vinet　　Date: 08/13/19

Boring No.	LB-5	LB-6		
Sample No.	B-1	B-1		
Sample Depth (ft)	0 - 5.0	5.0 - 10.0		
Soil Identification:	s(CL)	s(CL)		
Wet Weight of Soil + Container (g)	100.00	100.00		
Dry Weight of Soil + Container (g)	100.00	100.00		
Weight of Container (g)	0.00	0.00		
Moisture Content (%)	0.00	0.00		
Weight of Soaked Soil (g)	100.00	100.00		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	1	2		
Crucible No.	1	2		
Furnace Temperature (°C)	850	850		
Time In / Time Out	Timer	Timer		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	25.2205	24.6325		
Wt. of Crucible (g)	25.2113	24.6255		
Wt. of Residue (g) (A)	0.0092	0.0070		
PPM of Sulfate (A) x 41150	378.58	288.05		
PPM of Sulfate, Dry Weight Basis	**379**	**288**		

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	30			
ml of AgNO3 Soln. Used in Titration (C)	3.8			
PPM of Chloride (C -0.2) * 100 * 30 / B	360			
PPM of Chloride, Dry Wt. Basis	**360**			

pH TEST, DOT California Test 643

pH Value	**6.37**			
Temperature °C	21.0			

SOIL RESISTIVITY TEST
DOT CA TEST 643

Leighton

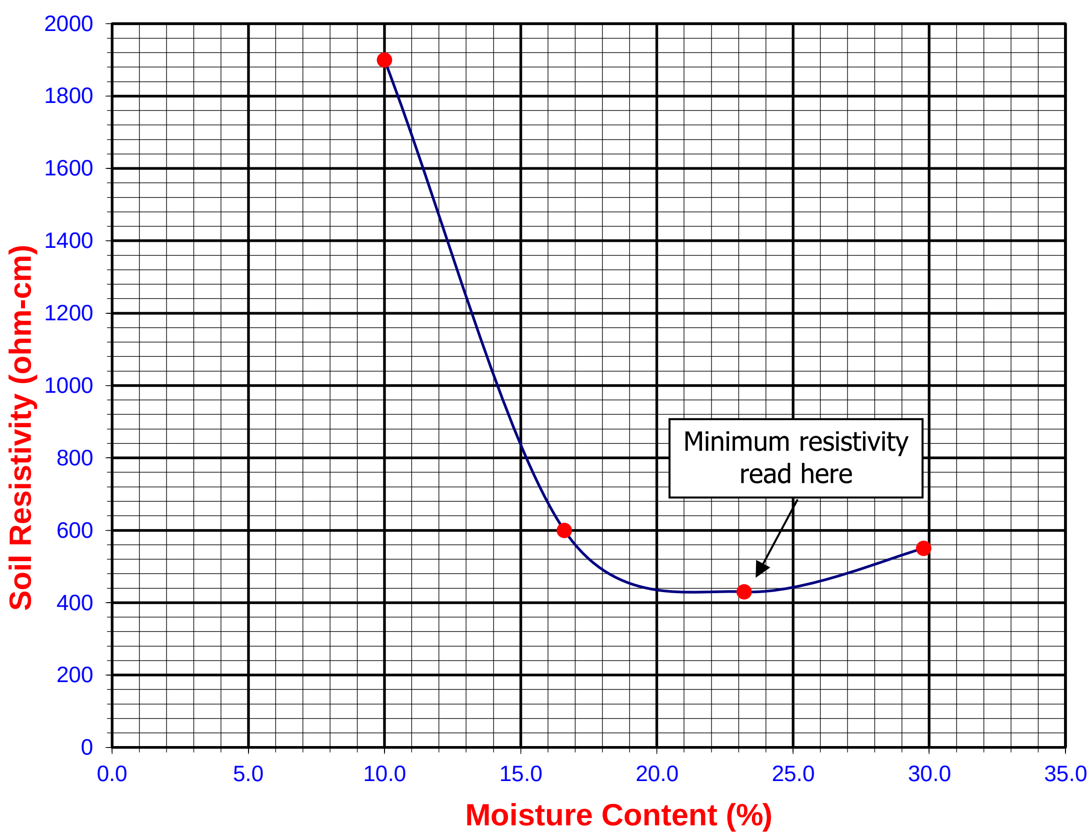
Project Name:	MCA New Buildings Geohazard	Tested By :	F. Mina	Date:	08/12/19
Project No. :	12393.001	Data Input By:	M. Vinet	Date:	08/13/19
Boring No.:	LB-5	Depth (ft.) :	0 - 5.0		
Sample No. :	B-1				
Soil Identification:*	s(CL)				

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	50	10.00	1900	1900
2	83	16.60	600	600
3	116	23.20	430	430
4	149	29.80	550	550
5				

Moisture Content (%) (MCi)	0.00
Wet Wt. of Soil + Cont. (g)	100.00
Dry Wt. of Soil + Cont. (g)	100.00
Wt. of Container (g)	0.00
Container No.	A
Initial Soil Wt. (g) (Wt)	500.00
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
430	**23.2**	**379**	**360**	**6.37**	**21.0**



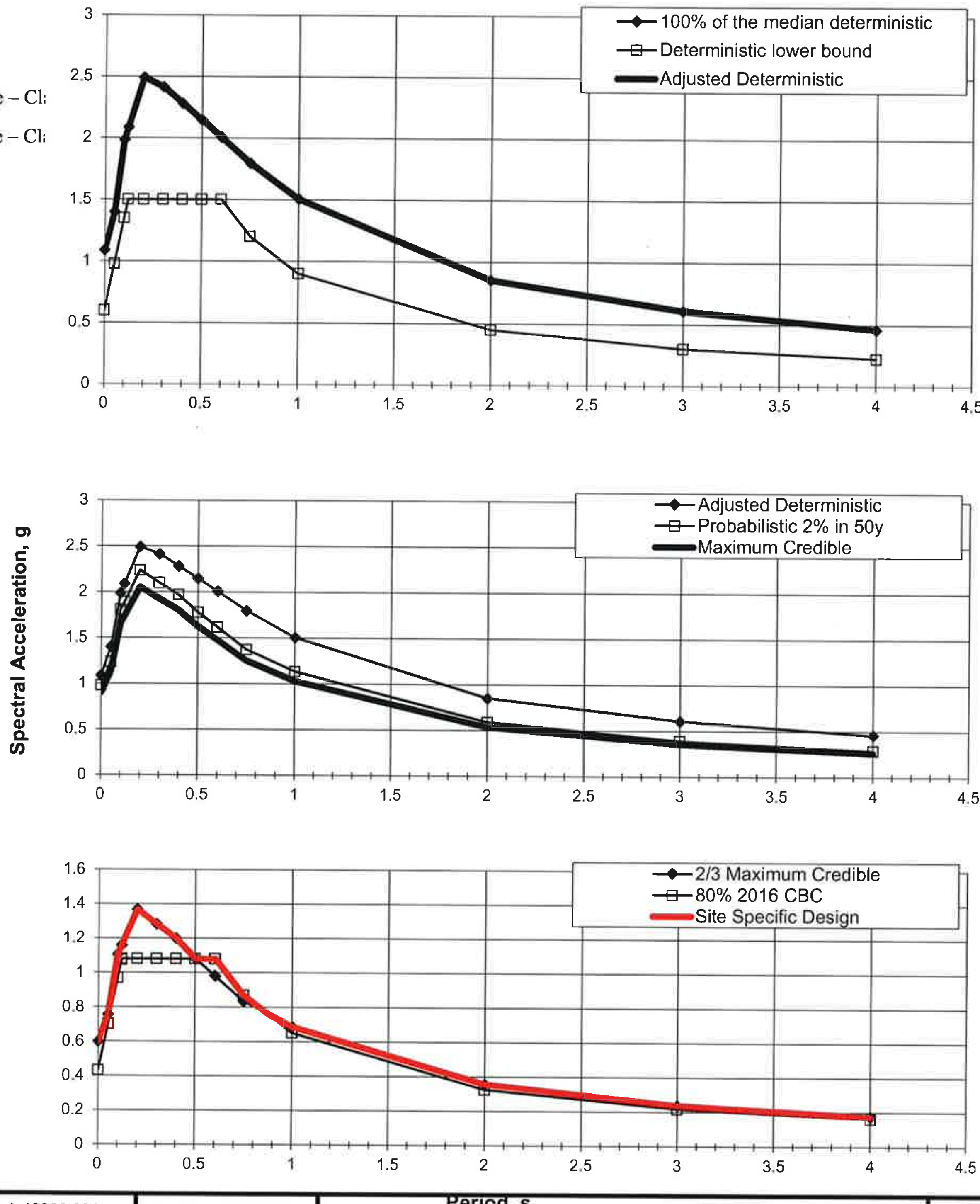
APPENDIX C

SITE-SPECIFIC SEISMIC ANALYSIS

Site Specific Response Spectrum

Project Name: MVUSD Murrieta Canyon Academy
Project No.: 12393.001

Parameter	Value
Spectral Response – Class C (short), S_S	2.052
Spectral Response – Class C (1 sec), S_1	0.713
Site Coefficient, F_a	1
Site Coefficient, F_v	1.5
Maximum Considered Earthquake Spectral Response Acceleration (short), S_{MS}	2.052
Maximum Considered Earthquake Spectral Response Acceleration – (1 sec), S_{M1}	1.07
5% Damped Design Spectral Response Acceleration (short), S_{DS}	1.368
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.713



Proj: 12393.001	Eng/Geol: SIS/RFR
Scale: NTS	Date: 08/2019
Reference:	

SITE-SPECIFIC RESPONSE SPECTRA

Murrieta VAlley Unified School District
Proposed Murrieta Canyon Academy
Murrieta, California

Figure C-1

Leighton

APPENDIX D

EARTHWORK AND GRADING SPECIFICATIONS

APPENDIX D

LEIGHTON CONSULTING, INC.
EARTHWORK AND GRADING GUIDE SPECIFICATIONS

TABLE OF CONTENTS

D-1.0 GENERAL

D-1.1 **Intent**

These Earthwork and Grading Guide Specifications are for grading and earthwork shown on the current, approved grading plan(s) and/or indicated in the Leighton Consulting, Inc. geotechnical report(s). These Guide Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the project-specific recommendations in the geotechnical report shall supersede these Guide Specifications. Leighton Consulting, Inc. shall provide geotechnical observation and testing during earthwork and grading. Based on these observations and tests, Leighton Consulting, Inc. may provide new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

D-1.2 **Role of Leighton Consulting, Inc.**

Prior to commencement of earthwork and grading, Leighton Consulting, Inc. shall meet with the earthwork contractor to review the earthwork contractor's work plan, to schedule sufficient personnel to perform the appropriate level of observation, mapping and compaction testing. During earthwork and grading, Leighton Consulting, Inc. shall observe, map, and document subsurface exposures to verify geotechnical design assumptions. If observed conditions are found to be significantly different than the interpreted assumptions during the design phase, Leighton Consulting, Inc. shall inform the owner, recommend appropriate changes in design to accommodate these observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include (1) natural ground after clearing to receiving fill but before fill is placed, (2) bottoms of all "remedial removal" areas, (3) all key bottoms, and (4) benches made on sloping ground to receive fill.

Leighton Consulting, Inc. shall observe moisture-conditioning and processing of the subgrade and fill materials, and perform relative compaction testing of fill to determine the attained relative compaction. Leighton Consulting, Inc. shall provide *Daily Field Reports* to the owner and the Contractor on a routine and frequent basis.

D-1.3 **The Earthwork Contractor**

The earthwork contractor (Contractor) shall be qualified, experienced and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Guide

Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing grading and backfilling in accordance with the current, approved plans and specifications.

The Contractor shall inform the owner and Leighton Consulting, Inc. of changes in work schedules at least one working day in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that Leighton Consulting, Inc. is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish earthwork and grading in accordance with the applicable grading codes and agency ordinances, these Guide Specifications, and recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of Leighton Consulting, Inc., unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, adverse weather, etc., are resulting in a quality of work less than required in these specifications, Leighton Consulting, Inc. shall reject the work and may recommend to the owner that earthwork and grading be stopped until unsatisfactory condition(s) are rectified.

D-2.0 PREPARATION OF AREAS TO BE FILLED

D-2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies and Leighton Consulting, Inc.. Care should be taken not to encroach upon or otherwise damage native and/or historic trees designated by the Owner or appropriate agencies to remain. Pavements, flatwork or other construction should not extend under the “drip line” of designated trees to remain.

Leighton Consulting, Inc. shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 3 percent of organic materials (by dry weight: ASTM D 2974). Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area. As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

D-2.2 Processing

Existing ground that has been declared satisfactory for support of fill, by Leighton Consulting, Inc., shall be scarified to a minimum depth of 6 inches (15 cm). Existing ground that is not satisfactory shall be over-excavated as specified in the following Section D-2.3. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

D-2.3 Overexcavation

In addition to removals and over-excavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be over-excavated to competent ground as evaluated by Leighton Consulting, Inc. during grading. All undocumented fill soils under proposed structure footprints should be excavated

D-2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), (>20 percent grade) the ground shall be stepped or benched. The lowest bench or key shall be a minimum of 15 feet (4.5 m) wide and at least 2 feet (0.6 m) deep, into competent material as evaluated by Leighton Consulting, Inc.. Other benches shall be excavated a minimum height of 4 feet (1.2 m) into competent material or as otherwise recommended by Leighton Consulting, Inc.. Fill placed on ground sloping flatter than 5:1 (horizontal to vertical units), (<20 percent grade) shall also be benched or otherwise over-excavated to provide a flat subgrade for the fill.

D-2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by Leighton Consulting, Inc. as suitable to receive fill. The Contractor shall obtain a written acceptance (*Daily Field Report*) from Leighton Consulting, Inc. prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys and benches.

D-3.0 FILL MATERIAL

D-3.1 Fill Quality

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by Leighton Consulting, Inc. prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to Leighton Consulting, Inc. or mixed with other soils to achieve satisfactory fill material.

D-3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 6 inches (15 cm), shall not be buried or placed in fill unless location, materials and placement methods are specifically accepted by Leighton Consulting, Inc.. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 feet (3 m) measured vertically from finish grade, or within 2 feet (0.61 m) of future utilities or underground construction.

D-3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of Section D-3.1, and be free of hazardous materials ("contaminants") and rock larger than 3-inches (8 cm) in largest dimension. All import soils shall have an Expansion Index (EI) of 20 or less and a sulfate content no greater than (≤) 500 parts-per-million (ppm). A representative sample of a potential import source shall be given to Leighton Consulting, Inc. at least four full working days before importing begins, so that suitability of this import material can be determined and appropriate tests performed.

D-4.0 FILL PLACEMENT AND COMPACTION

D-4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill, as described in Section D-2.0, above, in near-horizontal layers not exceeding 8 inches (20 cm) in loose thickness. Leighton Consulting, Inc. may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers, and only if the building officials with the appropriate jurisdiction approve. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

D-4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM) Test Method D 1557.

D-4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, each layer shall be uniformly compacted to not-less-than (≥) 90 percent of the maximum dry density as determined by ASTM Test Method D 1557. In some cases, structural fill may be specified (see project-specific geotechnical report) to be uniformly compacted to at-least (≥) 95 percent of the ASTM D 1557 modified Proctor laboratory maximum dry density. For fills thicker than (>) 15 feet (4.5 m), the portion of fill deeper than 15 feet below proposed finish grade shall be compacted to 95 percent of the ASTM D 1557 laboratory maximum density. Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

D-4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by back rolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet (1 to 1.2 m) in fill elevation, or by other methods producing satisfactory results acceptable to Leighton Consulting, Inc.. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of the ASTM D 1557 laboratory maximum density.

D-4.5 Compaction Testing

Field-tests for moisture content and relative compaction of the fill soils shall be performed by Leighton Consulting, Inc.. Location and frequency of tests shall be at our field representative(s) discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

D-4.6 Compaction Test Locations

Leighton Consulting, Inc. shall document the approximate elevation and horizontal coordinates of each density test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that Leighton

Consulting, Inc. can determine the test locations with sufficient accuracy. Adequate grade stakes shall be provided.

D-5.0 EXCAVATION

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by Leighton Consulting, Inc. during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by Leighton Consulting, Inc. based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, then observed and reviewed by Leighton Consulting, Inc. prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by Leighton Consulting, Inc..

D-6.0 TRENCH BACKFILLS

D-6.1 Safety

The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations. Work should be performed in accordance with Article 6 of the *California Construction Safety Orders*, 2009 Edition or more current (see also: http://www.dir.ca.gov/title8/sb4a6.html).

D-6.2 Bedding and Backfill

All utility trench bedding and backfill shall be performed in accordance with applicable provisions of the 2015 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Bedding material shall have a Sand Equivalent greater than 30 (SE>30). Bedding shall be placed to 1-foot (0.3 m) over the top of the conduit, and densified by jetting in areas of granular soils, if allowed by the permitting agency. Otherwise, the pipe-bedding zone should be backfilled with Controlled Low Strength Material (CLSM) consisting of at least one sack of Portland cement per cubic-yard of sand, and conforming to Section 201-6 of the 2015 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Backfill over the bedding zone shall be placed and densified mechanically to a minimum of 90 percent of relative compaction (ASTM D 1557) from 1 foot (0.3 m) above the top of the conduit to the surface. Backfill above the pipe zone shall **not** be jetted. Jetting of the bedding around the conduits shall be observed by Leighton Consulting, Inc. and backfill above the pipe zone (bedding) shall be observed and tested by Leighton Consulting, Inc..

D-6.3 Lift Thickness

Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to Leighton Consulting, Inc. that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method, and only if the building officials with the appropriate jurisdiction approve.

APPENDIX E

GBA – IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL REPORT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

Examples of material to provide in Appendix 4 may include but are not limited to the following:

- Environmental Site Assessments conducted for the project,
- Other information on Past Site Use that impacts the feasibility of LID BMP implementation on the site.

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 2.3 of the SMR WQMP and Sections D of this Template.

Appendix 5: LID Feasibility Supplemental Information

Information that supports or supplements the determination of LID technical feasibility documented in Section D

Examples of material to provide in Appendix 5 may include but are not limited to the following:

- Technical feasibility criteria for DMAs
- Site specific analysis of technical infeasibility of all LID BMPs (if Alternative Compliance is needed)
- Documentation of Approval criteria for Proprietary Biofiltration BMPs

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 2.3 of the SMR WQMP and Sections D of this Template.

Appendix 6: LID BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation to supplement Section D

Examples of material to provide in Appendix 6 may include but are not limited to the following:

- DCV calculations,
- LID BMP sizing calculations from Exhibit C of the SMR WQMP
- Design details/drawings from manufacturers for proprietary BMPs

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 3.4 of the SMR WQMP and Sections D.4 of this Template.

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-1/DMA-A (Pervious)		

Enter the Area Tributary to this Feature A_T = 1.58 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.72 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (\text{in-ac/ac}) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 4,129 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-1/DMA-A (Pervious)		

Enter the Area Tributary to this Feature A_T = 2.04 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.09 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 666 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-2/DMA-A (Pervious)		

Enter the Area Tributary to this Feature A_T = 0.12 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.72 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 314 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-2/DMA-A (Pervious)		

Enter the Area Tributary to this Feature A_T = 0.03 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.09 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 10 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-2/DMA-A (Pervious)		

Enter the Area Tributary to this Feature A_T = 0.08 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.72 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 209 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-2/DMA-A (Pervious)		

Enter the Area Tributary to this Feature A_T = 0.01 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township

Range

Section

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.09 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\,(ft^3) = \frac{V_U\,(in\text{-}ac/ac) \times A_T\,(ac) \times 43{,}560\,(ft^2/ac)}{12\,(in/ft)}$$

V_{BMP} = 3 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-2/DMA-C (Impervious)		

Enter the Area Tributary to this Feature A_T = 0.07 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.72 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 183 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-2/DMA-C (Pervious)		

Enter the Area Tributary to this Feature $A_T =$ 0.01 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85th Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.09 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 3 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-3/DMA-A (Impervious)		

Enter the Area Tributary to this Feature A_T = 0.37 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.72 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 967 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend:	Required Entries
	Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-3/DMA-A (Pervious)		

Enter the Area Tributary to this Feature A_T = 0.03 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.09 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 10 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-4/DMA-A (Impervious)		

Enter the Area Tributary to this Feature A_T = 0.13 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.72 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 340 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-4/DMA-A (Pervious)		

Enter the Area Tributary to this Feature A_T = 0.06 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.09 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\,(ft^3) = \frac{V_U\,(in\text{-}ac/ac) \times A_T\,(ac) \times 43{,}560\,(ft^2/ac)}{12\,(in/ft)}$$

V_{BMP} = 20 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-5/DMA-A (Impervious)		

Enter the Area Tributary to this Feature A_T = 0.04 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.72 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 105 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-5/DMA-A (Pervious)		

Enter the Area Tributary to this Feature $A_T =$ 0.1 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85th Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.09 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 33 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-6/DMA-A (Impervious)		

Enter the Area Tributary to this Feature $A_T =$ 0.02 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township

Range

Section

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.72 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 52 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries | Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-6/DMA-A (Pervious)		

Enter the Area Tributary to this Feature A_T = 0.18 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.09 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 59 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-7/DMA-A (Impervious)		

Enter the Area Tributary to this Feature A_T = 0.09 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.72 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 235 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-7/DMA-A (Pervious)		

Enter the Area Tributary to this Feature A_T = 0.04 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.09 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 13 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Epic Engineer	Date	10/30/2019
Designed by	C.A.W.	County/City Case No	
Company Project Number/Name	104.13 MCA		
Drainage Area Number/Name	DA-8/DMA-A (Impervious)		

Enter the Area Tributary to this Feature A_T = 0.04 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	
Range	
Section	

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.81

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.72 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 105 ft^3

Notes:

Appendix 7: Hydromodification

Supporting Detail Relating to compliance with the Hydromodification Performance Standards

Examples of material to provide in Appendix 7 may include but are not limited to the following:

- Hydromodification Exemption Exhibit,
- Potential Critical Coarse Sediment Yield Area Mapping
- Hydromodification BMP sizing calculations,
- SMRHM report files,
- Site-Specific Critical Coarse Sediment Analysis,
- Design details/drawings from manufacturers for proprietary BMPs

This information should support the hydromodification exemption (if applicable) and hydrologic control BMP and Sediment Supply BMP sections of this Template. Refer to Section 2.4 and 3.6 of the SMR WQMP and Sections E of this Template.

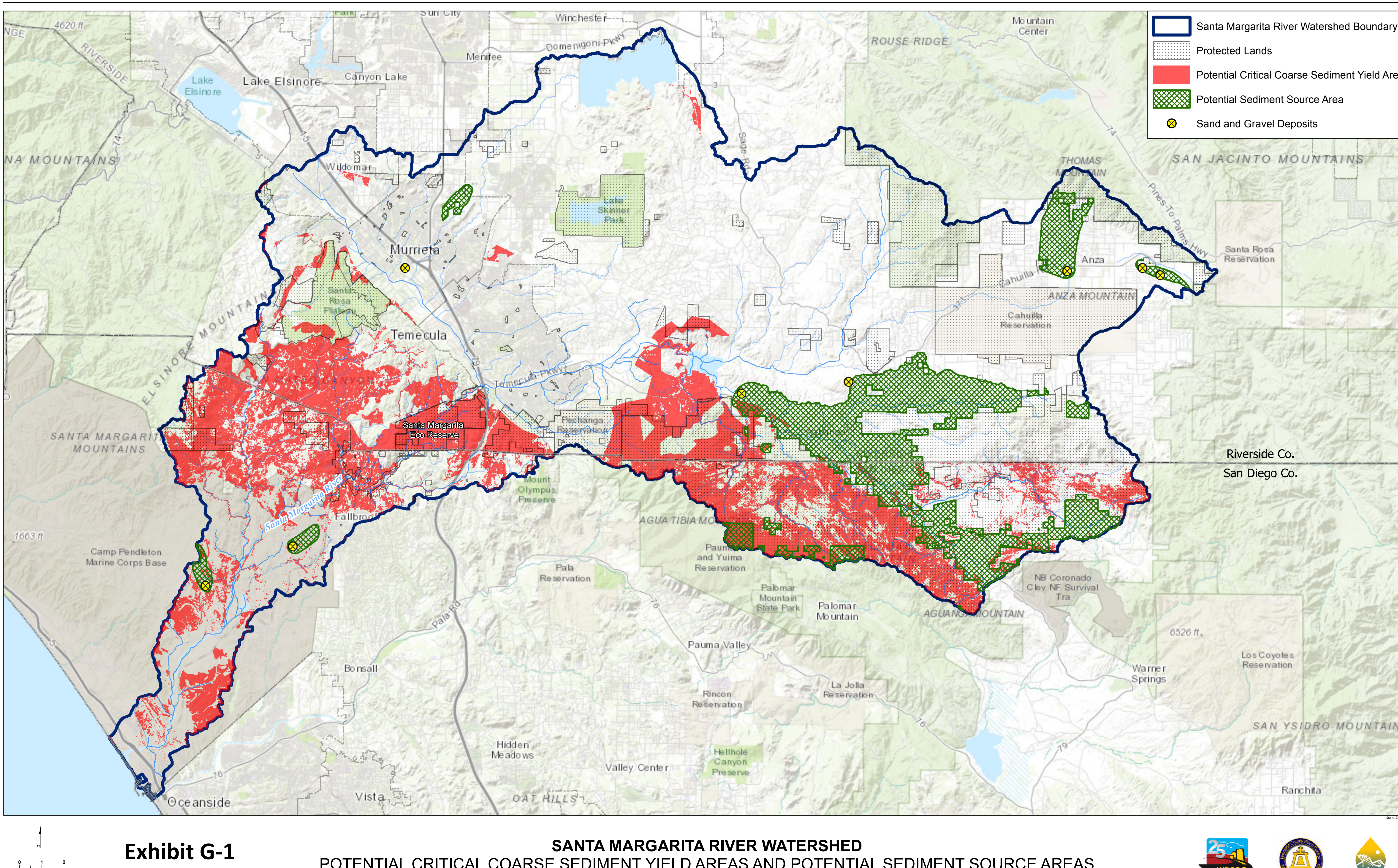


Exhibit G-1

SANTA MARGARITA RIVER WATERSHED

POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREAS AND POTENTIAL SEDIMENT SOURCE AREAS

wsp

Santa Margarita Region - County HydroMod Iterative Spreadsheet Model

Only for use the unincorporated portions of Riverside County, unless otherwise approved by the Co-Permittee

Development Project Number(s):	SC-2018-1817	Rain Gauge	Eastern Slopes
Latitude (decimal format):	33.5742	BMP Type (per WQMP):	Bioretention
Longitude (decimal format):	-117.1823	BMP Number (Sequential):	Entire Site

Pre-Development - Hydrology Information

DRAINAGE AREA (ACRES) - 10 acre max[1]	1.22	2-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.3	0.55
LONGEST WATERCOURSE (FT) - 1,000' max[1]	152	10-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.1	0.88
UPSTREAM ELEVATION OF WATERCOURSE (FT)	1244.44	SLOPE OF THE INTENSITY DURATION - Plate D-4.6	0.55
DOWNSTREAM ELEV. OF WATERCOURSE (FT)	1238.53	CLOSEST IMPERVIOUS PERCENTAGE (%)	0% Undeveloped - Poor Cover
EXISTING IMPERVIOUS PERCENTAGE (%)	0		
Use 10% of Q2 to avoid Field Screening requirements	Yes		

Pre-Development - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
22	1.22 Ac.	Urban Landscaping	Good Cover	22		38	40	43	**63**	80
								0	**0**	0
								0	**0**	0
	1.22 Ac.						**Weighted Average RI Numbers =**	**43.0**	**63.0**	**80.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are: AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Pre-Development - Calculated Range of Flow Rates analyzed for Hydromod (Suceptible Range of Flows)

Calculated Upper Flow-rate limit	Calculated Lower Flow-rate limit
Ex. 10-year Flowrate[1] = **2.348** cfs	Ex. 10% of the 2-year Flowrate[1] = **0.093** cfs
(Co-Permitte Approval is required) User-Defined Discharge Values with accompanying Hydrology Study[1]	
Ex. 10-year Flowrate (Attach Study) = cfs	Ex. 2-year Flowrate (Attach Study) = cfs

[1]The equations used to determine the 10-year and 10% of the 2-yr are limited to 10-acres and 1,000'. Flowrates from a separate study can be used to over-ride the calculated values so that larger areas (up to 20 acres) and longer watercourse lengths can be used. All values still need to be filled out, even when there is a user-defined discharge value entered.

Post-Project - Hydrograph Information

DRAINAGE AREA (ACRES)	5.6143	Diversions are mitigated or will not result in downstream issues	No
LONGEST WATERCOURSE (FT)	128	Go to "BMP Design" tab to design your BMP, then check results below.	
DIFFERENCE IN ELEV (FT) - along watercourse	3.83	Print both this "HydroMod" Sheet and the "BMP Design" sheet for your submittal.	
PROPOSED IMPERVIOUS PERCENTAGE (%)	50		

Post-Project - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
22	5.6143 Ac.	Urban Landscaping	Good Cover	22		38	40	43	**63**	80
								0	**0**	0
								0	**0**	0
	5.61 Ac.						**Weighted Average RI Numbers =**	**43.0**	**63.0**	**80.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are: AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Results

		First result out of compliance in the rainfall record				See below for the Height in the Basin (Stage) that is causing a non-compliant result	
Hydromod Ponded depth	**0.60 feet**	Requirement		Proposed			
Hydromod Drain Time (unclogged)	**62.00 hours**						
Is the HydroMod BMP properly sized?	**Yes, this is acceptable**	---	---	---	---		
Mitigated Q < 110% of Pre-Dev. Q?	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---
Mitigated Duration < 110% of Pre-Dev?*	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---

Responsible-in-charge: ____________________ Date: ____________

Signature: ____________________

Spreadsheet Developed by: Benjie Cho, P.E.

BMP Design

Fill in blue shaded areas

BMP Geometry & Detention Calculations

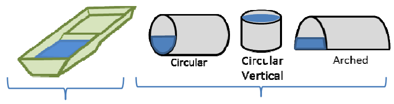
0.1 **feet, Stage Intervals**

Larger Stage Intervals may incr. the Q at the bottom stg.

PROPOSED BMP DIMENSIONS

STEP1: Size the BMP, so that the Total Volume > Max HydroMod Vol. (Deeper is ok, it will be refined in the Design Geometry)

Is the BMP a Tank shape? 2 — 1 for yes; 2 for no.

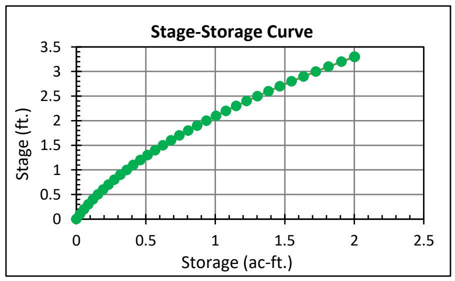


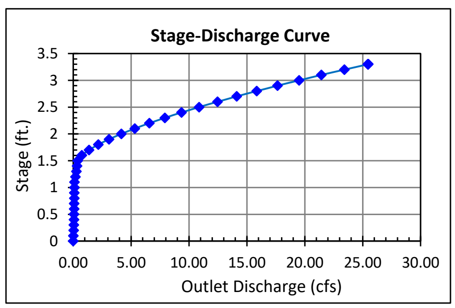
Basin Shaped BMP (Bottom Stage 1st)

Bottom Stage H= 3.3' SS= 4 :1

Top Area		Bottom Area		
Width	36.4	Width	10	FT
Length	1150.4	Length	1124	FT
area =	41874.56	area =	11240	

Top Stage H= 0.0'





Prop. Top Stg. Vol. =	-	FT3
Prop Bottom Stg Vol =	82,290	FT3
Total Prop. Volume[1] =	82,290	FT3
Max HydroMod Volume =	7,009	FT3
Total Surface Area[2] =	41,875	FT2
BMP % of Site =	17.12%	
Max HydroMod Depth[3] =	0.60	FT

[1]Does not include forebay, or low flow trench

[2]Does not account for freeboard or access roads

[3]Does not consider Increased Runoff

Stage-Storage-Discharge*

Stage (FT)	Storage (AC-FT)	Storage (FT3)	Q (CFS)
0	0	0	0
0.10	0.027	1169	0.01
0.20	0.056	2429	0.04
0.30	0.087	3780	0.05
0.40	0.120	5222	0.06
0.50	0.155	6755	0.07
0.60	0.192	8380	0.08
0.70	0.232	10096	0.09
0.80	0.273	11904	0.09
0.90	0.317	13804	0.10
1.00	0.363	15795	0.10
1.10	0.410	17879	0.11
1.20	0.460	20054	0.19
1.30	0.512	22322	0.28
1.40	0.567	24682	0.33
1.50	0.623	27135	0.38
1.60	0.681	29681	0.74
1.70	0.742	32319	1.37
1.80	0.805	35050	2.16
1.90	0.869	37874	3.10
2.00	0.936	40791	4.15
2.10	1.006	43802	5.31
2.20	1.077	46906	6.57
2.30	1.150	50103	7.92
2.40	1.226	53394	9.36
2.50	1.303	56779	10.87
2.60	1.383	60258	12.46
2.70	1.465	63831	14.12
2.80	1.550	67498	15.85
2.90	1.636	71260	17.65
3.00	1.724	75116	19.51
3.10	1.815	79066	21.44
3.20	1.908	83111	23.42
3.30	2.003	87251	25.46
3.30	2.003	87,251	

MINIMUM DESIGN GEOMETRY

STEP3: Delete outlets, then propose the largest lowest orifice that does not, exceed the ex. Q or Duration. If the Q is acceptable, but the duration is exceeded, try decreasing orifice, then adding a weir slightly below the stage that has an issue.

OUTLETS (for Stage-Discharge)

Orifice Outlets			Weir Outlets		
Invert Height (ft)	Diameter (inches)	No. of Orifices	Crest Height (ft)	Crest Width (ft)	No. of Weirs
0	2.00	1			
1	4.00	1			
1.5			1.50	3	1

Hydromod Depth = 0.60 FT

+ 1' Freeboard = 1.60 FT

Resize with Hydromod Depth +1' Freeboard

Top Surface Area

Based on HydroMod Depth +1' of Freeboard

Bottom Stage		
Width	36.4	FT
Length	1150.4	FT

STEP4: Complete an increased runoff analysis, if the project can impact downstream properties. Incorporate these designs into the WQMP site plan.
Add emergency overflow weir, for flows that exceed the Hydromod volumes, sized to the 100-year peak flow rate. Add access roads (< 10% longitudinal slope) with enough width & turn around access for equipment that would be needed to scarify the bottom or remove Bioretention soil media.

Add Infiltration

Enter information from actual infiltration tests or design BSM rate

No	**Consider Infiltration, Bioretention, or Biofiltration (Yes or No)?**	-	FT3/sec, Unfactored Infiltration (over entire bottom)
0.2	Infiltration/Biofiltration rate thru the finish surface of the BMP (in/hr)[3]	-	**FT3/sec, Infiltration / Factor of Safety**
3	Factor of Safety[3]	-	FT3, Vol. Infiltrated, over representative time
300	mins, Time represented by Infil. Tests or Biofiltraton Routing Time[4]	-	FT3/sec, Low-Loss after representative time

[3]Measured Infiltration Rate per the LID Manual, Appendix A for Infiltration/BioRetention. For BioFiltration use a rate thru the media of 2.5 in/hr (long term design rate).

[4]Time that infiltration rate is being applied for Hydromod analysis for Infiltration/BioRention. Use 300 minutes (5hrs) for BioFiltration. Pore space is not accounted for at this time.

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

Include a copy of the completed Pollutant Sources/Source Control Checklist used to document Source Control BMPs in Section H of this Template.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ A. **On-site storm drain inlets**	☑ **Locations of inlets.**	☑ **Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.**	☑ **Maintain and periodically repaint or replace inlet markings.** ☑ **Provide stormwater pollution prevention information to new site owners, lessees, or operators.** ☑ **See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** ☑ **Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."**
❑ B. **Interior floor drains and elevator shaft sump pumps**		❑ **State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.**	❑ **Inspect and maintain drains to prevent blockages and overflow.**
❑ C. **Interior parking garages**		❑ **State that parking garage floor drains will be plumbed to the sanitary sewer.**	❑ **Inspect and maintain drains to prevent blockages and overflow.**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ D1. **Need for future indoor & structural pest control**		☐ **Note building design features that discourage entry of pests.**	☐ **Provide Integrated Pest Management information to owners, lessees, and operators.**
☑ D2. **Landscape/ Outdoor Pesticide Use**	☑ **Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.** ☑ **Show self-retaining landscape areas, if any.** ☑ **Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)**	**State that final landscape plans will accomplish all of the following.** ☑ **Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.** ☑ **Design landscaping to minimize irrigation and runoff, to promote surface infiltration where** ✓ **appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.** ☑ **Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.** ☑ **Consider using pest-resistant plants, especially adjacent to hardscape.** ☑ **To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.**	☑ **Maintain landscaping using minimum or no pesticides.** ☑ **See applicable operational BMPs in "What you should know for…..Landscape and Gardening"** at http://rcflood.org/stormwater/**Error! Hyperlink reference not valid.** ☑ **Provide IPM information to new owners, lessees and operators.**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ E. **Pools, spas, ponds, decorative fountains, and other water features.**	☐ **Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)**	**If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.**	☐ **See applicable operational BMPs in** "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☐ F. **Food service**	☐ **For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment.** ☐ **On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.**	☐ **Describe the location and features of the designated cleaning area.** ☐ **Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.**	☐ **See the brochure, "**The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ **Provide this brochure to new site owners, lessees, and operators.**
☑ G. **Refuse areas**	☑ **Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas.** ☑ **If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area.** ☑ **Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.**	☑ **State how site refuse will be handled and provide supporting detail to what is shown on plans.** ☑ **State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.**	☑ **State how the following will be implemented:** **Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ H. **Industrial processes.**	❑ **Show process area.**	❑ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."**	❑ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ I. **Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)**	❑ **Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area.** ❑ **Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults.** ❑ **Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.**	**Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.** **Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for:** ▪ **Hazardous Waste Generation** ▪ **Hazardous Materials Release Response and Inventory** ▪ **California Accidental Release (CalARP)** ▪ **Aboveground Storage Tank** ▪ **Uniform Fire Code Article 80 Section 103(b) & (c) 1991** ▪ **Underground Storage Tank** **www.cchealth.org/groups/hazmat/**	❑ **See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ J. **Vehicle and Equipment Cleaning**	❑ **Show on drawings as appropriate:** **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	❑ **If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.**	**Describe operational measures to implement the following (if applicable):** ❑ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ❑ **Car dealerships and similar may rinse cars with water only.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ K. **Vehicle/Equipment Repair and Maintenance**	❑ **Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater.** ❑ **Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.** ❑ **Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.**	❑ **State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.** ❑ **State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.** ❑ **State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.**	**In the Stormwater Control Plan, note that all of the following restrictions apply to use the site:** ❑ **No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.** ❑ **No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.** ❑ **No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.** Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ L. **Fuel Dispensing Areas**	❑ **Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable.** ❑ **Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.**		❑ **The property owner shall dry sweep the fueling area routinely.** ❑ **See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

[6] **The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ M. **Loading Docks**	❑ **Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer.** ❑ **Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.** ❑ **Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.**		❑ **Move loaded and unloaded items indoors as soon as possible.** ❑ **See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ N. **Fire Sprinkler Test Water**		❑ **Provide a means to drain fire sprinkler test water to the sanitary sewer.**	❑ **See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**
O. **Miscellaneous Drain or Wash Water or Other Sources** ❑ **Boiler drain lines** ❑ **Condensate drain lines** ❑ **Rooftop equipment** ❑ **Drainage sumps** ❑ **Roofing, gutters, and trim.** ❑ **Other sources**		❑ **Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.** ❑ **Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.** ❑ **Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.** ❑ **Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.** ❑ **Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.** ❑ **Include controls for other sources as specified by local reviewer.**	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ P. **Plazas, sidewalks, and parking lots.**			☑ **Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.**

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

Include the completed Operation and Maintenance Plan in this Appendix along with additional documentation of Finance and Maintenance Recording Mechanisms for the site. Refer to Sections 3.10 and 5 of the SMR WQMP and Section J of this Template.

Operation and Maintenance Plan

Project Title: Murrieta Canyon Academy

Original Date Prepared: November 20, 2019

Revision Date(s): ______________________

Revision Date(s): ______________________

Revision Date(s): ______________________

Revision Date(s): ______________________

Contact Information:

Prepared for:

Murrieta Valley Unified School District
41870 McAlby Court
Murrieta, CA 92562
(951) 696-1600
CONTACT: Lori Noorigian
Coordinator of Facilities

Prepared by:

Epic Engineers
101 E. Redlands Blvd., Suite 146
Redlands, CA 92373
(909) 792-5969
CONTACT: Sebastian Ulloa
(sebastian@epicrce.com)

Table of Contents

I. Introduction

This document is the Operations and Maintenance Plan (O&M Plan) developed for:

Murrieta Canyon Academy
24150 Hayes Avenue
Murrieta, CA 92562

In 1972 the Federal Water Pollution Control Act (known as the Clean Water Act) was amended to effectively prohibit discharge of pollutants to "waters of the United States" from any point source unless the discharge is in compliance with an NPDES permit. The United States Environmental Protection Agency (USEPA) has delegated administration of the NPDES program within California to the State. California's Porter Cologne Act gives the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (Regional Boards) the authority to administer the NPDES Program. The 1987 amendments of the Clean Water Act added Section 402(p) which established the framework for regulating discharges of pollutants via stormwater from industrial activities and MS4s. Section 402(p) required the USEPA to develop permitting regulations for stormwater discharges from MS4s and from industrial facilities, including construction sites.

The O&M Plan will be reviewed at least annually to determine if any revision is necessary to reflect changes in the facility or changes in the activities conducted that:

- May significantly increase the quantities of pollutants in stormwater runoff.
- Cause a new area of the facility to be exposed to stormwater or authorized non-stormwater discharges: or
- Start-up of an activity that would introduce a new pollutant source at a facility.

Proposed Improvements

The Murrieta Canyon Academy located at 24150 Hayes Avenue, Murrieta, California, is a fully functioning adult education school campus constructed during various phases. The proposed buildings are generally located within the existing softball fields located immediately north of the existing campus and south of Thompson Middle School. The existing Murrieta Canyon Academy buildings are to be demolished and new parking/landscape to be constructed. Access to all portions of the site was through a locked gate along the south side of the campus.

Existing Conditions

The Murrieta Canyon Academy located at 24150 Hayes Avenue, Murrieta, California, is a fully functioning adult education school campus constructed during various phases. The proposed buildings are generally located within the existing softball fields located immediately north of the existing campus and south of Thompson Middle School. The existing Murrieta Canyon Academy buildings are to be demolished and new parking/landscape to be constructed. Access to all portions of the site was through a locked gate along the south side of the campus.

Proposed Conditions

The proposed project has eight Drainage Areas (DA). Stormwater runoff from DA-1 sheet flows into proposed catch basins throughout the Drainage Area. Stormwater runoff will be conveyed through proposed storm drain lines into the proposed BMP, a Biofiltration with Partial Infiltration Basin. The stormwater will filter through 3” of non-floating hardwood mulch, 36” of engineered media soil, per the Riverside County – Low Impact Development BMP Design Handbook, and 18” of an open graded ASTM #57 stone layer, before outletting through a perforated pipe and into outlet #1. The DCV for DA-1 is 4,795 cubic feet. The design volume for the proposed Biofiltration basin is 7,725 cubic feet. Stormwater greater than the DCV will outlet through a Type X inlet per RCFCWCD standard. The design for the biofiltration basin meets Hydromod requirements.

Stormwater runoff from DA-2 sheet flows south into proposed catch basins in the Drainage Area. Stormwater runoff will be conveyed through proposed storm drain lines into the proposed BMP, a Bio-Clean Biofiltration System.

Stormwater runoff from DA-3 sheet flows south into an existing curb inlet. This Drainage Area cannot be collected into the proposed BMP, so we proposed a catch basin insert filter to treat the flows. The Design Flow Rate for DA-3 is 0.1 cfs and the filtered flow rate of the catch basin insert filter is 1.76 cfs.

Stormwater runoff from DA-4 cannot be collected into onsite BMPs. Stormwater runoff flows south towards Hayes Avenue and gets captured by a trench drain onsite before it has a chance to outlet onto Hayes Avenue. Stormwater runoff will be conveyed into the existing storm drain pipe via a proposed storm drain line.

Stormwater runoff from DA-5 cannot be collected into onsite BMPs. Stormwater runoff will sheet flow south down the slope onto Hayes Avenue as it did in the existing condition.

Stormwater runoff from DA-6 cannot be collected into onsite BMPs. Stormwater runoff will sheet flow south down the slope onto Hayes Avenue as it did in the existing condition.

Stormwater runoff from DA-7 cannot be collected into onsite BMPs. Stormwater runoff will sheet flow onto the onsite alley way as it did in the existing condition.

Stormwater runoff from DA-8 cannot be collected into onsite BMPs. Stormwater runoff will sheet flow onto the onsite alley way as it did in the existing condition.

II. Inspection and Maintenance Log

An Annual Inspection and Maintenance Log helps to assure that significant changes in facilities or activities are identified and can then be reflected in the O&M Plan. The Annual Inspection and Maintenance includes:

- Visual inspection of all potential sources of pollutants that may enter the storm water drainage system via storm water or Non-Storm Water discharges;
- A review and assessment of all BMPs referred to in this WQMP to determine whether the BMPs are adequate, properly implemented and maintained, or whether additional BMPs are needed;
- Visual inspection of equipment needed to implement the O&M Plan, such as spill response equipment, drip pans, brooms or vacuum sweepers, or containers for used absorbents.

The Annual Inspection and Maintenance should be documented:

- Identification of personnel performing the evaluation;
- The date(s) of evaluation;
- Findings of the evaluation;
- Any incidents of non-compliance and the corrective actions taken.

Following the evaluations, necessary revisions to the O&M Plan are completed within 90 days.

Blank Inspections and Maintenance Logs may be found in Appendix A.

Date	BMP	Observations/Actions (SEE **VII.A** FOR SCHEDULE)	Inspector
	Storm Drain Signage		
	Trash Storage Areas		
	Biofiltration Basin		
	Bio-Clean Biofiltration System #1		

Additional inspection and maintenance logs to be included in Appendix A of this O&M Plan.

III. Updates, Revisions, and Errata

Any changes to the O&M Plan regarding the stormwater BMPs and project site must be documented:

- Identification of personnel preparing revion(s)
- Identification of personnel approval
- Description of update, revision, and/or errata; including section and page number.
- Revision Number;
- The date of the update(s), Revision(s), and Errata

Blank Update, Revision, and Errata Logs may be found in Appendix B.

Revision Number	Date	Brief Description of Update/Revision/Errata, Include Section and Page Number	Prepared and Approved By

Additional updates, revisions, and errata to be included in Appendix B of this O&M Plan.

IV. Responsibility for Maintenance

IV.A General

Funding will be provided by the owner:

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT
41870 McALBY COURT
MURRIETA, CA 92562
(951) 696-1600
Contact: LORI NOORIGIAN

A copy of the Covenant Agreement will be attached in Appendix C of this O&M Plan.

IV.B Staff Training Program

Training for Facility Personnel

Murrieta Valley Unified School District is responsible for Stormwater Management training for staff at this facility.

Training related to Stormwater Management is provided on at least an annual basis to review specific responsibilities for implementing this O&M Plan, what and how to accomplish those responsibilities, including BMP implementation. This training typically occurs in September shortly before the start of the rainy season (typically this is October 1st through May 30th).

Additionally, general awareness training is provided annually to all employees whose activities may impact stormwater discharges. The purpose of this training is to educate workers on activities that can impact stormwater discharges, and to help in the implementation of BMPs. All staff and contract pesticide and fertilizer applicators are required to have appropriate training, permits and certifications.

Training attendance sheets and any other training documentation is provided in Appendix D. The training records include name of instructor, date and time of training, location of training and training participants. The training records are kept for a period of no less than five years.

Staff training records and descriptions will be inserted in Appendix D of this O&M Plan.

IV.C Records

Maintenance records are to be inserted chronologically in Appendix A of this O&M Plan.

IV.D Safety

All maintenance procedures shall comply with the latest OSHA standards.

V. Summary of Drainage Management Areas and Stormwater BMPs

V.A Drainage Areas

See Appendix E of this O&M Plan for WQMP site map.

DMA Name or ID	Surface Type(s)	Area (Sq. Ft.)	Area (Acres)	DMA Type
DA-1/DMA-A	Concrete or Asphalt	68,639	1.58	Type “D”
DA-1/DMA-A	Ornamental Landscaping	89,187	2.05	Type “D”
DA-2/DMA-A	Concrete or Asphalt	5,103	0.12	Type “D”
DA-2/DMA-A	Ornamental Landscaping	849	0.02	Type “D”
DA-2/DMA-B	Concrete or Asphalt	3,646	0.08	Type “D”
DA-2/DMA-B	Ornamental Landscaping	476	0.01	Type “D”
DA-2/DMA-C	Concrete or Asphalt	3,072	0.07	Type “D”
DA-2/DMA-C	Ornamental Landscaping	323	0.001	Type “D”
DA-3/DMA-A	Concrete or Asphalt	16,490	0.38	---
DA-3/DMA-A	Ornamental Landscaping	801	0.02	---
DA-4/DMA-A	Concrete or Asphalt	5,785	0.13	---
DA-4/DMA-A	Ornamental Landscaping	2,612	0.06	---
DA-5/DMA-A	Concrete or Asphalt	1,788	0.04	---
DA-5/DMA-A	Ornamental Landscaping	4,306	0.10	---
DA-6/DMA-A	Concrete or Asphalt	817	0.02	---
DA-6/DMA-A	Ornamental Landscaping	7,889	0.18	---
DA-7/DMA-A	Concrete or Asphalt	4,320	0.10	---
DA-7/DMA-A	Ornamental Landscaping	1,272	0.03	---
DA-8/DMA-A	Concrete or Asphalt	1,853	0.04	---
DA-8/DMA-A	Ornamental Landscaping	4,555	0.10	---

Geo-location of the BMPs using latitude and longitude coordinates.

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	Latitude	Longitude
A	In-site storm drain inlets	WQMP Site Map	---	---
B	Interior floor drains	N/A	---	---
D2	Landscape / Outdoor Pesticide Use	On-site Landscape Improvement Plans	---	---
P	Plazas, sidewalks, and parking lots	WQMP Site Map	---	---
Biofiltration Basin	Biofiltration Basin	WQMP Site Map	33.560803°	-117.232695°
Bio-Clean Biofiltration System #1	Bio-Clean Biofiltration System #1	WQMP Site Map	33.560323°	-117.232666°

V.B Structural Post-Construction BMPs

See Appendix E of this O&M Plan for WQMP site map.

Additional BMP details are available in Appendix 10 of this WQMP.

VI. Stormwater BMP Design Documentation

VI.A "As-Built" Drawings of each Stormwater BMP

See Appendix F of this O&M Plan for "as-built" drawings.

VI.B Manufacturer's Data, Manuals, and Maintenance Requirements

Not applicable, there are no manufactured stormwater BMPs.

VI.C Specific Operation and Maintenance Concerns and Troubleshooting

Not applicable.

VII. Maintenance Schedule or Matrix

VII.A Maintenance Schedule

Schedule (Biofiltration Basin)	Inspection and Maintenance Activity (Biofiltration Basin)
Monthly including just before the annual storm season and following rainfall events.	• Inspect soil. Repair eroded areas. • Remove litter and debris. • Check for obvious problems and repair as needed. Address odor, standing water, and overgrowth issues associated with stagnant or standing water in the basin bottom. • Revegetate side slopes where needed.
Semi-Annually. Schedule these inspections within 72 hours after a significant rainfall event and prior to the rainy season (October 1st). "Significant rainfall" is defined as 0.5 inched or greater of rainfall: http://www.wrh.noaa.gov/forecast/wxtables/	• Inspect and repair eroded areas. • Repair or replace shrubs as needed. • Re-mulch void areas. • Check for areas of sediment accumulation. • Remove and replace dead and diseased vegetation.
Annually. Schedule these inspections within 72 hours after a significant rainfall event and prior to the rainy season (October 1st). "Significant rainfall" is defined as 0.5 inched or greater of rainfall: http://www.wrh.noaa.gov/forecast/wxtables/	• Replace tree stakes and wires. • Inspection of hydraulic and structural facilities. Examine the inlet for blockage, the embankment and spillway integrity, as well as damage to any structural element. • Check side slopes and embankments for erosion, slumping, and overgrowth. • Inspect the soil media at the filter drain to verify it is allowing acceptable infiltration. • Check the underdrains for damage or clogging. Repair as needed. • Repair basin inlets, outlets, and energy dissipaters whenever damage is discovered. • No standing water should present 72 hours after a storm event. No long term standing water should be present at all. No algae formation should be visible. Correct problem as needed. • Add mulch as needed.
Every 3 years or sooner depending on the observed drain times (no more than 72 hours to empty the basin).	• Replace mulch every 3 years or when bare spots appear. Remulch prior to the wet season. • When mulch replacement is no longer effective, remove and replace soil media layer.

Schedule (Bio-Clean Biofiltration System)	Inspection and Maintenance Activity (Bio-Clean Biofiltration System)
Monthly including just before the annual storm season and following rainfall events.	• Remove litter and debris. • Check for obvious problems and repair as needed. Address odor, standing water, and overgrowth issues associated with stagnant or standing water.
Semi-Annually. Schedule these inspections within 72 hours after a significant rainfall event and prior to the rainy season (October 1st). "Significant rainfall" is defined as 0.5 inched or greater of rainfall: http://www.wrh.noaa.gov/forecast/wxtables/	• Remove litter and debris. • Trim Vegetation • Check for obvious problems and repair as needed. Address odor, standing water, and overgrowth issues associated with stagnant or standing water.
Annually. Schedule these inspections within 72 hours after a significant rainfall event and prior to the rainy season (October 1st). "Significant rainfall" is defined as 0.5 inched or greater of rainfall: http://www.wrh.noaa.gov/forecast/wxtables/	• Remove litter and debris. • Trim Vegetation • Replace Drain Down Filter Media • Replace Cartridge Filter Media • Remove Sediment from Separation Chamber
Every 2 years or sooner depending on the observed drain times (no more than 72 hours to empty the basin).	• Replace Drain Down Filter Media • Replace Cartridge Filter Media • Remove Sediment from Separation Chamber

Schedule (Storm Drain Signage)	Inspection and Maintenance Activity (Storm Drain Signage)
Annually and at the installation of storm drains and project.	• Inspect system signage and repair/replace if needed. • Signage should read "**NO DUMPING – DRAINS TO OCEAN**"
Schedule (Trash Storage)	Inspection and Maintenance Activity (Trash Storage)
Monthly including before and after a major storm event.	• Waste (debris, vegetation, etc.) shall be properly disposed of its corresponding waste facility. • Trash areas should be monitored for vector habitats after a storm event.
Daily	• Trash receptacles shall be emptied daily. • Trash area maintenance and patrolling for illegal disposal or dumping.
Schedule (Landscaping & Irrigation)	Inspection and Maintenance Activity (Landscaping & Irrigation)
Monthly	• Inspect landscaping and irrigation systems for leaks, signs of erosion, and/or large amounts of runoff. • Repair/replace broken irrigation system if needed. • Remove and replace dead and diseased vegetation.
Schedule (Hardscape Sweeping)	Inspection and Maintenance Activity (Hardscape Sweeping)
Monthly including just before the annual storm season and following rainfall events.	• Sweep hardscape areas to reduce debris and silt. • Schedule sweeping activities for dry weather if possible.
Schedule (Street Sweeping)	Inspection and Maintenance Activity (Street Sweeping)
Monthly including just before the annual storm season and following rainfall events.	• A street sweeper shall clean parking lot area to reduce debris and silt.

VII.B Service Agreement Information

See Appendix H of this O&M Plan for service agreement information with any contractors regarding the O&M of BMPs at the site, if any.

Appendix A: Inspection and Maintenance Logs

Insert Additional Inspection or Maintenance Logs Here

Date	BMP	Observations/Actions (SEE **VII.A** FOR SCHEDULE)	Inspector

Appendix B: Updates, Revisions, and Errata

Insert Additional Updates, Revisions, and Errata Logs Here

Revision Number	Date	Brief Description of Update/Revision/Errata, Include Section and Page Number	Prepared and Approved By

Appendix C: Maintenance Mechanism

Copy of Covenant Agreement

Establishing Notification Process and Responsibility

For Water Quality Management Plan Implementation and Maintenance

RECORDING REQUESTED BY AND
WHEN RECORDED RETURN TO:

City Clerk
City of Murrieta
1 Town Square
Murrieta, CA 92562

Planning Case:

Above Space for Recorder's Use

DECLARATION OF WATER QUALITY MANAGEMENT PLAN RESTRICTIVE COVENANT

This Declaration of Water Quality Management Plan Restrictive Covenant (this "Covenant") is made this ___ day of _________, 2020 by Murrieta Valley Unified School District ("Owner")

A. The Owner of that certain real property (the "Property") located in the City of Murrieta, California ("City"), more particularly described in Exhibit "A" attached hereto and incorporated herein by this reference and has proposed that the Property be developed by Owner in accordance with the governmental approvals issued by the City and other governmental or quasi-governmental agencies having jurisdiction over the Property.

B. In accordance with the Murrieta Municipal Code, applicable State of California statutes, and other ordinances and regulations (collectively, the "Stormwater Laws") of City and the State of California which regulate land development and urban runoff, the Owners have prepared and submitted to the City a Final Water Quality Management Plan ("WQMP"), which is on file with City's Engineering Department and a copy of which is required to be kept on the Property. The WQMP proposes that stormwater runoff from the Property be managed by the use of the stormwater management facilities, which are identified in the WQMP as "Best Management Practices" or "BMP's." The precise location(s) and extent of the BMP's are indicated within the WQMP. The WQMP specifies the manner and standards by which the BMP's must be repaired and maintained in order to retain their effectiveness.

C. The purpose of this Covenant is to assure that the BMP's are adequately maintained by creating obligations which are enforceable against the Owner and its successors in interest in the Property. The Owner intends that these obligations be enforceable notwithstanding other provisions related to BMP maintenance which are provided by law.

COVENANT TERMS, CONDITIONS, AND RESTRICTIONS

In consideration of the above recitals and the mutual covenants, terms, conditions and restrictions contained herein, and pursuant to the laws of the United States, the State of California and the City of Murrieta Municipal Code, Owner hereby declares the Property shall be held, transferred, conveyed, leased, occupied or otherwise disposed of and used subject to the following restrictive covenants (and incorporating the above recitals herein by reference), which shall run with the land and be binding on the Owner's heirs, successors in interest, administrators, assigns, lessees or other occupiers and users (collectively "Successors") of the Property or any portion thereof.

1. Maintenance of Stormwater Management Facilities.

 1.1. Owner agrees, for themselves and their successors in interest to all or any portion of the Property, to comply in all respects with the requirements of the Stormwater Laws and the WQMP with regards to the construction and maintenance of BMP's designated in the WQMP. The Owner and its Successors, in particular agree to perform, at its sole cost, expense and liability, all inspections, cleaning, repairs, servicing, and maintenance with respect to all of the BMP's listed in Exhibit "B" attached hereto and incorporated herein by this reference (the "Maintenance Activities"). The Owner and its Successors shall initiate, perform and complete all Maintenance Activities at the required time, without request or demand from the City, or any other agency. Owner and its Successors shall keep a report of any inspections and/or maintenance of the BMP's for review at any time by City or the Water Quality Board for the region. The Owner and its Successors further agree that Maintenance Activities shall include replacement or modification of the BMP's in the event of failure. Replacement shall be with an identical type, size and model of BMP subject to applicable Stormwater Laws, except that:

  A. The City Engineer may authorize substitution of an alternative BMP if he or she determines that it will function as well as the failed BMP; or

  B. If the failure of the BMP, in the reasonable judgment of the City Engineer indicates that the BMP in use is inappropriate or inadequate to the circumstances, the BMP must be modified or replaced with an upgraded BMP to prevent future failure.

 1.2. The Owner and its Successors shall, at all times, be subject to the Stormwater Laws with respect to the City's right of entry, inspection and maintenance or abatement.

2. Covenant Binds Successors and Runs with the Property. It is understood and agreed that the terms, covenants and conditions herein contained shall constitute covenants running with the land and shall be binding upon the heirs, executors, administrators, successors and assigns of the Owner and its Successors, and shall be deemed to be for the benefit of all persons owning any interest in the Property. It is the intent of the Owner that this Covenant may be recorded and shall be binding upon all persons purchasing or otherwise

acquiring all or any lot, unit or other portion of the Property who shall be deemed to have consented to and become bound by all the provisions hereof.

3. Amendment and Release. The terms of this Covenant may be modified only by a written amendment approved and signed by City and by the Owner or its Successors in interest. This Covenant may be terminated and Owner and its Successors released from the covenants set forth herein by a written release which City may execute if it determines that another mechanism will assure the ongoing maintenance of the BMP's and transfers of ownership, or that it is no longer necessary to assure such maintenance and transfers of ownership.

4. Governing Law and Severability. This Covenant shall be governed by the laws of the State of California. Venue in any action related to this Covenant shall be in the Superior Court of the State of California, County of Riverside. In the event that any of the provisions of this Covenant are held to be unenforceable or invalid by any court of competent jurisdiction, the validity, and enforceability of the remaining provisions shall not be affected thereby.

5. Copy of Final WQMP. A copy of the Final WQMP must be kept on the Property at all times.

[SIGNATURES FOLLOW ON NEXT PAGE]

IN WITNESS WHEREOF, the Owner has executed this Covenant on the day and year first written above.

“OWNER”:

Murrieta Valley Unified School District
Company/Corporation/Partnership

____
(Print Name)

____
(Print Title)

By:_________________________________
Name:_______________________________
Its:_________________________________

Signature must be notarized. Attach notary acknowledgment

EXHIBIT “A”

PROPERTY

APN: 904-050-047

EXHIBIT “B”

BEST MANAGEMENT PRACTICES

The following is a list of Source and Treatment Control BMP’s on the property:

- Biofiltration Basin
- Bio-Clean Biofiltration System
- Storm Drain Signage
- Trash Storage
- Landscaping & Irrigation
- Hardscape Sweeping
- Street Sweeping

Please refer to the Final Water Quality Management Plan for a complete description of the operation and maintenance procedures. An up to date copy is required to be kept on the property at all times.

Notification Process and Responsibility

1. **Name:** ____

Title: ____

Phone No.: ____

WQMP Responsibilities:

(1) Routine inspections to evaluate BMP effectiveness.
(2) Identifying when BMPs require maintenance.
(3) Working with qualified contractors to maintain the BMP.
(4) Recordkeeping of inspections and maintenance activities.

2. **Name:** ____

Title: ____

Phone No.: ____

WQMP Responsibilities:

(1) Cleaning, repairing, servicing, and maintenance of BMP.

3. **Name:** ____

Title: ____

Phone No.: ____

WQMP Responsibilities:

(1) In event of failure, and with City Engineer's authorization, modify or replace with an upgraded BMP to prevent future failure.
(2) Notify successors of BMPs and maintenance requirements.

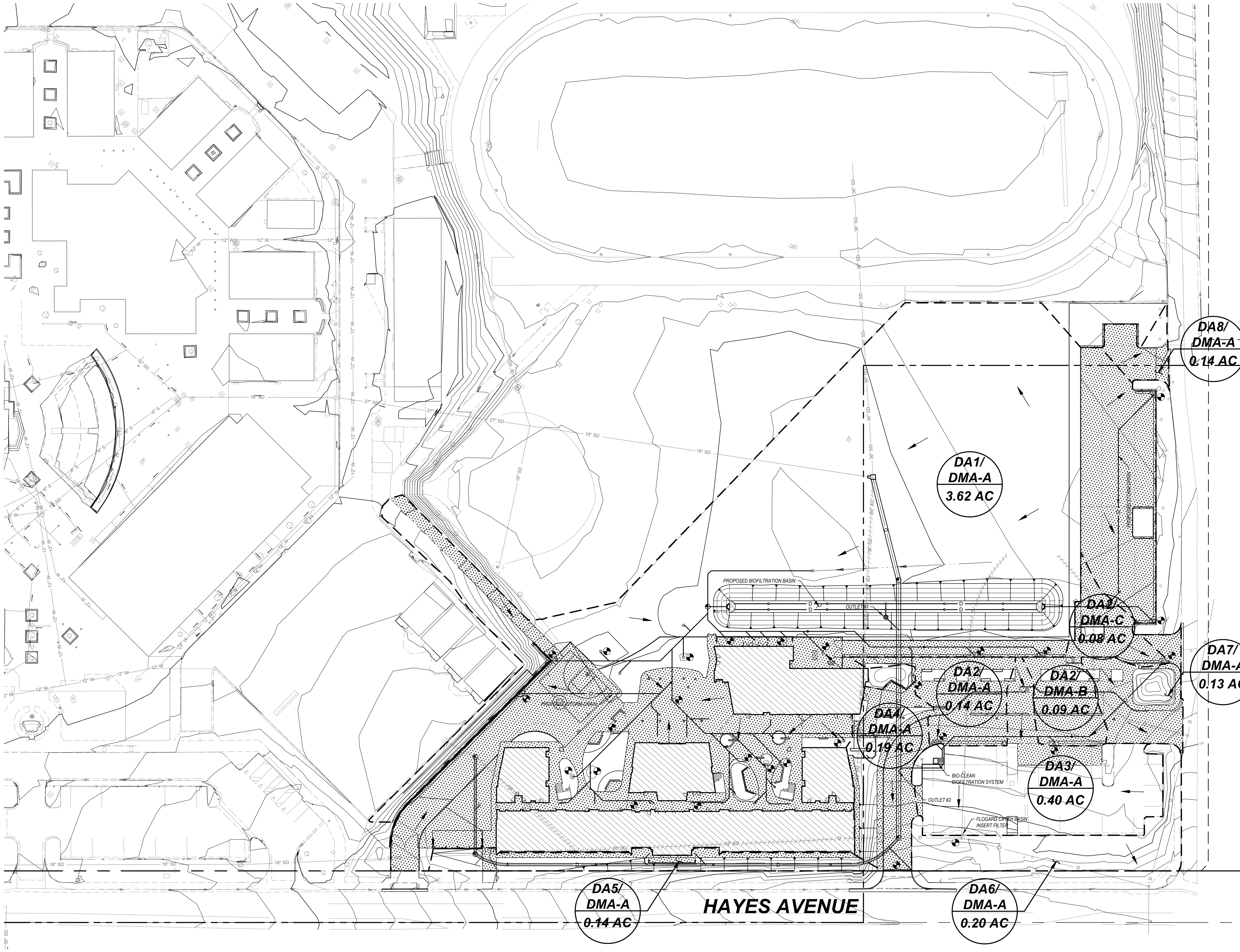
Appendix D: Training Records

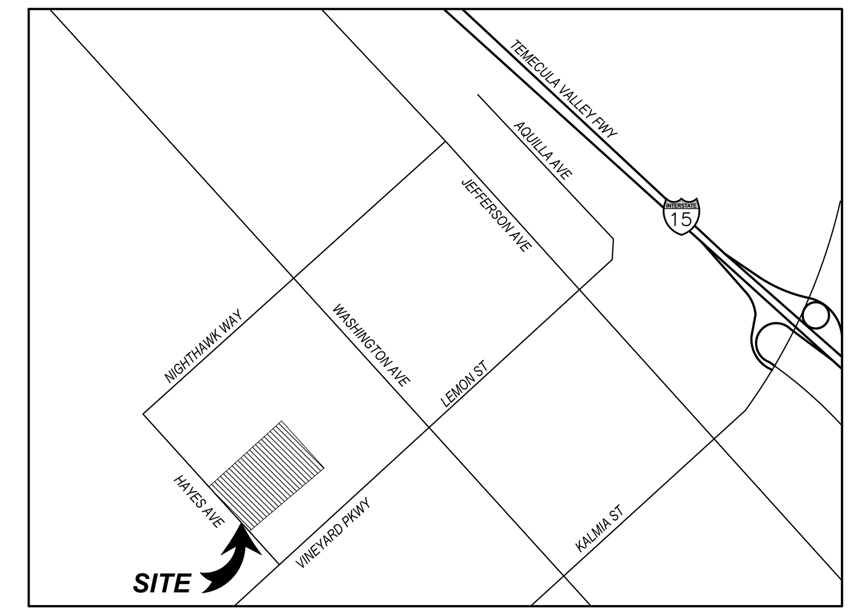
Insert Training Records with Brief Description Here

Date	Training Type (EX. Formal Class, Tailgate Session, Video)	Training Duration	Attendees

Appendix E: Site Plan and Details

WQMP Site Map and BMP Details





VICINITY MAP

NOT TO SCALE

IDENTIFICATION STAMP
DIVISION OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES

APPL #

AC ____ F/LS ____ SS ____

DATE:

LICENSED ARCHITECT — NO.C28042 — EXP. 9-30-21 — STATE OF CALIFORNIA

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT
MURRIETA CANYON ACADEMY

LEGEND:

KEYNOTES:

- IMPERVIOUS AREA
- DIRECTION OF SURFACE FLOW
- PROPOSED STORM DRAIN PIPE PER UTILITY PLAN
- LIMITS OF CONSTRUCTION DRAINAGE AREA BOUNDARY
- L/A — LANDSCAPED AREA
- XX-X / X.XX AC — DENOTES DRAINAGE AREA AND ACERAGE

RECEIVING WATER BODIES

- MURRIETA CREEK
- UPPER SANTA MARGARITA RIVER
- LOWER SANTA MARGARITA RIVER

PROJECT AREA

TOTAL PROJECT AREA: 223,780 SQ. FT. (5.14 ACRES)
IMPERVIOUS AREA: 111,513 SQ. FT. (2.56 ACRES)
PERVIOUS AREA: 112,267 SQ. FT. (2.58 ACRES)

NOTE

THE PROPOSED PROJECT HAS EIGHT DRAINAGE AREAS (DA). STORMWATER RUNOFF FROM DA-1 SHEET FLOWS INTO PROPOSED CATCH BASINS THROUGHOUT THE DRAINAGE AREA. STORMWATER RUNOFF WILL BE CONVEYED THROUGH PROPOSED STORM DRAIN LINES INTO THE PROPOSED BMP, A BIOFILTRATION WITH PARTIAL INFILTRATION BASIN. THE STORMWATER WILL FILTER THROUGH 3" OF NON-FLOATING HARDWOOD MULCH, 36" OF ENGINEERED MEDIA SOIL, PER THE RIVERSIDE COUNTY - LOW IMPACT DEVELOPMENT BMP DESIGN HANDBOOK, AND 18" OF AN OPEN GRADED ASTM #57 STONE LAYER, BEFORE OUTLETTING THROUGH A PERFORATED PIPE AND INTO OUTLET #1. THE DCV FOR DA-1 IS 4,795 CUBIC FEET. THE DESIGN VOLUME FOR THE PROPOSED BIOFILTRATION WITH PARTIAL INFILTRATION BASIN IS 7,725 CUBIC FEET. STORMWATER GREATER THAN THE DCV WILL OUTLET THROUGH A TYPE X INLET PER RCFCWCD STANDARD. THE DESIGN FOR THE BIOFILTRATION BASIN MEETS HYDROMOD REQUIREMENTS.

STORMWATER RUNOFF FROM DA-2 SHEET FLOWS SOUTH INTO PROPOSED CATCH BASINS IN THE DRAINAGE AREA. STORMWATER RUNOFF WILL BE CONVEYED THROUGH PROPOSED STORM DRAIN LINES INTO THE PROPOSED BMP, A BIO-CLEAN BIOFILTRATION SYSTEM.

STORMWATER RUNOFF FROM DA-3 SHEET FLOWS SOUTH INTO AN EXISTING CURB INLET. THIS DRAINAGE AREA CANNOT BE COLLECTED INTO THE PROPOSED BMP, SO WE PROPOSED A CATCH BASIN INSERT FILTER TO TREAT THE FLOWS. THE DESIGN FLOW RATE FOR DA-3 IS 0.1 CFS AND THE FILTERED FLOW RATE OF THE CATCH BASIN INSERT FILTER IS 1.76 CFS.

STORMWATER RUNOFF FROM DA-4 CANNOT BE COLLECTED INTO ONSITE BMPS. STORMWATER RUNOFF FLOWS SOUTH TOWARDS HAYES AVENUE AND GETS CAPTURED BY A TRENCH DRAIN ONSITE BEFORE IT HAS A CHANCE TO OUTLET ONTO HAYES AVENUE. STORMWATER RUNOFF WILL BE CONVEYED INTO THE EXISTING STORM DRAIN PIPE VIA A PROPOSED STORM DRAIN LINE.

STORMWATER RUNOFF FROM DA-5 CANNOT BE COLLECTED INTO ONSITE BMPS. STORMWATER RUNOFF WILL SHEET FLOW SOUTH DOWN THE SLOPE ONTO HAYES AVENUE AS IT DID IN THE EXISTING CONDITION.

STORMWATER RUNOFF FROM DA-6 CANNOT BE COLLECTED INTO ONSITE BMPS. STORMWATER RUNOFF WILL SHEET FLOW SOUTH DOWN THE SLOPE ONTO HAYES AVENUE AS IT DID IN THE EXISTING CONDITION.

STORMWATER RUNOFF FROM DA-7 CANNOT BE COLLECTED INTO ONSITE BMPS. STORMWATER RUNOFF WILL SHEET FLOW ONTO THE ONSITE ALLEY WAY AS IT DID IN THE EXISTING CONDITION.

STORMWATER RUNOFF FROM DA-8 CANNOT BE COLLECTED INTO ONSITE BMPS. STORMWATER RUNOFF WILL SHEET FLOW ONTO THE ONSITE ALLEY WAY AS IT DID IN THE EXISTING CONDITION.

DRAINAGE AREAS

AREA	PERVIOUS	IMPERVIOUS	TOTAL ACREAGE
DA-1	2.04 ACRES	1.58 ACRES	3.62 ACRES
DA-2	0.04 ACRES	0.27 ACRES	0.31 ACRES
DA-3	0.02 ACRES	0.38 ACRES	0.40 ACRES
DA-4	0.06 ACRES	0.13 ACRES	0.19 ACRES
DA-5	0.10 ACRES	0.04 ACRES	0.14 ACRES
DA-6	0.18 ACRES	0.02 ACRES	0.20 ACRES
DA-7	0.03 ACRES	0.10 ACRES	0.13 ACRES
DA-8	0.10 ACRES	0.04 ACRES	0.14 ACRES

REGISTERED PROFESSIONAL ENGINEER — TROY DAVID MOLAUG — No. C 59118 — CIVIL — STATE OF CALIFORNIA

DIGALERT — Call 2 Working Days Before You Dig! 811

SITE SPECIFIC DATA

PROJECT NUMBER	104.13		
PROJECT NAME	MCA		
PROJECT LOCATION	Murrieta, CA		
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.115	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	24.49	SDR-35	8"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	23.21	SDR-35	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	27.10		
SURFACE LOAD	INDIRECT TRAFFIC		
FRAME & COVER	36" X 36"	UNDERGRO	N/A
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION

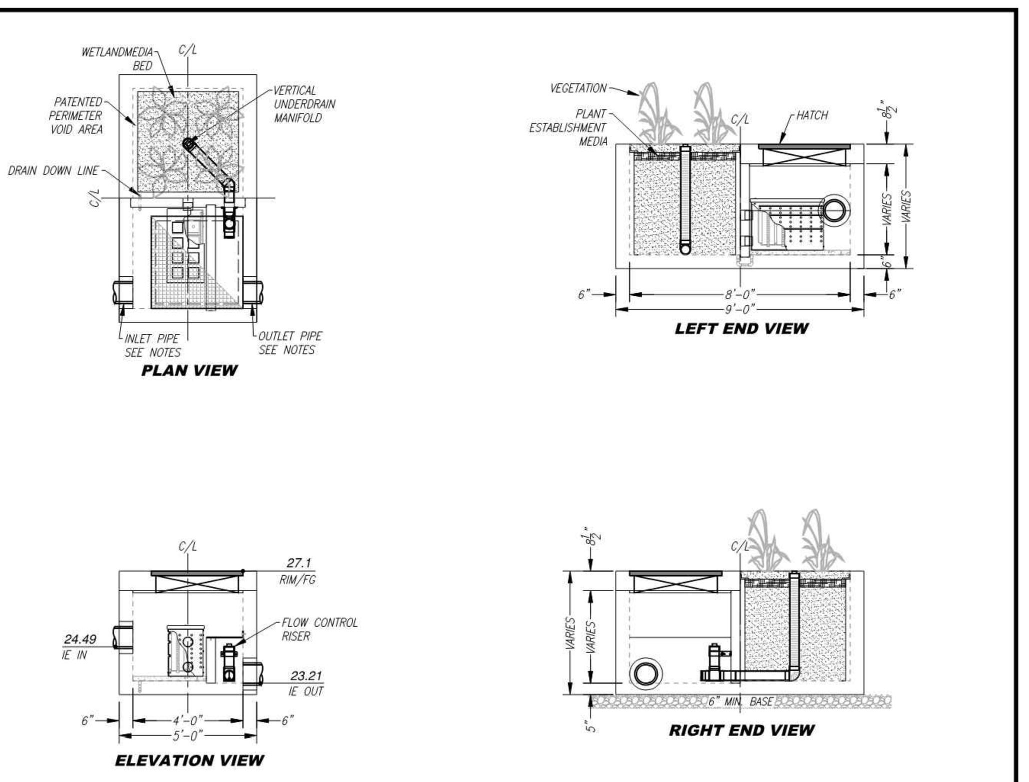
INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.

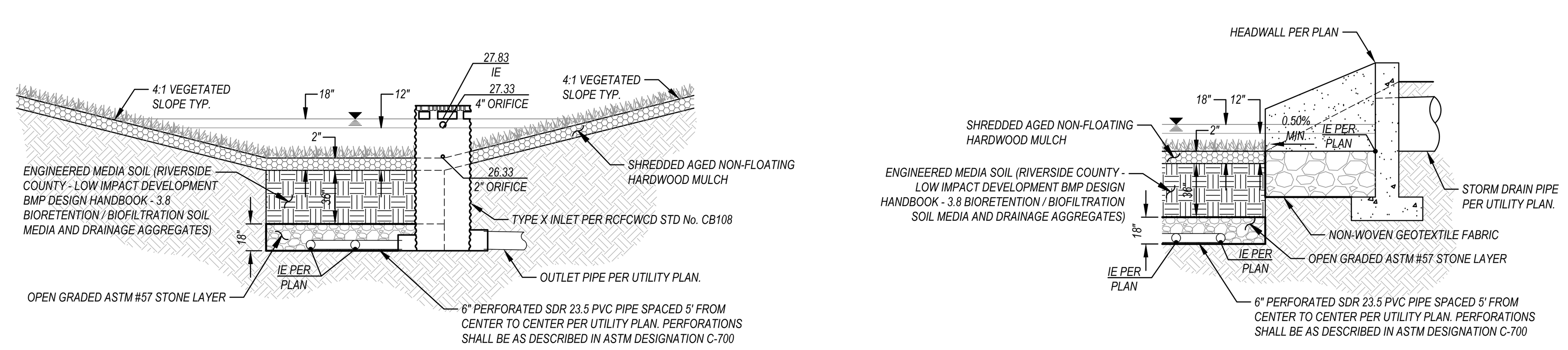
5/23/19TOLEE



TREATMENT FLOW (CFS)	0.115
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

Bio Clean — A Forterra Company

MWS-L-4-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL



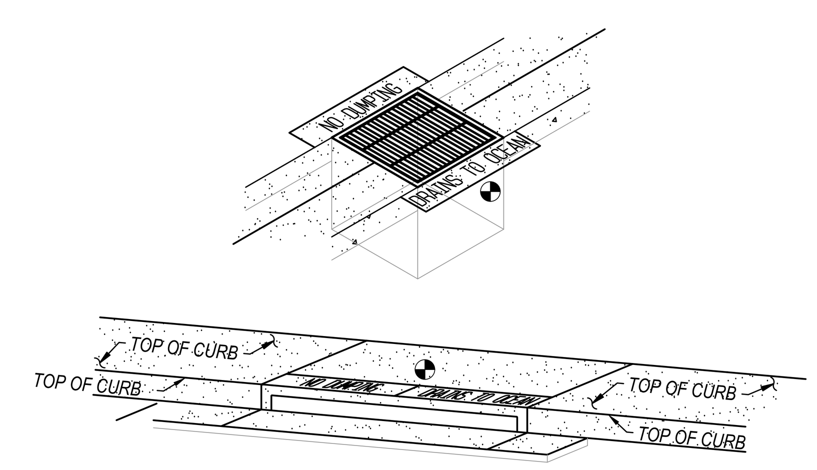
MEDIA SOIL MINERAL COMPONENT RANGE REQUIRMENTS

WITH OUTLET CONTROL	COMPONENT
WASHED	SAND TYPE
80%	SAND FRACTION, BY VOLUME
COCONUT COIR PITH, PEAT, OR LOW NUTRIENT COMPOST	ORGANIC TYPE
20%	ORGANIC FRACTION, BY VOLUME

BIO-FILTRATION BASIN

WITH PARTIAL INFILTRATION

NOT TO SCALE



1. STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING DRAINS TO OCEAN".
2. PLACE BOTH STENCILS CENTERED WITHIN THE CATCHBASIN OPENING AND WITHIN THE TOP OF THE CURB.
3. SPRAY BOTH STENCILS WITH WHITE PAINT.
4. REMOVE STENCILS WHEN PAINT IS DRY.

CATCH BASIN STENCILING DETAIL

NOT TO SCALE

EPIC ENGINEERS
CIVIL ENGINEERING | LAND SURVEYING | PLANNING | STORMWATER MANAGEMENT
101 E. REDLANDS BOULEVARD, SUITE 144, REDLANDS, CA 92373
TEL: 909.792.5969
www.epicrcm.com

BakerNowicki design studio
731 Ninth Avenue, Suite A, San Diego, California 92101
619.795.2450
www.bndesignstudio.com

NO.	DATE	ISSUE

PROJECT NO: 104.13
DATE: 12/5/2019

DRAWING

Bio Clean

A Forterra Company

Modular Wetlands® System Linear

A Stormwater Biofiltration Solution

OVERVIEW

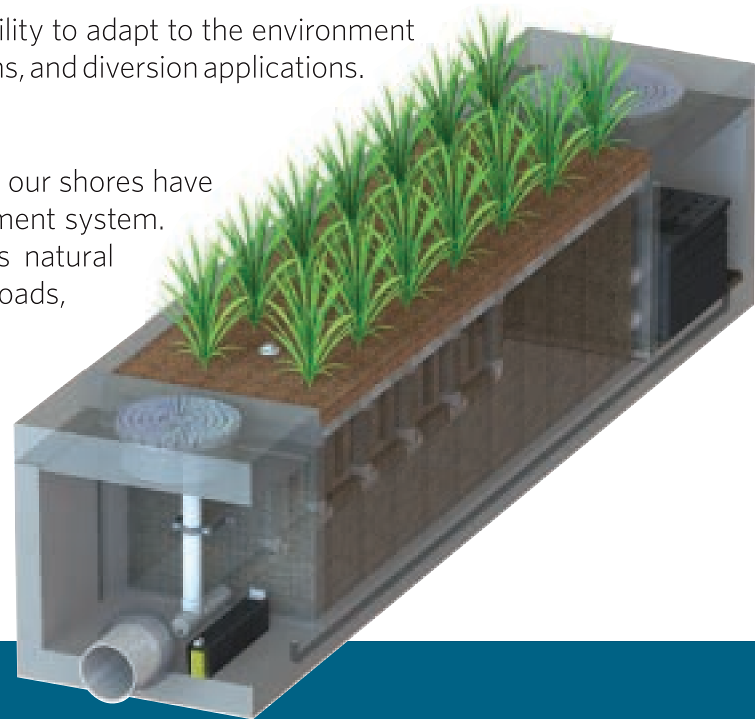
The Bio Clean Modular Wetlands® System Linear represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint, higher treatment capacity, and a wide range of versatility. While most biofilters use little or no pretreatment, the Modular Wetlands® incorporates an advanced pretreatment chamber that includes separation and pre-filter cartridges. In this chamber, sediment and hydrocarbons are removed from runoff before entering the biofiltration chamber, reducing maintenance costs and improving performance.

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.

The Urban Impact

For hundreds of years, natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the Modular Wetlands® System Linear.



PERFORMANCE

The Modular Wetlands® continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. Since 2007 the Modular Wetlands® has been field tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. In fact, the Modular Wetlands® harnesses some of the same biological processes found in natural wetlands in order to collect, transform, and remove even the most harmful pollutants.

- **66%** REMOVAL OF DISSOLVED ZINC
- **69%** REMOVAL OF TOTAL ZINC
- **38%** REMOVAL OF DISSOLVED COPPER
- **64%** REMOVAL OF TOTAL PHOSPHORUS
- **45%** REMOVAL OF NITROGEN
- **50%** REMOVAL OF TOTAL COPPER
- **95%** REMOVAL OF MOTOR OIL
- **67%** REMOVAL OF ORTHO PHOSPHORUS
- **85%** REMOVAL OF TSS

APPROVALS

The Modular Wetlands® System Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation and perhaps the world. Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.

State of Washington TAPE GULD Basic Enhanced/Metals Phosphorus

Washington State Department of Ecology TAPE Approved
The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

CA

California Water Resources Control Board, Full Capture Certification
The Modular Wetlands® System is the first biofiltration system to receive certification as a full capture trash treatment control device.

VA

Virginia Department of Environmental Quality, Assignment
The Virginia Department of Environmental Quality assigned the MWS Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) regulation technical criteria.

MD

Maryland Department of the Environment, Approved ESD
Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.

MA

MASTEP Evaluation
The University of Massachusetts at Amherst – Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% total phosphorus, 68.5% total zinc, and more.

RI

Rhode Island Department of Environmental Management, Approved BMP
Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% pathogens, 30% total phosphorus, and 30% total nitrogen.

ADVANTAGES

- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

The Modular Wetlands® System Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

Figure 1 & Figure 2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

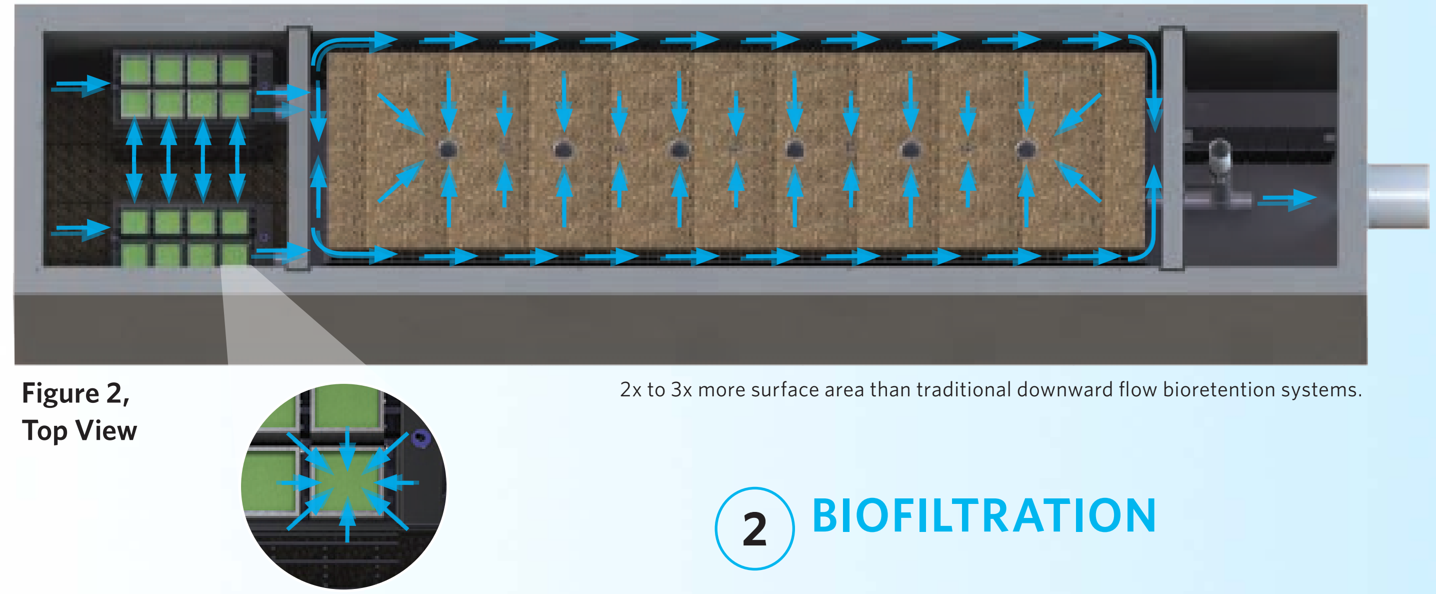


Figure 2, Top View

2x to 3x more surface area than traditional downward flow bioretention systems.

1 PRETREATMENT

SEPARATION

- Trash, sediment, and debris are separated before entering the pre-filter cartridges
- Designed for easy maintenance access

PRE-FILTER CARTRIDGES

- Over 25 sq. ft. of surface area per cartridge
- Utilizes BioMediaGREEN™ filter material
- Removes over 80% of TSS and 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber

2 BIOFILTRATION

HORIZONTAL FLOW

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

PATENTED PERIMETER VOID AREA

- Vertically extends void area between the walls and the WetlandMEDIA™ on all four sides
- Maximizes surface area of the media for higher treatment capacity

WETLANDMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and lightweight

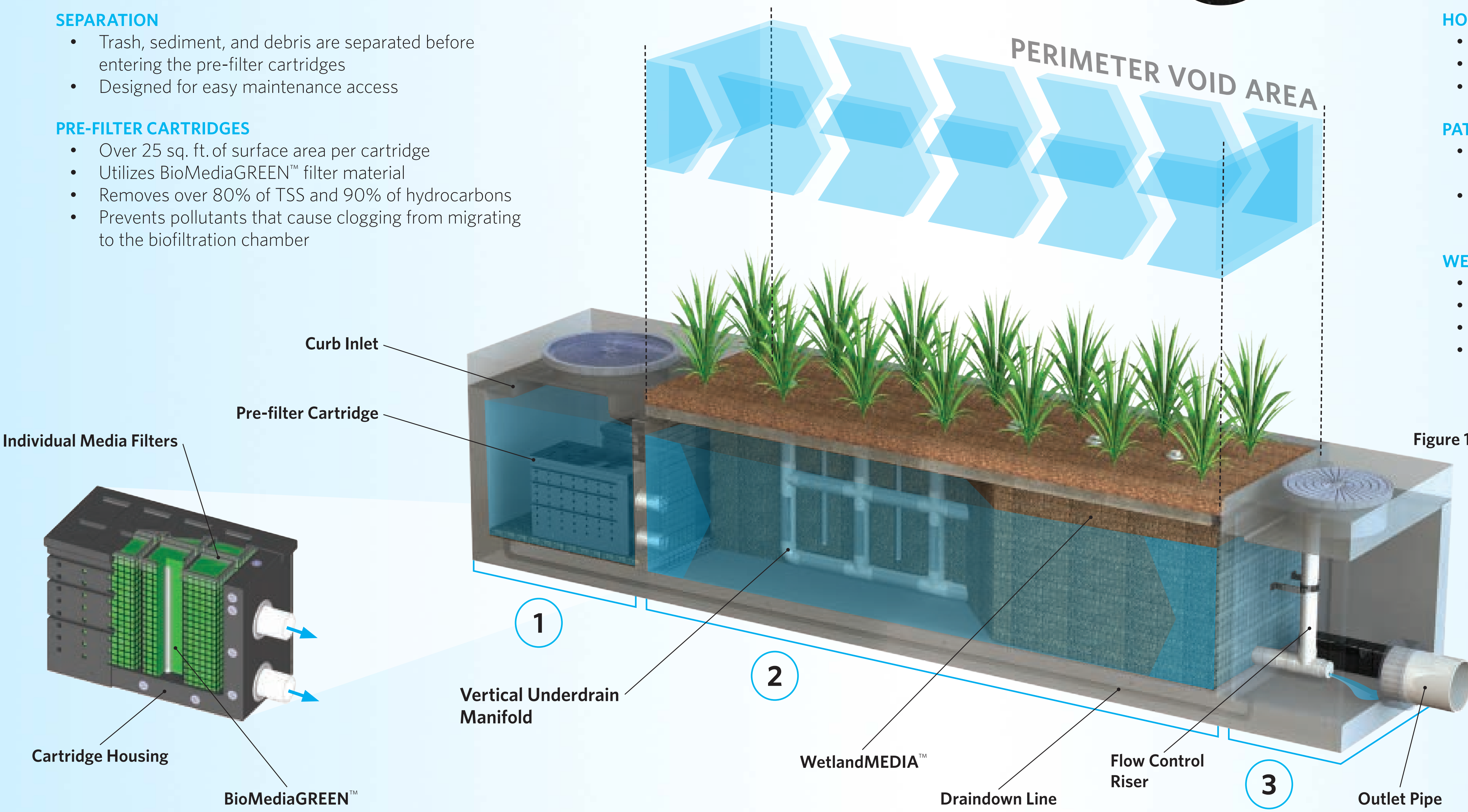


Figure 1

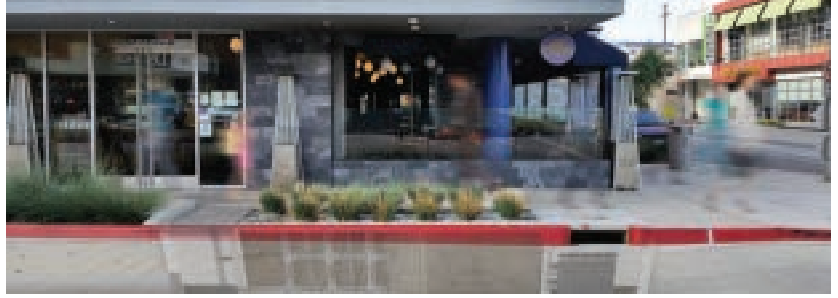
3 DISCHARGE

FLOW CONTROL

- Orifice plate controls flow of water through WetlandMEDIA™ to a level lower than the media's capacity
- Extends the life of the media and improves performance

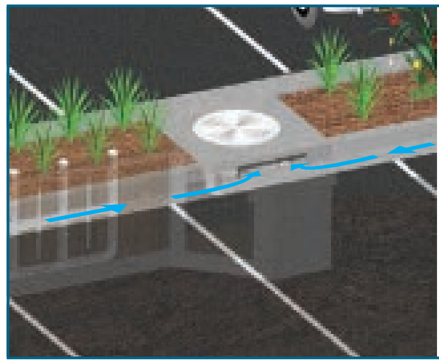
DRAINDOWN FILTER

- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated



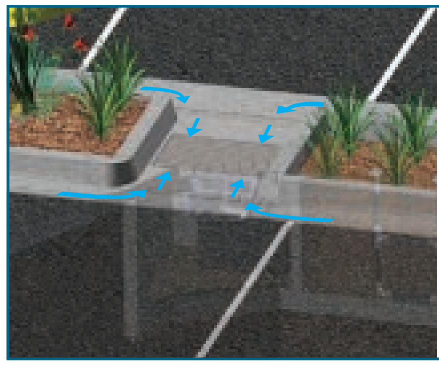
CONFIGURATIONS

The Modular Wetlands® System Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



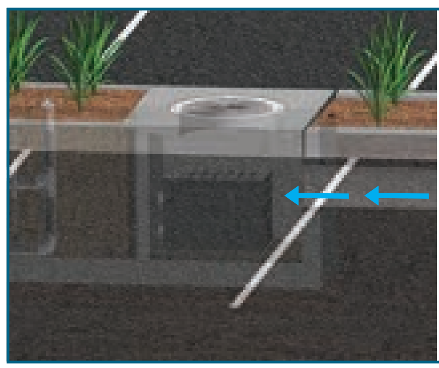
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions. Length of curb opening varies based on model and size.



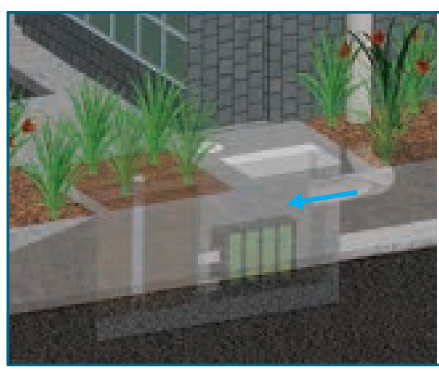
GRATE TYPE

The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the systems pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. ADA-compliant grates are available to assure easy and safe access. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



VAULT TYPE

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pretreatment chamber, meaning the Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretention systems. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.



DOWNSPOUT TYPE

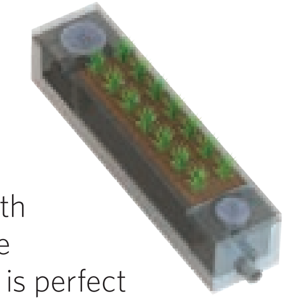
The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

ORIENTATIONS

SIDE-BY-SIDE

The Side-By-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.

END-TO-END



The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is that bypass must be external.

BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

The Side-By-Side orientation places the pretreatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pretreatment chamber directly to the discharge chamber.

EXTERNAL DIVERSION WEIR STRUCTURE

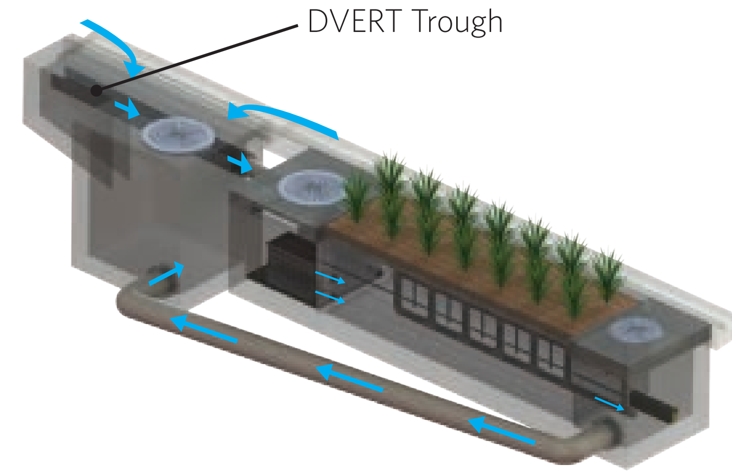
This traditional offline diversion method can be used with the Modular Wetlands® in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the Modular Wetlands® for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

FLOW-BY-DESIGN

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the Modular Wetlands® and into the standard inlet downstream.

DVERT LOW FLOW DIVERSION

This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands® via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels them over



to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allow the Modular Wetlands® to be installed anywhere space is available.

SPECIFICATIONS

FLOW-BASED DESIGNS

The Modular Wetlands® System Linear can be used in stand-alone applications to meet treatment flow requirements. Since the Modular Wetlands® is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

MODEL #	DIMENSIONS	WETLANDMEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4' x 4'	23	0.052
MWS-L-4-6	4' x 6'	32	0.073
MWS-L-4-8	4' x 8'	50	0.115
MWS-L-4-13	4' x 13'	63	0.144
MWS-L-4-15	4' x 15'	76	0.175
MWS-L-4-17	4' x 17'	90	0.206
MWS-L-4-19	4' x 19'	103	0.237
MWS-L-4-21	4' x 21'	117	0.268
MWS-L-6-8	7' x 9'	64	0.147
MWS-L-8-8	8' x 8'	100	0.230
MWS-L-8-12	8' x 12'	151	0.346
MWS-L-8-16	8' x 16'	201	0.462
MWS-L-8-20	9' x 21'	252	0.577
MWS-L-8-24	9' x 25'	302	0.693
MWS-L-10-20	10' x 20'	302	0.693

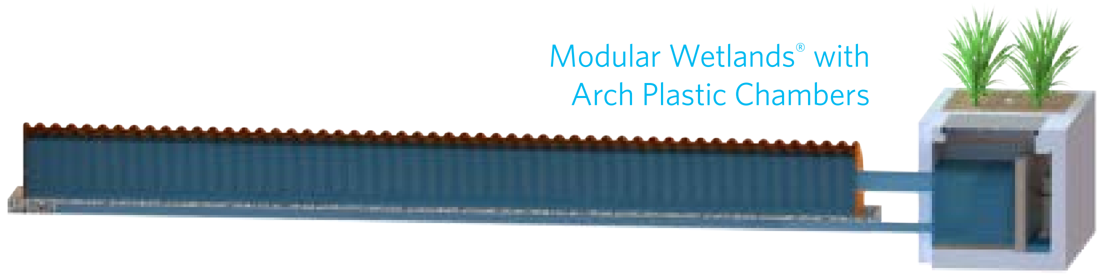
VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE

Modular Wetlands® with Box Culvert Prestorage

The Modular Wetlands® System Linear offers a unique advantage in the world of biofiltration due to its exclusive horizontal flow design: Volume-Based Design. No other biofilter has the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The systems horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points. In the example above, the Modular Wetlands® is installed downstream of underground box culvert storage. Designed for the water quality volume, the Modular Wetlands® will treat and discharge the required volume within local draindown time requirements.

Modular Wetlands® with Arch Plastic Chambers



DESIGN SUPPORT

Bio Clean engineers are trained to provide you with superior support for all volume sizing configurations throughout the country. Our vast knowledge of state and local regulations allow us to quickly and efficiently size a system to maximize feasibility. Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the Modular Wetlands®, the only biofilter than can be used downstream of storage BMPs.

ADVANTAGES

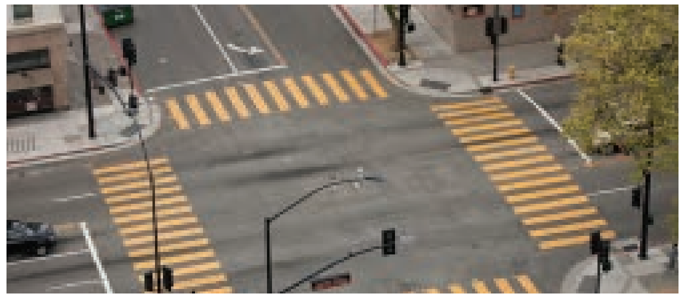
- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

APPLICATIONS

The Modular Wetlands® System Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.

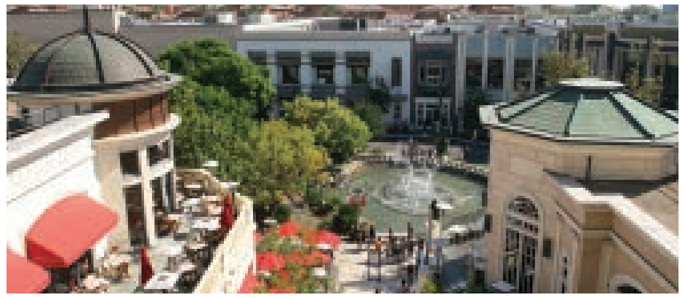
INDUSTRIAL
Many states enforce strict regulations for discharges from industrial sites. The Modular Wetlands® has helped various sites meet difficult EPA-mandated effluent limits for dissolved metals and other pollutants.

RESIDENTIAL
Low to high density developments can benefit from the versatile design of the Modular Wetlands®. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.



STREETS
Street applications can be challenging due to limited space. The Modular Wetlands® is very adaptable, and it offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.

PARKING LOTS
Parking lots are designed to maximize space and the Modular Wetlands'® 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.



COMMERCIAL
Compared to bioretention systems, the Modular Wetlands® can treat far more area in less space, meeting treatment and volume control requirements.

MIXED USE
The Modular Wetlands® can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications include:
• Agriculture • Reuse • Low Impact Development • Waste Water

PLANT SELECTION

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade, the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the Modular Wetlands®, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands'® micro/macro flora and fauna.

A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION

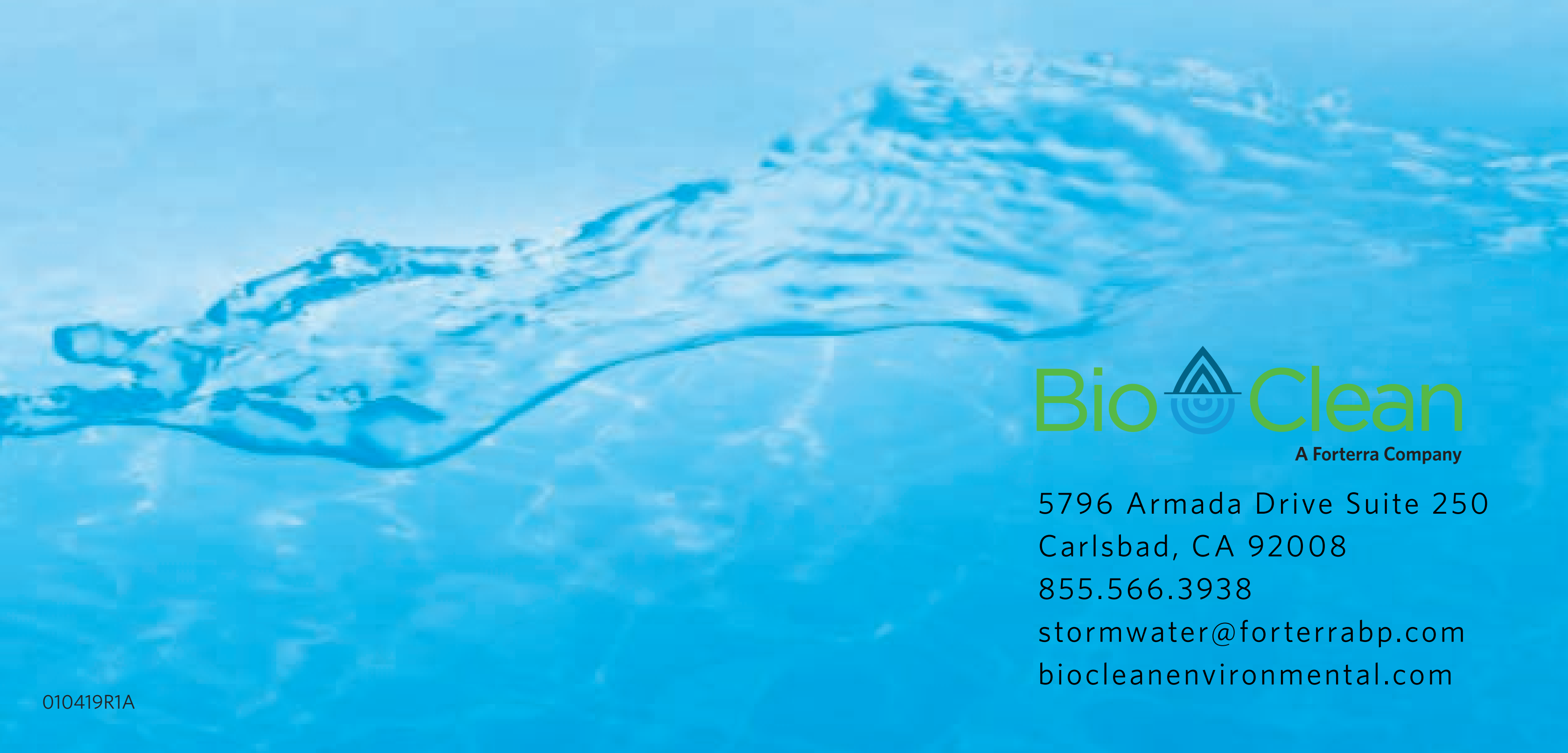
The Modular Wetlands® is simple, easy to install, and has a space-efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles precast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians is available to supervise installations and provide technical support.

MAINTENANCE

Reduce your maintenance costs, man hours, and materials with the Modular Wetlands®. Unlike other biofiltration systems that provide no pretreatment, the Modular Wetlands® is a self-contained treatment train which incorporates simple and effective pretreatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter cartridges is required for long-term operation, and there is absolutely no need to replace expensive biofiltration media.



Bio Clean
A Forterra Company

5796 Armada Drive Suite 250
Carlsbad, CA 92008
855.566.3938
stormwater@forterrabp.com
biocleanenvironmental.com

010419R1A

Appendix F: “As-Built” Drawings

Insert “As-Builts” Here When Available

Appendix G: Manufacturer Information

Brochures, Manuals, and Maintenance Requirements

Appendix H: Service Agreement Information

Insert Contractor Information (if any)

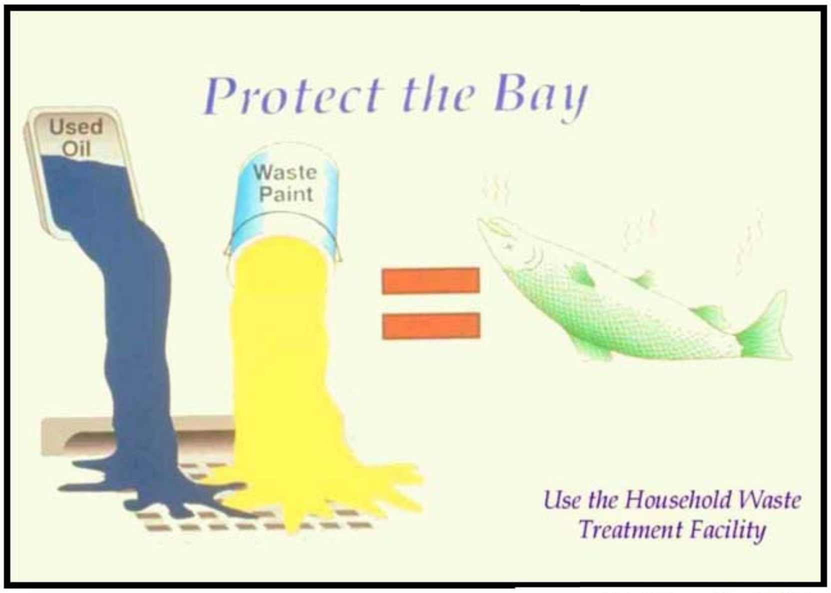
Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

Examples of material to provide in Appendix 10 may include but are not limited to the following:

- BMP Fact Sheets for proposed BMPs form Exhibit C: LID BMP Design Handbook of the SMR WQMP,
- Source control information and training material for site owners and operators,
- O&M training material,
- Other educational/training material related to site drainage and BMPs.

Non-Stormwater Discharges SC-10



Graphic by: Margie Winter

Objectives

- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. For municipalities non-stormwater discharges present themselves in two situations. One is from fixed facilities owned and/or operated by the municipality. The other situation is non-stormwater discharges that are discovered during the normal operation of a field program. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, and surface cleaning. However, there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances (such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants) into storm drains. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges.

Approach

The municipality must address non-stormwater discharges from its fixed facilities by assessing the types of non-stormwater discharges and implementing BMPs for the discharges determined to pose environmental concern. For field programs the field staff must be trained to now what to look for regarding non-stormwater discharges and the procedures to follow in investigating the detected discharges.

Suggested Protocols

Fixed Facility

General

- Post "No Dumping" signs with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Landscaping and beautification efforts of hot spots might also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.

Illicit Connections

- Locate discharges from the fixed facility drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- Use techniques such as smoke testing, dye testing and television camera inspection (as noted below) to verify physical connections.
- Isolate problem areas and plug illicit discharge points.

Visual Inspection and Inventory

- Inventory and inspect each discharge point during dry weather.
- Keep in mind that drainage from a storm event can continue for several days following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- Review the "as-built" piping schematic as a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.

- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

  Dye Testing

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Storm Sewer

- TV Cameras can be employed to visually identify illicit connections to the fixed facility storm drain system.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.

- Clean up spills on paved surfaces with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.

- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.

- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

- See fact sheet SC-11 Spill Prevention, Control, and Clean Up.

<u>Field Program</u>

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially ones that involve more than one jurisdiction and those that are not classified as hazardous, which are often not responded to as effectively as they need to be.

- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- See SC-74 Stormwater Drainage System Maintenance for additional information.

Field Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- During routine field program maintenance field staff should look for evidence of illegal discharges or illicit connection:
  - Is there evidence of spills such as paints, discoloring, etc.
  - Are there any odors associated with the drainage system
  - Record locations of apparent illegal discharges/illicit connections and notify appropriate investigating agency.
- If trained, conduct field investigation of non-stormwater discharges to determine whether they pose a threat to water quality.

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers
- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms.
- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms

- Educational materials

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any onsite drainage points observed.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Enforcement

- Educate the responsible party if identified on the impacts of their actions, explain the stormwater requirements, and provide information regarding Best Management Practices (BMP), as appropriate. Initiate follow-up and/or enforcement procedures.
- If an illegal discharge is traced to a commercial, residential or industrial source, conduct the following activities or coordinate the following activities with the appropriate agency:
  - Contact the responsible party to discuss methods of eliminating the non-stormwater discharge, including disposal options, recycling, and possible discharge to the sanitary sewer (if within POTW limits).
  - Provide information regarding BMPs to the responsible party, where appropriate.
  - Begin enforcement procedures, if appropriate.
  - Continue inspection and follow-up activities until the illicit discharge activity has ceased.
- If an illegal discharge is traced to a commercial or industrial activity, coordinate information on the discharge with the jurisdiction's commercial and industrial facility inspection program.

Training

- Train technical staff to identify and document illegal dumping incidents.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Train employees to identify non-stormwater discharges and report them to the appropriate departments.
- Train staff who have the authority to conduct surveillance and inspections, and write citations for those caught illegally dumping.

- Train municipal staff responsible for surveillance and inspection in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).
  - OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and federal OSHA 29 CFR 1910.146).
  - Procedural training (field screening, sampling, smoke/dye testing, TV inspection).
- Educate the identified responsible party on the impacts of his or her actions.

Spill Response and Prevention

- See SC-11 Spill Prevention Control and Clean Up

Other Considerations

- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The cost of fees for dumping at a proper waste disposal facility are often more than the fine for an illegal dumping offense, thereby discouraging people from complying with the law. The absence of routine or affordable pickup service for trash and recyclables in some communities also encourages illegal dumping. A lack of understanding regarding applicable laws or the inadequacy of existing laws may also contribute to the problem.
- Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.
- Many facilities do not have accurate, up-to-date schematic drawings.
- Can be difficult to locate illicit connections especially if there is groundwater infiltration.

Requirements

Costs

- Eliminating illicit connections can be expensive especially if structural modifications are required such re-plumbing cross connections under an existing slab.
- Minor cost to train field crews regarding the identification of non-stormwater discharges. The primary cost is for a fully integrated program to identify and eliminate illicit connections and illegal dumping. However, by combining with other municipal programs (i.e. pretreatment program) cost may be lowered.
- Municipal cost for containment and disposal may be borne by the discharger.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges are discharges not made up entirely of stormwater and include water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, landscape irrigation, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Current municipal NPDES permits require municipalities to effectively prohibit non-stormwater discharges unless authorized by a separate NPDES permit or allowed in accordance with the current NPDES permit conditions. Typically the current permits allow certain non-stormwater discharges in the storm drain system as long as the discharges are not significant sources of pollutants. In this context the following non-stormwater discharges are typically allowed:
  - Diverted stream flows;
  - Rising found waters;
  - Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20));
  - Uncontaminated pumped ground water;
  - Foundation drains;
  - Springs;
  - Water from crawl space pumps;
  - Footing drains;
  - Air conditioning condensation;
  - Flows from riparian habitats and wetlands;
  - Water line and hydrant flushing ;
  - Landscape irrigation;
  - Planned and unplanned discharges from potable water sources;
  - Irrigation water;
  - Individual residential car washing; and
  - Lawn watering.

Municipal facilities subject to industrial general permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The state's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Illegal Dumping

- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties

Outreach

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people on the street who are aware of the problem and who have the tools to at least identify the incident, if not correct it. There we a number of ways of accomplishing this:

- Train municipal staff from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report the incidents.
- Deputize municipal staff who may come into contact with illegal dumping with the authority to write illegal dumping tickets for offenders caught in the act (see below).
- Educate the public. As many as 3 out of 4 people do not understand that in most communities the storm drain does not go to the wastewater treatment plant. Unfortunately, with the heavy emphasis in recent years on public education about solid waste management, including recycling and household hazardous waste, the sewer system (both storm and sanitary) has been the likely recipient of cross-media transfers of waste.
- Provide the public with a mechanism for reporting incidents such as a hot line and/or door hanger (see below).
- Help areas where incidents occur more frequently set up environmental watch programs (like crime watch programs).
- Train volunteers to notice and report the presence and suspected source of an observed pollutant to the appropriate public agency.

What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges are discharges not made up entirely of stormwater and include water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, landscape irrigation, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Current municipal NPDES permits require municipalities to effectively prohibit non-stormwater discharges unless authorized by a separate NPDES permit or allowed in accordance with the current NPDES permit conditions. Typically the current permits allow certain non-stormwater discharges in the storm drain system as long as the discharges are not significant sources of pollutants. In this context the following non-stormwater discharges are typically allowed:

  - Diverted stream flows;
  - Rising found waters;
  - Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20));
  - Uncontaminated pumped ground water;
  - Foundation drains;
  - Springs;
  - Water from crawl space pumps;
  - Footing drains;
  - Air conditioning condensation;
  - Flows from riparian habitats and wetlands;
  - Water line and hydrant flushing ;
  - Landscape irrigation;
  - Planned and unplanned discharges from potable water sources;
  - Irrigation water;
  - Individual residential car washing; and
  - Lawn watering.

Municipal facilities subject to industrial general permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The state's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Storm Drain Stenciling

- Stencil storm drain inlets with a message to prohibit illegal dumpings, especially in areas with waste handling facilities.
- Encourage public reporting of improper waste disposal by a HOTLINE number stenciled onto the storm drain inlet.
- See Supplemental Information section of this fact sheet for further detail on stenciling program approach.

Oil Recycling

- Contract collection and hauling of used oil to a private licensed used oil hauler/recycler.
- Comply with all applicable state and federal regulations regarding storage, handling, and transport of petroleum products.
- Create procedures for collection such as; collection locations and schedule, acceptable containers, and maximum amounts accepted.
- The California Integrated Waste Management Board has a Recycling Hotline, (800) 553-2962, that provides information and recycling locations for used oil.

Household Hazardous Waste

- Provide household hazardous waste (HHW) collection facilities. Several types of collection approaches are available including permanent, periodic, or mobile centers, curbside collection, or a combination of these systems.

Training

- Train municipal employees and contractors in proper and consistent methods for waste disposal.
- Train municipal employees to recognize and report illegal dumping.
- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Federal Regulations (RCRA, SARA, CERCLA) and state regulations exist regarding the disposal of hazardous waste.
- Municipalities are required to have a used oil recycling element and a HHW element within their integrated waste management plan.
- Significant liability issues are involved with the collection, handling, and disposal of HHW.

Examples

The City of Palo Alto has developed a public participation program for reporting dumping violations. When a concerned citizen or public employee encounters evidence of illegal dumping, a door hanger (similar in format to hotel "Do Not Disturb" signs) is placed on the front doors in the neighborhood. The door hanger notes that a violation has occurred in the neighborhood, informs the reader why illegal dumping is a problem, and notes that illegal dumping carries a significant financial penalty. Information is also provided on what citizens can do as well as contact numbers for more information or to report a violation.

The Port of Long Beach has a state of the art database incorporating storm drain infrastructure, potential pollutant sources, facility management practices, and a pollutant tracking system.

The State Department of Fish and Game has a hotline for reporting violations called CalTIP (1-800-952-5400). The phone number may be used to report any violation of a Fish and Game code (illegal dumping, poaching, etc.).

The California Department of Toxic Substances Control's Waste Alert Hotline, 1-800-69TOXIC, can be used to report hazardous waste violations.

References and Resources

http://www.stormwatercenter.net/

California's Nonpoint Source Program Plan http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm

Orange County Stormwater Program,
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (http://www.projectcleanwater.org)

Santa Clara Valley Urban Runoff Pollution Prevention Program
http://www.scvurppp-w2k.com/pdf%20documents/PS_ICID.PDF

Spill Prevention, Control & Cleanup SC-11

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	☑
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Description

Spills and leaks, if not properly controlled, can adversely impact the storm drain system and receiving waters. Due to the type of work or the materials involved, many activities that occur either at a municipal facility or as a part of municipal field programs have the potential for accidental spills and leaks. Proper spill response planning and preparation can enable municipal employees to effectively respond to problems when they occur and minimize the discharge of pollutants to the environment.

Approach

- An effective spill response and control plan should include:
  - Spill/leak prevention measures;
  - Spill response procedures;
  - Spill cleanup procedures;
  - Reporting; and
  - Training
- A well thought out and implemented plan can prevent pollutants from entering the storm drainage system and can be used as a tool for training personnel to prevent and control future spills as well.

Pollution Prevention

- Develop and implement a Spill Prevention Control and Response Plan. The plan should include:

- A description of the facility, the address, activities and materials involved
- Identification of key spill response personnel
- Identification of the potential spill areas or operations prone to spills/leaks
- Identification of which areas should be or are bermed to contain spills/leaks
- Facility map identifying the key locations of areas, activities, materials, structural BMPs, etc.
- Material handling procedures
- Spill response procedures including:
    - Assessment of the site and potential impacts
    - Containment of the material
    - Notification of the proper personnel and evacuation procedures
    - Clean up of the site
    - Disposal of the waste material and
    - Proper record keeping

- Product substitution – use less toxic materials (i.e. use water based paints instead of oil based paints)
- Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of materials that are brought into the facility or into the field.

Suggested Protocols

Spill/Leak Prevention Measures

- If possible, move material handling indoors, under cover, or away from storm drains or sensitive water bodies.
- Properly label all containers so that the contents are easily identifiable.
- Berm storage areas so that if a spill or leak occurs, the material is contained.
- Cover outside storage areas either with a permanent structure or with a seasonal one such as a tarp so that rain can not come into contact with the materials.
- Check containers (and any containment sumps) often for leaks and spills. Replace containers that are leaking, corroded, or otherwise deteriorating with containers in good condition. Collect all spilled liquids and properly dispose of them.

- Store, contain and transfer liquid materials in such a manner that if the container is ruptured or the contents spilled, they will not discharge, flow or be washed into the storm drainage system, surface waters, or groundwater.

- Place drip pans or absorbent materials beneath all mounted taps and at all potential drip and spill locations during the filling and unloading of containers. Any collected liquids or soiled absorbent materials should be reused/recycled or properly disposed of.

- For field programs, only transport the minimum amount of material needed for the daily activities and transfer materials between containers at a municipal yard where leaks and spill are easier to control.

- If paved, sweep and clean storage areas monthly, do not use water to hose down the area unless all of the water will be collected and disposed of properly.

- Install a spill control device (such as a tee section) in any catch basins that collect runoff from any storage areas if the materials stored are oil, gas, or other materials that separate from and float on water. This will allow for easier cleanup if a spill occurs.

- If necessary, protect catch basins while conducting field activities so that if a spill occurs, the material will be contained.

Training

- Educate employees about spill prevention, spill response and cleanup on a routine basis.

- Well-trained employees can reduce human errors that lead to accidental releases or spills:

  - The employees should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

  - Employees should be familiar with the Spill Prevention Control and Countermeasure Plan if one is available.

- Training of staff from all municipal departments should focus on recognizing and reporting potential or current spills/leaks and who they should contact.

- Employees responsible for aboveground storage tanks and liquid transfers for large bulk containers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.

Spill Response and Prevention

- Identify key spill response personnel and train employees on who they are.

- Store and maintain appropriate spill cleanup materials in a clearly marked location near storage areas; and train employees to ensure familiarity with the site's spill control plan and/or proper spill cleanup procedures.

- Locate spill cleanup materials, such as absorbents, where they will be readily accessible (e.g. near storage and maintenance areas, on field trucks).

- Follow the Spill Prevention Control and Countermeasure Plan if one is available.
- If a spill occurs, notify the key spill response personnel immediately. If the material is unknown or hazardous, the local fire department may also need to be contacted.
- If safe to do so, attempt to contain the material and block the nearby storm drains so that the area impacted is minimized. If the material is unknown or hazardous wait for properly trained personnel to contain the materials.
- Perform an assessment of the area where the spill occurred and the downstream area that it could impact. Relay this information to the key spill response and clean up personnel.

Spill Cleanup Procedures

- Small non-hazardous spills
  - Use a rag, damp cloth or absorbent materials for general clean up of liquids
  - Use brooms or shovels for the general clean up of dry materials
  - If water is used, it must be collected and properly disposed of. The wash water can not be allowed to enter the storm drain.
  - Dispose of any waste materials properly
  - Clean or dispose of any equipment used to clean up the spill properly
- Large non-hazardous spills
  - Use absorbent materials for general clean up of liquids
  - Use brooms, shovels or street sweepers for the general clean up of dry materials
  - If water is used, it must be collected and properly disposed of. The wash water can not be allowed to enter the storm drain.
  - Dispose of any waste materials properly
  - Clean or dispose of any equipment used to clean up the spill properly
- For hazardous or very large spills, a private cleanup company or Hazmat team may need to be contacted to assess the situation and conduct the cleanup and disposal of the materials.
- Chemical cleanups of material can be achieved with the use of absorbents, gels, and foams. Remove the adsorbent materials promptly and dispose of according to regulations.
- If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

Reporting

- Report any spills immediately to the identified key municipal spill response personnel.

- Report spills in accordance with applicable reporting laws. Spills that pose an immediate threat to human health or the environment must be reported immediately to the Office of Emergency Service (OES)

- Spills that pose an immediate threat to human health or the environment may also need to be reported within 24 hours to the Regional Water Quality Control Board.

- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour)

- After the spill has been contained and cleaned up, a detailed report about the incident should be generated and kept on file (see the section on Reporting below). The incident may also be used in briefing staff about proper procedures

Other Considerations

- State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure Plan (SPCC) Plan (Health & Safety Code Chapter 6.67).

- State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.

- Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, if permitted to do so, prohibiting any hard connections to the storm drain.

Requirements

Costs

- Will vary depending on the size of the facility and the necessary controls.

- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of wastes, contaminated soil and water is very expensive

Maintenance

- This BMP has no major administrative or staffing requirements. However, extra time is needed to properly handle and dispose of spills, which results in increased labor costs

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the response and containment of a spill. A good record keeping system helps the municipality minimize incident recurrence, correctly respond with appropriate containment and cleanup activities, and comply with legal requirements.

A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm drain.

These records should contain the following information:

- Date and time of the incident
- Weather conditions
- Duration of the spill/leak/discharge
- Cause of the spill/leak/discharge
- Response procedures implemented
- Persons notified
- Environmental problems associated with the spill/leak/discharge

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- The date and time the inspection was performed
- Name of the inspector
- Items inspected
- Problems noted
- Corrective action required
- Date corrective action was taken

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Examples
The City of Palo Alto includes spill prevention and control as a major element of its highly effective program for municipal vehicle maintenance shops.

References and Resources

King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, and abnormal pH. Utilizing the following protocols will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.
- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a waste water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.

- If soaps or detergents are not used, and the surrounding area is paved, wash water runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in he catch basin to trap the particles in wash water runoff.

- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement. Ensure that this practice does not kill grass.

Landscaping Activities

- Do not apply any chemicals (insecticide, herbicide, or fertilizer) directly to surface waters, unless the application is approved and permitted by the state.

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.

- Use mulch or other erosion control measures on exposed soils.

- Check irrigation schedules so pesticides will not be washed away and to minimize non-stormwater discharge.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.

- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.

- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.

- Clean paint brushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.

- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. In which case you should direct the water through hay bales and filter fabric or use other sediment filters or traps.

- Store toxic material under cover with secondary containment during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.

- Use mulch or other erosion control measures when soils are exposed.

- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.

- Consider an alternative approach when bailing out muddy water; do not put it in the storm drain, pour over landscaped areas.

- Use hand or mechanical weeding where practical.

Fertilizer and Pesticide Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

- Follow manufacturers' recommendations and label directions. Pesticides must never be applied if precipitation is occuring or predicted. Do not apply insecticides within 100 feet of surface waters such as lakes, ponds, wetlands, and streams.

- Use less toxic pesticides that will do the job, whenever possible. Avoid use of copper-based pesticides if possible.

- Do not use pesticides if rain is expected.

- Do not mix or prepare pesticides for application near storm drains.

- Use the minimum amount needed for the job.

- Calibrate fertilizer distributors to avoid excessive application.

- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.

- Apply pesticides only when wind speeds are low.
- Work fertilizers into the soil rather than dumping or broadcasting them onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.
- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

- Overall costs should be low in comparison to other BMPs.

Maintenance

- Sweep paved areas regularly to collect loose particles, and wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping but it is subject to rusting and results in lower quality water. Initially the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time, typically a year, between flushes and may accumulate iron, manganese, lead, copper, nickel and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

King County - ftp://dnr.metrokc.gov/wlr/dss/spcm/Chapter%203.PDF

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASSMA) http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA) http://www.basmaa.org/

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Parking/Storage Area Maintenance SC-43

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The following protocols are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook).
- Keep accurate maintenance logs to evaluate BMP implementation.

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low concentrations.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel and dispose of litter in the trash.

Surface cleaning

- Use dry cleaning methods (e.g. sweeping or vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- If water is used follow the procedures below:
  - Block the storm drain or contain runoff.
  - Wash water should be collected and pumped to the sanitary sewer or discharged to a pervious surface, do not allow wash water to enter storm drains.
  - Dispose of parking lot sweeping debris and dirt at a landfill.
- When cleaning heavy oily deposits:
  - Use absorbent materials on oily spots prior to sweeping or washing.
  - Dispose of used absorbents appropriately.

Surface Repair

- Pre-heat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination form contacting stormwater runoff.
- Cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc., where applicable. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.

- Use only as much water as necessary for dust control, to avoid runoff.

- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of the parking facilities and stormwater conveyance systems associated with them on a regular basis.

- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.

- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.

- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, nad implement accordingly.

- Have spill cleanup materials readily available and in a known location.

- Cleanup spills immediately and use dry methods if possible.

- Properly dispose of spill cleanup material.

Other Considerations

- Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

Requirements

Costs

Cleaning/sweeping costs can be quite large, construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot to minimize cleaning with water.

- Clean out oil/water/sand separators regularly, especially after heavy storms.

- Clean parking facilities on a regular basis to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination form contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Use only as much water as necessary for dust control, to avoid runoff.

References and Resources

http://www.stormwatercenter.net/

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA) http://www.basma.org

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Housekeeping Practices SC-60

Description

Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals. Related information is provided in BMP fact sheets SC-11 Spill Prevention, Control & Cleanup and SC-34 Waste Handling & Disposal.

Approach

Pollution Prevention

- Purchase only the amount of material that will be needed for foreseeable use. In most cases this will result in cost savings in both purchasing and disposal. See SC-61 Safer Alternative Products for additional information.

- Be aware of new products that may do the same job with less environmental risk and for less or the equivalent cost. Total cost must be used here; this includes purchase price, transportation costs, storage costs, use related costs, clean up costs and disposal costs.

Suggested Protocols

General

- Keep work sites clean and orderly. Remove debris in a timely fashion. Sweep the area.

- Dispose of wash water, sweepings, and sediments, properly.

- Recycle or dispose of fluids properly.

- Establish a daily checklist of office, yard and plant areas to confirm cleanliness and adherence to proper storage and security. Specific employees should be assigned specific inspection responsibilities and given the authority to remedy any problems found.

- Post waste disposal charts in appropriate locations detailing for each waste its hazardous nature (poison, corrosive, flammable), prohibitions on its disposal (dumpster, drain, sewer) and the recommended disposal method (recycle, sewer, burn, storage, landfill).

- Summarize the chosen BMPs applicable to your operation and post them in appropriate conspicuous places.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Require a signed checklist from every user of any hazardous material detailing amount taken, amount used, amount returned and disposal of spent material.

- Do a before audit of your site to establish baseline conditions and regular subsequent audits to note any changes and whether conditions are improving or deteriorating.

- Keep records of water, air and solid waste quantities and quality tests and their disposition.

- Maintain a mass balance of incoming, outgoing and on hand materials so you know when there are unknown losses that need to be tracked down and accounted for.

- Use and reward employee suggestions related to BMPs, hazards, pollution reduction, work place safety, cost reduction, alternative materials and procedures, recycling and disposal.

- Have, and review regularly, a contingency plan for spills, leaks, weather extremes etc. Make sure all employees know about it and what their role is so that it comes into force automatically.

Training

- Train all employees, management, office, yard, manufacturing, field and clerical in BMPs and pollution prevention and make them accountable.

- Train municipal employees who handle potentially harmful materials in good housekeeping practices.

- Train personnel who use pesticides in the proper use of the pesticides. The California Department of Pesticide Regulation license pesticide dealers, certify pesticide applicators and conduct onsite inspections.

- Train employees and contractors in proper techniques for spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.

- Keep your Spill Prevention Control and Countermeasure (SPCC) plant up-to-date, and implement accordingly.

- Have spill cleanup materials readily available and in a known location.

- Cleanup spills immediately and use dry methods if possible.

- Properly dispose of spill cleanup material.

Other Considerations

- There are no major limitations to this best management practice.

- There are no regulatory requirements to this BMP. Existing regulations already require municipalities to properly store, use, and dispose of hazardous materials

Requirements

Costs

- Minimal cost associated with this BMP. Implementation of good housekeeping practices may result in cost savings as these procedures may reduce the need for more costly BMPs.

Maintenance

- Ongoing maintenance required to keep a clean site. Level of effort is a function of site size and type of activities.

Supplemental Information

Further Detail of the BMP

- The California Integrated Waste Management Board's Recycling Hotline, 1-800-553-2962, provides information on household hazardous waste collection programs and facilities.

Examples

There are a number of communities with effective programs. The most pro-active include Santa Clara County and the City of Palo Alto, the City and County of San Francisco, and the Municipality of Metropolitan Seattle (Metro).

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000.
http://www.nalms.org/bclss/bmphome.html#bmp

King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities, Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July, 1998, Revised by California Coastal Commission, February 2002.

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Mateo STOPPP - (http://stoppp.tripod.com/bmp.html)

Safer Alternative Products SC-61

Descriptions
Promote the use of less harmful products. Alternatives exist for most product classes including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (batteries, fluorescent lamps).

Approach
Develop a comprehensive program based on:

- The "Precautionary Principle," which is an alternative to the "Risk Assessment" model that says it's acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it's acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is really necessary, and whether alternative products would perform just as well.

- Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients used in the facility's custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.

- Integrated Pest Management (IPM) or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests by methods that pose a lower risk to employees, the public, and the environment.

- Energy Efficiency Program including no-cost and low-cost energy conservation and efficiency actions that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.

Consider the following mechanisms for developing and implementing a comprehensive program:

- Policies
- Procedures
  - Standard operating procedures (SOPs)
  - Purchasing guidelines and procedures

Objectives

- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	☑
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑
Oxygen Demanding	

CALIFORNIA STORMWATER QUALITY ASSOCIATION

  - Bid packages (services and supplies)

- Materials

  - Preferred or approved product and supplier lists

  - Product and supplier evaluation criteria

  - Training sessions and manuals

  - Fact sheets for employees

Training

- Employees who handle potentially harmful materials in the use of safer alternatives.

- Purchasing departments should be encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.

Regulations

This BMP has no regulatory requirements. Existing regulations already encourage facilities to reduce the use of hazardous materials through incentives such as reduced:

- Specialized equipment storage and handling requirements,

- Stormwater runoff sampling requirements,

- Training and licensing requirements, and

- Record keeping and reporting requirements.

Equipment

- There are no major equipment requirements to this BMP.

Limitations

- Alternative products may not be available, suitable, or effective in every case.

Requirements

Costs

- The primary cost is for staff time to: 1) develop new policies and procedures and 2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.

- Some alternative products may be slightly more expensive than conventional products.

Supplemental Information

Employees and contractors / service providers can both be educated about safer alternatives by using information developed by a number of organizations including the references and resources listed below.

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references and resources listed below.

- Automotive products – Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Rerefined motor oil is also available.
- Vehicle/Trailer lubrication – Fifth wheel bearings on trucks require routine lubrication. Adhesive lubricants are available to replace typical chassis grease.
- Cleaners – Vegetables-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.
- Paint products – Water-based paints, wood preservatives, stains, and finishes are available.
- Pesticides – Specific alternative products or methods exist to control most insects, fungi, and weeds.
- Chemical Fertilizers – Compost and soil amendments are natural alternatives.
- Consumables – Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps. All fluorescent lamps contain mercury, however low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescent lamp.
- Janitorial chemicals – Even biodegradable soap can harm fish and wildlife before it biodegrades. Biodegradable does not mean non-toxic. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal, and restroom cleaning and disinfecting.

Examples

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent are listed below in the references and resources section.

References and Resources

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information

California Department of Toxic Substances Control (www.dtsc.ca.gov)

California Integrated Waste Management Board (www.ciwmb.ca.gov)

City of Santa Monica (www.santa-monica.org/environment)

City of Palo Alto (www.city.palo-alto.ca.us/cleanbay)

City and County of San Francisco, Department of the Environment (www.ci.sf.ca.us/sfenvironment)

Earth 911 (www.earth911.org/master.asp)

Environmental Finance Center Region IX (www.greenstart.org/efc9)

Flex Your Power (www.flexyourpower.ca.gov)

GreenBiz.com (www.greenbiz.com)

Green Business Program (www.abag.org/bayarea/enviro/gbus/gb.html)

Pacific Industrial and Business Association (www.piba.org)

Sacramento Clean Water Business Partners (www.sacstormwater.org)

USEPA BMP fact sheet – Alternative products (http://cfpub.epa.gov/npdes/stormwater/menuofbmps/poll_2.cfm)

USEPA Region IX Pollution Prevention Program (www.epa.gov/region09/p2)

Western Regional Pollution Prevention Network (www.westp2net.org)

Metals (mercury, copper)

National Electrical Manufacturers Association - Environment, Health and Safety (www.nema.org)

Sustainable Conservation (www.suscon.org)

Auto Recycling Project

Brake Pad Partnership

Pesticides and Chemical Fertilizers

Bio-Integral Resource Center (www.birc.org)

California Department of Pesticide Regulation (www.cdpr.ca.gov)

University of California Statewide IPM Program (www.ipm.ucdavis.edu/default.html)

Dioxins

Bay Area Dioxins Project (http://dioxin.abag.ca.gov/)

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Pollutants on sidewalks and other pedestrian traffic areas and plazas are typically due to littering and vehicle use. This fact sheet describes good housekeeping practices that can be incorporated into the municipality's existing cleaning and maintenance program.

Approach

Pollution Prevention

- Use dry cleaning methods whenever practical for surface cleaning activities.
- Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal).

Suggested Protocols

Surface Cleaning

- Regularly broom (dry) sweep sidewalk, plaza and parking lot areas to minimize cleaning with water.
- Dry cleanup first (sweep, collect, and dispose of debris and trash) when cleaning sidewalks or plazas, then wash with or without soap.
- Block the storm drain or contain runoff when cleaning with water. Discharge wash water to landscaping or collect water and pump to a tank or discharge to sanitary sewer if allowed. (Permission may be required from local sanitation district.)

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Block the storm drain or contain runoff when washing parking areas, driveways or drive-throughs. Use absorbents to pick up oil; then dry sweep. Clean with or without soap. Collect water and pump to a tank or discharge to sanitary sewer if allowed. Street Repair and Maintenance.

Graffiti Removal

- Avoid graffiti abatement activities during rain events.
- Implement the procedures under Painting and Paint Removal in SC-70 Roads, Streets, and Highway Operation and Maintenance fact sheet when graffiti is removed by painting over.
- Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a dirt or landscaped area after treating with an appropriate filtering device.
- Plug nearby storm drain inlets and vacuum/pump wash water to the sanitary sewer if authorized to do so if a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound). Ensure that a non-hazardous cleaning compound is used or dispose as hazardous waste, as appropriate.

Surface Removal and Repair

- Schedule surface removal activities for dry weather if possible.
- Avoid creating excess dust when breaking asphalt or concrete.
- Take measures to protect nearby storm drain inlets prior to breaking up asphalt or concrete (e.g. place hay bales or sand bags around inlets). Clean afterwards by sweeping up as much material as possible.
- Designate an area for clean up and proper disposal of excess materials.
- Remove and recycle as much of the broken pavement as possible to avoid contact with rainfall and stormwater runoff.
- When making saw cuts in pavement, use as little water as possible. Cover each storm drain inlet completely with filter fabric during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site.
- Always dry sweep first to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains. Once dry sweeping is complete, the area may be hosed down if needed. Wash water should be directed to landscaping or collected and pumped to the sanitary sewer if allowed.

Concrete Installation and Repair

- Schedule asphalt and concrete activities for dry weather.

- Take measures to protect any nearby storm drain inlets and adjacent watercourses, prior to breaking up asphalt or concrete (e.g. place san bags around inlets or work areas).
- Limit the amount of fresh concrete or cement mortar mixed, mix only what is needed for the job.
- Store concrete materials under cover, away from drainage areas. Secure bags of cement after they are open. Be sure to keep wind-blown cement powder away from streets, gutters, storm drains, rainfall, and runoff.
- Return leftover materials to the transit mixer. Dispose of small amounts of hardened excess concrete, grout, and mortar in the trash.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile, or dispose in the trash.
- Protect applications of fresh concrete from rainfall and runoff until the material has dried.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide litter receptacles in busy, high pedestrian traffic areas of the community, at recreational facilities, and at community events.
- Cover litter receptacles and clean out frequently to prevent leaking/spillage or overflow.
- Clean parking lots on a regular basis with a street sweeper.

Training

- Provide regular training to field employees and/or contractors regarding surface cleaning and proper operation of equipment.
- Train employee and contractors in proper techniques for spill containment and cleanup.
- Use a training log or similar method to document training.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Limitations related to sweeping activities at large parking facilities may include current sweeper technology to remove oil and grease.
- Surface cleaning activities that require discharges to the local sewering agency will require coordination with the agency.
- Arrangements for disposal of the swept material collected must be made, as well as accurate tracking of the areas swept and the frequency of sweeping.

Requirements

Costs

- The largest expenditures for sweeping and cleaning of sidewalks, plazas, and parking lots are in staffing and equipment. Sweeping of these areas should be incorporated into street sweeping programs to reduce costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Community education, such as informing residents about their options for recycling and waste disposal, as well as the consequences of littering, can instill a sense of citizen responsibility and potentially reduce the amount of maintenance required by the municipality.

Additional BMPs that should be considered for parking lot areas include:

- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low concentrations.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Structural BMPs such as storm drain inlet filters can be very effective in reducing the amount of pollutants discharged from parking facilities during periods of rain.

References and Resources

Bay Area Stormwater Management Agencies Association (BASMAA). 1996. Pollution From Surface Cleaning Folder http://www.basmaa.org

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

Santa Clara Valley Urban Runoff Pollution Prevention Program. Maintenance Best Management Practices for the Construction Industry. Brochures: Landscaping, Gardening, and Pool; Roadwork and Paving; and Fresh Concrete and Mortar Application. June 2001.

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Plan. 2001. Municipal Activities Model Program Guidance. November.

Objectives

- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	
Oxygen Demanding	☑

Description

Landscape maintenance activities include vegetation removal; herbicide and insecticide application; fertilizer application; watering; and other gardening and lawn care practices. Vegetation control typically involves a combination of chemical (herbicide) application and mechanical methods. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. The major objectives of this BMP are to minimize the discharge of pesticides, herbicides and fertilizers to the storm drain system and receiving waters; prevent the disposal of landscape waste into the storm drain system by collecting and properly disposing of clippings and cuttings, and educating employees and the public.

Approach

Pollution Prevention

- Implement an integrated pest management (IPM) program. IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools.
- Choose low water using flowers, trees, shrubs, and groundcover.
- Consider alternative landscaping techniques such as naturescaping and xeriscaping.
- Conduct appropriate maintenance (i.e. properly timed fertilizing, weeding, pest control, and pruning) to help preserve the landscapes water efficiency.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Consider grass cycling (grass cycling is the natural recycling of grass by leaving the clippings on the lawn when mowing. Grass clippings decompose quickly and release valuable nutrients back into the lawn).

Suggested Protocols

Mowing, Trimming, and Weeding

- Whenever possible use mechanical methods of vegetation removal (e.g mowing with tractor-type or push mowers, hand cutting with gas or electric powered weed trimmers) rather than applying herbicides. Use hand weeding where practical.

- Avoid loosening the soil when conducting mechanical or manual weed control, this could lead to erosion. Use mulch or other erosion control measures when soils are exposed.

- Performing mowing at optimal times. Mowing should not be performed if significant rain events are predicted.

- Mulching mowers may be recommended for certain flat areas. Other techniques may be employed to minimize mowing such as selective vegetative planting using low maintenance grasses and shrubs.

- Collect lawn and garden clippings, pruning waste, tree trimmings, and weeds. Chip if necessary, and compost or dispose of at a landfill (see waste management section of this fact sheet).

- Place temporarily stockpiled material away from watercourses, and berm or cover stockpiles to prevent material releases to storm drains.

Planting

- Determine existing native vegetation features (location, species, size, function, importance) and consider the feasibility of protecting them. Consider elements such as their effect on drainage and erosion, hardiness, maintenance requirements, and possible conflicts between preserving vegetation and the resulting maintenance needs.

- Retain and/or plant selected native vegetation whose features are determined to be beneficial, where feasible. Native vegetation usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.

- Consider using low water use groundcovers when planting or replanting.

Waste Management

- Compost leaves, sticks, or other collected vegetation or dispose of at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.

- Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.

- Reduce the use of high nitrogen fertilizers that produce excess growth requiring more frequent mowing or trimming.

- Avoid landscape wastes in and around storm drain inlets by either using bagging equipment or by manually picking up the material.

Irrigation

- Where practical, use automatic timers to minimize runoff.

- Use popup sprinkler heads in areas with a lot of activity or where there is a chance the pipes may be broken. Consider the use of mechanisms that reduce water flow to sprinkler heads if broken.

- Ensure that there is no runoff from the landscaped area(s) if re-claimed water is used for irrigation.

- If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.

- Irrigate slowly or pulse irrigate to prevent runoff and then only irrigate as much as is needed.

- Apply water at rates that do not exceed the infiltration rate of the soil.

Fertilizer and Pesticide Management

- Utilize a comprehensive management system that incorporates integrated pest management (IPM) techniques. There are many methods and types of IPM, including the following:

  - Mulching can be used to prevent weeds where turf is absent, fencing installed to keep rodents out, and netting used to keep birds and insects away from leaves and fruit.

  - Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off the plant with water or in some cases vacuumed off of larger plants.

  - Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used.

  - Slugs can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.

  - In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).

  - Small mammals and birds can be excluded using fences, netting, tree trunk guards.

  - Beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seed head weevils, and spiders that prey on detrimental pest species can be promoted.

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

- Use pesticides only if there is an actual pest problem (not on a regular preventative schedule).
- Do not use pesticides if rain is expected. Apply pesticides only when wind speeds are low (less than 5 mph).
- Do not mix or prepare pesticides for application near storm drains.
- Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the pest.
- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Calibrate fertilizer and pesticide application equipment to avoid excessive application.
- Periodically test soils for determining proper fertilizer use.
- Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Purchase only the amount of pesticide that you can reasonably use in a given time period (month or year depending on the product).
- Triple rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Dispose of empty pesticide containers according to the instructions on the container label.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.
- Inspect pesticide/fertilizer equipment and transportation vehicles daily.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution. Pesticide application must be under the supervision of a California qualified pesticide applicator.
- Train/encourage municipal maintenance crews to use IPM techniques for managing public green areas.
- Annually train employees within departments responsible for pesticide application on the appropriate portions of the agency's IPM Policy, SOPs, and BMPs, and the latest IPM techniques.

- Employees who are not authorized and trained to apply pesticides should be periodically (at least annually) informed that they cannot use over-the-counter pesticides in or around the workplace.

- Use a training log or similar method to document training.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup

- Have spill cleanup materials readily available and in a know in location

- Cleanup spills immediately and use dry methods if possible.

- Properly dispose of spill cleanup material.

Other Considerations

- The Federal Pesticide, Fungicide, and Rodenticide Act and California Title 3, Division 6, Pesticides and Pest Control Operations place strict controls over pesticide application and handling and specify training, annual refresher, and testing requirements. The regulations generally cover: a list of approved pesticides and selected uses, updated regularly; general application information; equipment use and maintenance procedures; and record keeping. The California Department of Pesticide Regulations and the County Agricultural Commission coordinate and maintain the licensing and certification programs. All public agency employees who apply pesticides and herbicides in "agricultural use" areas such as parks, golf courses, rights-of-way and recreation areas should be properly certified in accordance with state regulations. Contracts for landscape maintenance should include similar requirements.

- All employees who handle pesticides should be familiar with the most recent material safety data sheet (MSDS) files.

- Municipalities do not have the authority to regulate the use of pesticides by school districts, however the California Healthy Schools Act of 2000 (AB 2260) has imposed requirements on California school districts regarding pesticide use in schools. Posting of notification prior to the application of pesticides is now required, and IPM is stated as the preferred approach to pest management in schools.

Requirements

Costs

Additional training of municipal employees will be required to address IPM techniques and BMPs. IPM methods will likely increase labor cost for pest control which may be offset by lower chemical costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Waste Management

Composting is one of the better disposal alternatives if locally available. Most municipalities either have or are planning yard waste composting facilities as a means of reducing the amount of waste going to the landfill. Lawn clippings from municipal maintenance programs as well as private sources would probably be compatible with most composting facilities

Contractors and Other Pesticide Users

Municipal agencies should develop and implement a process to ensure that any contractor employed to conduct pest control and pesticide application on municipal property engages in pest control methods consistent with the IPM Policy adopted by the agency. Specifically, municipalities should require contractors to follow the agency's IPM policy, SOPs, and BMPs; provide evidence to the agency of having received training on current IPM techniques when feasible; provide documentation of pesticide use on agency property to the agency in a timely manner.

References and Resources

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. 1995. King County Surface Water Management. July. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

Los Angeles County Stormwater Quality Model Programs. Public Agency Activities http://ladpw.org/wmd/npdes/model_links.cfm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

Orange County Stormwater Program http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Landscaping and Lawn Care. Office of Water. Office of Wastewater Management. On-line: http://www.epa.gov/npdes/menuofbmps/poll_8.htm

Drainage System Maintenance SC-74

Photo Credit: Geoff Brosseau

Objectives

- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Approach

Suggested Protocols

Catch Basins/Inlet Structures

- Municipal staff should regularly inspect facilities to ensure the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC-75 Waste Handling and Disposal).
- Clean catch basins, storm drain inlets, and other conveyance structures in high pollutant load areas just before the wet season to remove sediments and debris accumulated during the summer.

- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Record the amount of waste collected.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed of. Do not dewater near a storm drain or stream.
- Except for small communities with relatively few catch basins that may be cleaned manually, most municipalities will require mechanical cleaners such as eductors, vacuums, or bucket loaders.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect flushed effluent and pump to the sanitary sewer for treatment.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge from cleaning a storm drain pump station or other facility to reach the storm drain system.
- Conduct quarterly routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.
- Sample collected sediments to determine if landfill disposal is possible, or illegal discharges in the watershed are occurring.

Open Channel

- Consider modification of storm channel characteristics to improve channel hydraulics, to increase pollutant removals, and to enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies

(SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS

Illicit Connections and Discharges

- During routine maintenance of conveyance system and drainage structures field staff should look for evidence of illegal discharges or illicit connections:
  - Is there evidence of spills such as paints, discoloring, etc.
  - Are there any odors associated with the drainage system
  - Record locations of apparent illegal discharges/illicit connections
  - Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of up gradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
  - Once the origin of flow is established, require illicit discharger to eliminate the discharge.
- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post “No Dumping” signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

- The State Department of Fish and Game has a hotline for reporting violations called Cal TIP (1-800-952-5400). The phone number may be used to report any violation of a Fish and Game code (illegal dumping, poaching, etc.).

- The California Department of Toxic Substances Control's Waste Alert Hotline, 1-800-69TOXIC, can be used to report hazardous waste violations.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.

- Only properly trained individuals are allowed to handle hazardous materials/wastes.

- Train municipal employees from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report illegal dumping.

- Train municipal employees and educate businesses, contractors, and the general public in proper and consistent methods for disposal.

- Train municipal staff regarding non-stormwater discharges (See SC-10 Non-Stormwater Discharges).

Spill Response and Prevention

- Refer to SC-11, Prevention, Control & Cleanup

- Have spill cleanup materials readily available and in a known location.

- Cleanup spills immediately and use dry methods if possible.

- Properly dispose of spill cleanup material.

Other Considerations

- Cleanup activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.

- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and disposal of flushed effluent to sanitary sewer may be prohibited in some areas.

- Regulations may include adoption of substantial penalties for illegal dumping and disposal.

- Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

- Private property access rights may be needed to track illegal discharges up gradient.

- Requirements of municipal ordinance authority for suspected source verification testing for illicit connections necessary for guaranteed rights of entry.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget. A careful study of cleaning effectiveness should be undertaken before increased cleaning is implemented. Catch basin cleaning costs are less expensive if vacuum street sweepers are available; cleaning catch basins manually can cost approximately twice as much as cleaning the basins with a vacuum attached to a sweeper.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary. Encouraging reporting of illicit discharges by employees can offset costs by saving expense on inspectors and directing resources more efficiently. Some programs have used funds available from "environmental fees" or special assessment districts to fund their illicit connection elimination programs.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.

- Identifying illicit discharges requires teams of at least two people (volunteers can be used), plus administrative personnel, depending on the complexity of the storm sewer system.

- Arrangements must be made for proper disposal of collected wastes.

- Requires technical staff to detect and investigate illegal dumping violations, and to coordinate public education.

Supplemental Information

Further Detail of the BMP

Storm Drain flushing

Sanitary sewer flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in sanitary sewer systems. The same principles that make sanitary sewer flushing effective can be used to flush storm drains. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as to an open channel, to another point where flushing will be initiated, or over to the sanitary sewer and on to the treatment facilities, thus preventing re-suspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. The deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce the impacts of stormwater pollution, a second inflatable device, placed well downstream, may be used to re-collect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to re-collect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75 percent for organics and 55-65 percent for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm drain flushing.

Flow Management

Flow management has been one of the principal motivations for designing urban stream corridors in the past. Such needs may or may not be compatible with the stormwater quality goals in the stream corridor.

Downstream flood peaks can be suppressed by reducing through flow velocity. This can be accomplished by reducing gradient with grade control structures or increasing roughness with boulders, dense vegetation, or complex banks forms. Reducing velocity correspondingly increases flood height, so all such measures have a natural association with floodplain open space. Flood elevations laterally adjacent to the stream can be lowered by increasing through flow velocity.

However, increasing velocity increases flooding downstream and inherently conflicts with channel stability and human safety. Where topography permits, another way to lower flood elevation is to lower the level of the floodway with drop structures into a large but subtly excavated bowl where flood flows we allowed to spread out.

Stream Corridor Planning

Urban streams receive and convey stormwater flows from developed or developing watersheds. Planning of stream corridors thus interacts with urban stormwater management programs. If local programs are intended to control or protect downstream environments by managing flows delivered to the channels, then it is logical that such programs should be supplemented by management of the materials, forms, and uses of the downstream riparian corridor. Any proposal for steam alteration or management should be investigated for its potential flow and stability effects on upstream, downstream, and laterally adjacent areas. The timing and rate of flow from various tributaries can combine in complex ways to alter flood hazards. Each section of channel is unique, influenced by its own distribution of roughness elements, management activities, and stream responses.

Flexibility to adapt to stream features and behaviors as they evolve must be included in stream reclamation planning. The amenity and ecology of streams may be enhanced through the landscape design options of 1) corridor reservation, 2) bank treatment, 3) geomorphic restoration, and 4) grade control.

Corridor reservation - Reserving stream corridors and valleys to accommodate natural stream meandering, aggradation, degradation, and over bank flows allows streams to find their own form and generate less ongoing erosion. In California, open stream corridors in recent urban developments have produced recreational open space, irrigation of streamside plantings, and the aesthetic amenity of flowing water.

Bank treatment - The use of armoring, vegetative cover, and flow deflection may be used to influence a channel's form, stability, and biotic habitat. To prevent bank erosion, armoring can be done with rigid construction materials, such as concrete, masonry, wood planks and logs, riprap, and gabions. Concrete linings have been criticized because of their lack of provision of biotic habitat. In contrast, riprap and gabions make relatively porous and flexible linings. Boulders, placed in the bed reduce velocity and erosive power.

Riparian vegetation can stabilize the banks of streams that are at or near a condition of equilibrium. Binding networks of roots increase bank shear strength. During flood flows, resilient vegetation is forced into erosion-inhibiting mats. The roughness of vegetation leads to lower velocity, further reducing erosive effects. Structural flow deflection can protect banks from erosion or alter fish habitat. By concentrating flow, a deflector causes a pool to be scoured in the bed.

Geomorphic restoration – Restoration refers to alteration of disturbed streams so their form and behavior emulate those of undisturbed streams. Natural meanders are retained, with grading to gentle slopes on the inside of curves to allow point bars and riffle-pool sequences to develop. Trees are retained to provide scenic quality, biotic productivity, and roots for bank stabilization, supplemented by plantings where necessary.

A restorative approach can be successful where the stream is already approaching equilibrium. However, if upstream urbanization continues new flow regimes will be generated that could disrupt the equilibrium of the treated system.

Grade Control - A grade control structure is a level shelf of a permanent material, such as stone, masonry, or concrete, over which stream water flows. A grade control structure is called a sill, weir, or drop structure, depending on the relation of its invert elevation to upstream and downstream channels.

A sill is installed at the preexisting channel bed elevation to prevent upstream migration of nick points. It establishes a firm base level below which the upstream channel can not erode.

A weir or check dam is installed with invert above the preexisting bed elevation. A weir raises the local base level of the stream and causes aggradation upstream. The gradient, velocity, and erosive potential of the stream channel are reduced. A drop structure lowers the downstream invert below its preexisting elevation, reducing downstream gradient and velocity. Weirs and drop structure control erosion by dissipating energy and reducing slope velocity.

When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to he reclaimed.

Examples

The California Department of Water Resources began the Urban Stream Restoration Program in 1985. The program provides grant funds to municipalities and community groups to implement stream restoration projects. The projects reduce damages from streambank aid watershed instability arid floods while restoring streams' aesthetic, recreational, and fish and wildlife values.

In Buena Vista Park, upper floodway slopes are gentle and grassed to achieve continuity of usable park land across the channel of small boulders at the base of the slopes.

The San Diego River is a large, vegetative lined channel, which was planted in a variety of species to support riparian wildlife while stabilizing the steep banks of the floodway.

References and Resources

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

Los Angeles County Stormwater Quality. Public Agency Activities Model Program. On-line: http://ladpw.org/wmd/npdes/public_TC.cfm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) Municipal Activities Model Program Guidance. 2001. Project Clean Water. November.

United States Environmental Protection Agency (USEPA). 1999. Stormwater Management Fact Sheet Non-stormwater Discharges to Storm Sewers. EPA 832-F-99-022. Office of Water, Washington, D.C. September.

United States Environmental Protection Agency (USEPA). 1999. Stormwater O&M Fact Sheet Catch Basin Cleaning. EPA 832-F-99-011. Office of Water, Washington, D.C. September.

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Illegal Dumping Control. On line: http://www.epa.gov/npdes/menuofbmps/poll_7.htm

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line: http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Site Design & Landscape Planning SD-10

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.

- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.

- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.

- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

- Promote natural vegetation by using parking lot islands and other landscaped areas.

- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.

- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.

- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:

  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff

  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect

  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible

  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth

- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13

Design Objectives

Maximize Infiltration

Provide Retention

Slow Runoff

Minimize Impervious Land Coverage

☑ Prohibit Dumping of Improper Materials

Contain Pollutants

Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Maintenance Concerns, Objectives, and Goals

- Clogged Soil or Outlet Structures
- Invasive Species
- Vegetation/Landscape Maintenance
- Erosion
- Channelization of Flow
- Aesthetics

General Description

The bioretention best management practice (BMP) functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants. The runoff's velocity is reduced by passing over or through a sand bed and is subsequently distributed evenly along a ponding area. Exfiltration of the stored water in the bioretention area planting soil into the underlying soils occurs over a period of days.

Inspection/Maintenance Considerations

Bioretention requires frequent landscaping maintenance, including measures to ensure that the area is functioning properly, as well as maintenance of the landscaping on the practice. In many cases, bioretention areas initially require intense maintenance, but less maintenance is needed over time. In many cases, maintenance tasks can be completed by a landscaping contractor, who may already be hired at the site. In cold climates the soil may freeze, preventing runoff from infiltrating into the planting soil.

Targeted Constituents

☑	Sediment	■
☑	Nutrients	▲
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■
☑	Oxygen Demanding	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Inspection Activities	Suggested Frequency
■ Inspect soil and repair eroded areas.	Monthly
■ Inspect for erosion or damage to vegetation, preferably at the end of the wet season to schedule summer maintenance and before major fall runoff to be sure the strips are ready for winter. However, additional inspection after periods of heavy runoff is desirable.	Semi-annual inspection
■ Inspect to ensure grass is well established. If not, either prepare soil and reseed or replace with alternative species. Install erosion control blanket. ■ Check for debris and litter, and areas of sediment accumulation. ■ Inspect health of trees and shrubs.	

Maintenance Activities	Suggested Frequency
■ Water plants daily for 2 weeks.	At project completion
■ Remove litter and debris.	Monthly
■ Remove sediment. ■ Remulch void areas. ■ Treat diseased trees and shrubs. ■ Mow turf areas. ■ Repair erosion at inflow points. ■ Repair outflow structures. ■ Unclog underdrain. ■ Regulate soil pH regulation.	As needed
■ Remove and replace dead and diseased vegetation.	Semi-annual
■ Add mulch. ■ Replace tree stakes and wires.	Annual
■ Mulch should be replaced every 2 to 3 years or when bare spots appear. Remulch prior to the wet season.	Every 2-3 years, or as needed

Additional Information

Landscaping is critical to the function and aesthetic value of bioretention areas. It is preferable to plant the area with native vegetation, or plants that provide habitat value, where possible. Another important design feature is to select species that can withstand the hydrologic regime they will experience. At the bottom of the bioretention facility, plants that tolerate both wet and dry conditions are preferable. At the edges, which will remain primarily dry, upland species will be the most resilient. It is best to select a combination of trees, shrubs, and herbaceous materials.

References

Metropolitan Council, Urban Small Sites Best Management Practices Manual. Available at: http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July, 1998, revised February, 2002.

U.S. Environmental Protection Agency, Post-Construction Stormwater Management in New Development & Redevelopment BMP Factsheets. Available at: cfpub.epa.gov/npdes/stormwater/menuofbmps/bmp_files.cfm

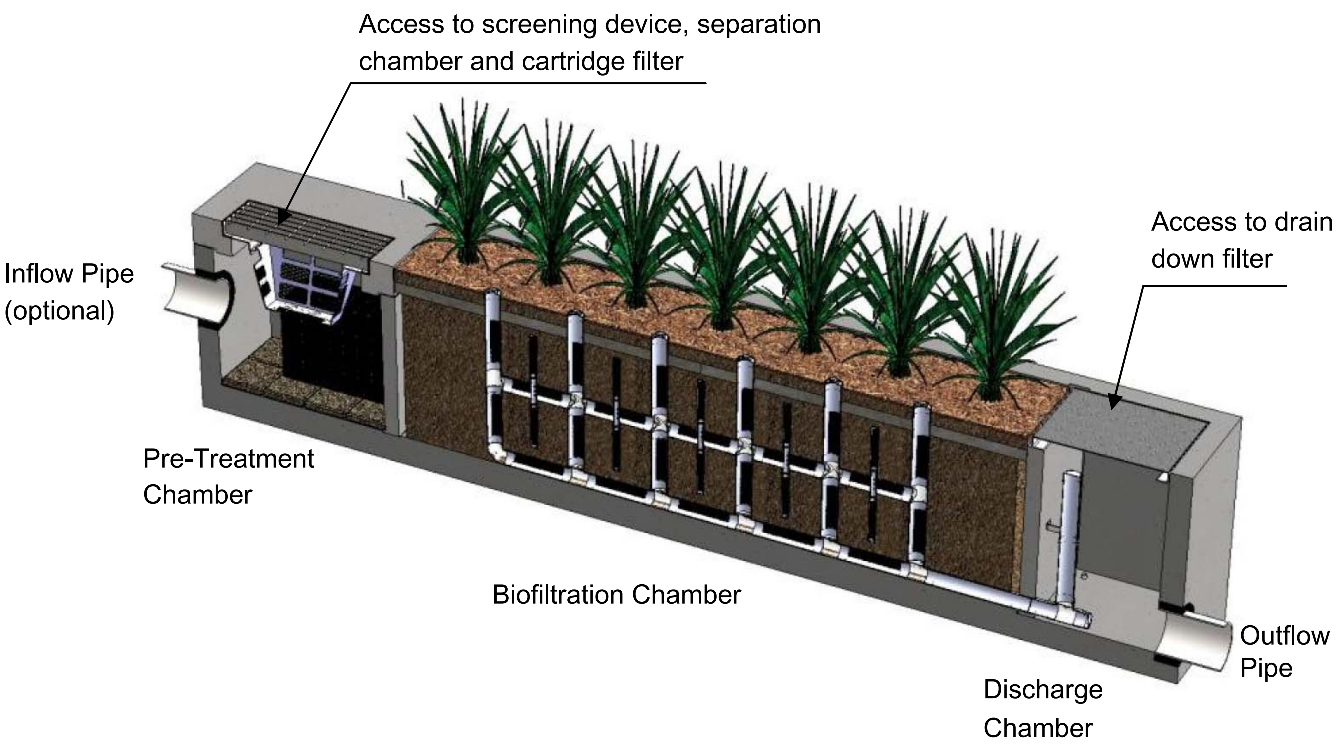
Ventura Countywide Stormwater Quality Management Program, Technical Guidance Manual for Stormwater Quality Control Measures. July, 2002.

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - (*5 minute average service time*).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - (*5 minute average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Appendix J: Murrieta Canyon Academy Noise Impact Analysis

Murrieta Canyon Academy

NOISE IMPACT ANALYSIS

CITY OF MURRIETA

PREPARED BY:

Bill Lawson, PE, INCE
blawson@urbanxroads.com
(949) 336-5979

MAY 4, 2020

TABLE OF CONTENTS

APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

(1)	Reference
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
mph	Miles per hour
PPV	Peak Particle Velocity
Project	Murrieta Canyon Academy
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed Murrieta Canyon Academy development ("Project"). The Project site is located northeast corner of Hayes Avenue and Fullerton Road in the City of Murrieta. The proposed Project includes the construction of a new campus with approximately 41,500 square feet of classrooms and administrative offices, an associated parking lot, and other site improvements, to replace an existing campus of 22,500 square feet of portable classrooms. This noise study has been prepared to satisfy applicable City of Murrieta noise standards and significance criteria based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1)

ON-SITE TRAFFIC NOISE ANALYSIS

The results of this analysis indicate that future vehicle noise from Hayes Avenue represents the principal source of community noise that will impact the Project site. The Project will also experience some background traffic noise impacts from the Project's internal local streets, however due to the distance, topography and low traffic volume/speeds, traffic noise from these roads will not make a significant contribution to the noise environment. With the following recommended noise mitigation measures, the on-site noise impacts will be *less than significant*.

EXTERIOR NOISE ANALYSIS

No exterior noise mitigation is required to satisfy the City of Murrieta General Plan Noise Element exterior land use/noise level compatibility criteria for the planned school use. The Murrieta Canyon Academy classrooms and labs facing Hayes will experience *normally acceptable* exterior noise levels of less than 70.0 dBA CNEL. Therefore, because of the future unmitigated exterior traffic noise levels at the Project site, additional interior noise analysis is required to satisfy the General Plan Noise Element *normally acceptable* land use compatibility requirements. (2)

INTERIOR NOISE ANALYSIS

This noise study evaluates the interior noise levels at the Project buildings based on the City of Murrieta 45 dBA CNEL residential interior noise level standard. The Project buildings are shown to require a Noise Reduction (NR) of up to 19.2 dBA and a windows-closed condition requiring a means of mechanical ventilation (e.g. air conditioning). The first and second floor interior noise level analysis shows that the City of Murrieta 45 dBA CNEL interior noise level standards can be satisfied using standard building construction providing windows and sliding glass doors with minimum STC ratings of 27. To meet the City of Murrieta 45 dBA CNEL interior noise standards the following on-site mitigation measures are required:

- Windows: All buildings require standards windows and sliding glass doors with a minimum STC rating of 27 (all windows/glass doors, all floors), and a means of mechanical ventilation (e.g., air conditioning).

- Exterior Doors (Non-Glass): All residential building exterior doors shall be well weather-stripped and have minimum STC ratings of 27. Well-sealed perimeter gaps around the doors are essential to achieve the optimal STC rating. (3)
- Walls: At any penetrations of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar to form an airtight seal.
- Residential Roofs: Roof sheathing of wood construction shall be per manufacturer's specification or caulked plywood of at least one-half inch thick. Ceilings shall be per manufacturer's specification or well-sealed gypsum board of at least one-half inch thick. Insulation with at least a rating of R-19 shall be used in the attic space.
- Ventilation: Arrangements for any habitable room shall be such that any exterior door or window can be kept closed when the room is in use and still receive circulated air. A forced air circulation system (e.g. air conditioning) or active ventilation system (e.g. fresh air supply) shall be provided, which satisfies the requirements of the Uniform Building Code.

OPERATIONAL NOISE ANALYSIS

Using reference noise levels to represent the expected noise sources from the Murrieta Canyon Academy site, the operational analysis estimates the Project-related stationary-source noise hourly average L_{eq} levels at nearby sensitive receiver locations. The typical activities associated with the proposed Murrieta Canyon Academy are anticipated to include roof-top air conditioning units, outdoor student activity, basketball court activity and parking lot vehicle movements activity. The operational noise analysis shows that the Project will satisfy the City of Murrieta stationary-source exterior hourly average L_{eq} noise levels of 50 dBA L_{eq} daytime at all nearby receiver locations. No Project activities are expected during the nighttime hours from 10:00 p.m. to 7:00 a.m. Therefore, the Project-related operational noise level impacts are considered *less than significant*.

CONSTRUCTION NOISE ANALYSIS

Construction noise levels are expected to create temporary and intermittent high-level noise conditions at receivers surrounding the Project site when certain activities occur at the closest point to the nearby receiver locations from the edge of primary Project construction activity. Using sample reference noise levels to represent the construction activities at the Murrieta Canyon Academy site, this analysis estimates the Project-related construction noise levels at nearby sensitive receiver locations. The analysis shows that the Project related construction equipment noise levels will satisfy the City of Murrieta Municipal Code construction noise level standards of 75 dBA L_{max} for mobile equipment and the 60 dBA L_{max} standards for stationary equipment at all receiver locations. Therefore, the noise impacts due to unmitigated Project construction noise levels are considered *less than significant.*

Though construction is temporary, intermittent and of short duration, and will not present any long-term impacts, the following noise abatement measures would reduce the noise level impacts due to Project construction activities at the nearby noise-sensitive residential land uses:

CONSTRUCTION NOISE ABATEMENT MEASURES

- Prior to approval of grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours of 7:00 a.m. to 8:00 p.m. daily, with no activity allowed on Sundays or holidays (City of Murrieta Municipal Code, Section 16.30.130(A)(2)(a)(1)). The Project construction supervisor shall ensure compliance with the note and the City shall conduct periodic inspection at its discretion.
- During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receivers nearest the Project site.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site during all Project construction activities (i.e., to the center).
- The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 a.m. to 8:00 p.m. daily, with no activity allowed on Sundays or holidays). The contractor shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

CONSTRUCTION VIBRATION ANALYSIS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. At distances ranging from 125 to 656 feet from the Project construction activities, construction vibration velocity levels are estimated to range from 0.000 to 0.006 in/sec RMS and will remain below the threshold of 0.01 in/sec RMS at all receiver locations. Therefore, the Project-related vibration impacts are considered *less than significant* during the construction activities at the Project site.

SUMMARY OF CEQA SIGNIFICANCE FINDINGS

The results of this Murrieta Canyon Academy Noise Impact Analysis are summarized below based on the significance criteria in Section 4 of this report consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) Table ES-1 shows the findings of significance for each potential noise and/or vibration impact under CEQA before and after any required mitigation measures.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Off-Site Traffic Noise	7	*Less Than Significant*	-
On-Site Traffic Noise	8	*Less Than Significant*	-
Operational Noise	10	*Less Than Significant*	-
Construction Noise	11	*Less Than Significant*	-
Construction Vibration		*Less Than Significant*	-

1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Murrieta Canyon Academy ("Project"). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, sets out the local regulatory setting, presents the study methods and procedures for transportation related CNEL traffic noise analysis, and evaluates the future exterior noise environment. In addition, this study includes an analysis of the potential Project-related long-term stationary-source operational noise and short-term construction noise and vibration impacts.

1.1 SITE LOCATION

The proposed Murrieta Canyon Academy Project is located on the northeast corner of Hayes Avenue and Fullerton Road in the City of Murrieta, as shown on Exhibit 1-A. The area surrounding the Project Site includes residential to the east and south; Thompson Middle School field and Thompson Middle School to the west; and Murrieta Valley High School to the north.

1.2 PROJECT DESCRIPTION

Murrieta Valley Unified School District (MVUSD) proposes to construct new buildings and associated infrastructure at the Murrieta Canyon Academy (MCA). MCA is an existing school campus consisting of portable structures that provides alternative high school programs including, independent study, alternative high school, and adult education. MVUSD proposes to construct a new campus with permanent single and two-story buildings and associated infrastructure and demolish the existing MCA buildings (Project). The site plan for the proposed Project is shown on Exhibit 1-B.

The proposed Project includes the construction of a new campus with approximately 41,500 square feet of classrooms and administrative offices, an associated parking lot, and other site improvements, to replace an existing campus of 22,500 square feet of portable classrooms. More specifically, the new campus will include construction of single and two-story buildings with 22 classroom, student pavilion, library, restrooms, storage rooms, administration office, and various academic and activity courts with additional parking and landscaping. The proposed buildings are designed as single and two-story structures. All utilities exist to the Project site. The proposed Project will increase current enrollment capacity from 234 students to 594 students.

The Project is proposed to be constructed in the general location of the existing softball fields associated with Thompson Middle School, located immediately north-west of the existing MCA campus and south of the adjacent Thompson Middle School buildings. While the construction of the new buildings occur, the existing buildings will remain in operation. Following the completion of the new buildings, anticipated to be during summer recess from school, the original buildings and parking lot will be demolished, and the new parking and associated landscape will be constructed.

EXHIBIT 1-A: LOCATION MAP

EXHIBIT 1-B: SITE PLAN

This page intentionally left blank

2 FUNDAMENTALS

Noise is simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		SPEECH INTERFERENCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		SLEEP DISTURBANCE
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (4) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA at approximately 100 feet, which can cause serious discomfort. (5) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most used figure is the equivalent level (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the "average" noise levels within the environment.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite 24-hour noise level is utilized. The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time of day corrections require the addition of 5 decibels to dBA L_{eq} sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA L_{eq} sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when sound appears louder. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The City of Murrieta relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. The way noise reduces with distance depends on the following factors.

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (4)

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source. (6)

2.3.3 ATMOSPHERIC EFFECTS

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (4)

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an "out of sight, out of mind" effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby residents. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The FHWA does not consider the planting of vegetation to be a noise abatement measure.

2.4 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for an observation point or receiver by controlling the noise source, transmission path, receiver, or all three. This concept is known as the source-path-receiver concept. In general, noise control measures can be applied to these three elements.

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receiver. Noise barriers, however, do have limitations. For a noise barrier to work, it must be high enough and long enough to block the path of the noise source. (6)

2.6 LAND USE COMPATIBILITY WITH NOISE

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (7)

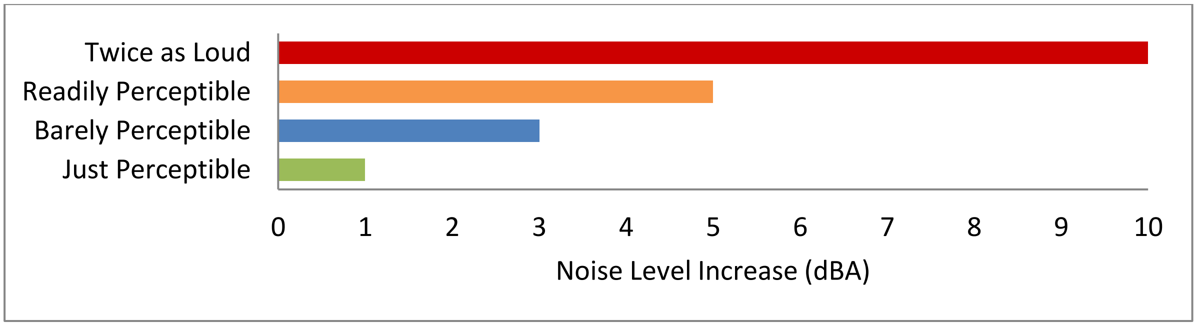
2.7 COMMUNITY RESPONSE TO NOISE

Community responses to noise may range from registering a complaint by telephone or letter, to initiating court action, depending upon everyone's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including:

- Fear associated with noise producing activities;
- Socio-economic status and educational level;
- Perception that those affected are being unfairly treated;
- Attitudes regarding the usefulness of the noise-producing activity;
- Belief that the noise source can be controlled.

Approximately ten percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints will occur. Twenty-five percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment. (8) Surveys have shown that about ten percent of the people exposed to traffic noise of 60 dBA will report being highly annoyed with the noise, and each increase of one dBA is associated with approximately two percent more people being highly annoyed. When traffic noise exceeds 60 dBA or aircraft noise exceeds 55 dBA, people may begin to complain. (8) Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. A change of 3 dBA are considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (6)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



2.8 EXPOSURE TO HIGH NOISE LEVELS

The Occupational Safety and Health Administration (OSHA) sets legal limits on noise exposure in the workplace. The permissible exposure limit (PEL) for a worker over an eight-hour day is 90 dBA. The OSHA standard uses a 5 dBA exchange rate. This means that when the noise level is increased by 5 dBA, the amount of time a person can be exposed to a certain noise level to receive the same dose is cut in half. The National Institute for Occupational Safety and Health (NIOSH) has recommended that all worker exposures to noise should be controlled below a level equivalent to 85 dBA for eight hours to minimize occupational noise induced hearing loss. NIOSH also recommends a 3 dBA exchange rate so that every increase by 3 dBA doubles the amount of the noise and halves the recommended amount of exposure time. (9)

OSHA has implemented requirements to protect all workers in general industry (e.g. the manufacturing and the service sectors) for employers to implement a Hearing Conservation Program where workers are exposed to a time weighted average noise level of 85 dBA or higher over an eight-hour work shift. Hearing Conservation Programs require employers to measure noise levels, provide free annual hearing exams and free hearing protection, provide training, and conduct evaluations of the adequacy of the hearing protectors in use unless changes to tools, equipment and schedules are made so that they are less noisy and worker exposure to noise is less than the 85 dBA. This noise study does not evaluate the noise exposure of workers within a project or construction site based on CEQA requirements, and instead, evaluates Project-related operational and construction noise levels at the nearby sensitive receiver locations in the Project study area.

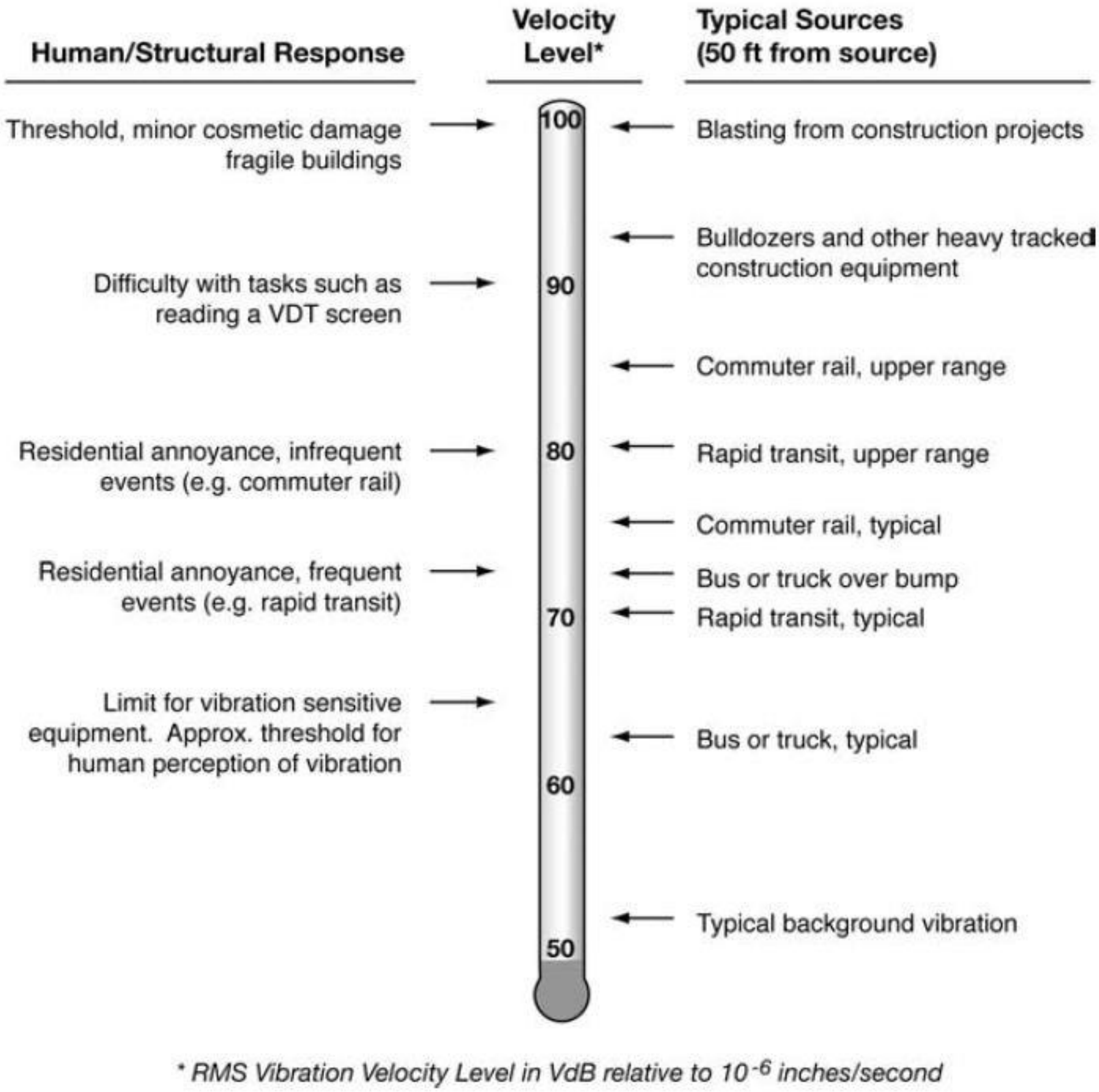
2.9 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Assessment* (10), vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. Decibel notation (VdB) serves to reduce the range of numbers used to describe human response to vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receivers for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment and/or activities

The background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



Source: Federal Transit Administration (FTA) Transit Noise Impact and Vibration Assessment.

This page intentionally left blank

3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research (OPR). (11) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 STATE OF CALIFORNIA BUILDING CODE

The State of California's noise insulation standards are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2, and the California Building Code. These noise standards are applied to new construction in California for controlling interior noise levels resulting from exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential buildings, schools, or hospitals, are developed near major transportation noise sources, and where such noise sources create an exterior noise level of 60 dBA CNEL or higher. Acoustical studies that accompany building plans for noise-sensitive land uses must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL.

3.3 CITY OF MURRIETA GENERAL PLAN NOISE ELEMENT

The City of Murrieta has adopted a Noise Element of the General Plan to control and abate environmental noise, and to protect the citizens of the City of Murrieta from excessive exposure to noise. (2) The Noise Element specifies the exterior noise levels allowable for new developments impacted by transportation noise sources such as arterial roads, freeways, airports and railroads. In addition, the Noise Element identifies noise polices designed to protect, create, and maintain an environment free from noise that may jeopardize the health or welfare of sensitive receivers, or degrade quality of life. To protect City of Murrieta residents from excessive noise, the Noise Element contains the following three goals related to the Project:

N-1 Noise sensitive land uses are properly and effectively protected from excessive noise generators.
N-2 A comprehensive and effective land use planning and development review process that ensures noise impacts are adequately addressed.
N-3 Noise from mobile noise sources is minimized.

The noise policies specified in the City of Murrieta Noise Element provide the guidelines necessary to satisfy these three goals. To protect noise sensitive land uses from excessive noise generators (N-1), Table 11-2 of the City of Murrieta General Plan Noise Element, shown on Exhibit 3-A, identifies a maximum allowable exterior *normally acceptable* noise level of 60 dBA CNEL and an interior noise level limit of 45 dBA CNEL for residential homes impacted by transportation noise sources such as arterial roads, freeways, airports and railroads. The Noise Element also provides several policies to reduce noise impacts to new developments (N-2) that include integrating noise considerations into planning decisions, noise mitigation measures as development requirements, and compliance with the standards of the Noise Element and Noise Ordinance. To ensure noise from mobile sources is minimized (N-3), noise mitigation measures must be considered in the design of all future streets and highways.

The policies included in the General Plan Noise Element consider land use compatibility and identify exterior noise level compatibility standards for transportation related noise. The *Land Use Compatibility for Community Noise Environments* matrix shown on Exhibit 3-A provides the City with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels.

According to the City's *Land Use Compatibility for Community Noise Environments* (Table 11-2), schools land uses such as the Murrieta Canyon Academy Project are considered *normally acceptable and conditionally acceptable* with exterior noise levels below 70 dBA CNEL. For land uses within the *normally unacceptable* category, where exterior noise levels range from 70 to 80 dBA CNEL, *new construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise-insulation features must be included in the design*.

EXHIBIT 3-A: LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS

Land Use Category	Community Noise Exposure (CNEL)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential-Low Density, Single-Family, Duplex, Mobile Homes	50 - 60	55 – 70	70 – 75	75 – 85
Residential – Multiple Family	50 – 65	60 – 70	70 – 75	70 – 85
Transient Lodging – Motel, Hotels	50 – 65	60 – 70	70 – 80	80 – 85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 – 70	60 – 70	70 – 80	80 – 85
Auditoriums, Concert Halls, Amphitheaters	NA	50 – 70	NA	65 – 85
Sports Arenas, Outdoor Spectator Sports	NA	50 – 75	NA	70 – 85
Playgrounds, Neighborhood Parks	50 – 70	NA	67.5 – 77.5	72.5 – 85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 – 70	NA	70 – 80	80 – 85
Office Buildings, Business Commercial and Professional	50 – 70	67.5 – 77.5	75 – 85	NA
Industrial, Manufacturing, Utilities, Agriculture	50 – 75	70 – 80	75 – 85	NA

CNEL = community noise equivalent level; NA = not applicable

NORMALLY ACCEPTABLE: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
CONDITIONALLY ACCEPTABLE: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features have been included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.
NORMALLY UNACCEPTABLE: New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise-insulation features must be included in the design.
CLEARLY UNACCEPTABLE: New construction or development should generally not be undertaken.

Source: Office of Planning and Research, California, *General Plan Guidelines*, October 2003.

Within the City of Murrieta, the *Noise Ordinance* governs operational noise generated between two properties and does not regulate noise from transportation sources, such as traffic, aircraft, and railways. Section 16.30.090 of the *Noise Ordinance* establishes the exterior noise standards.

3.4 OPERATIONAL NOISE STANDARDS

To analyze noise impacts originating from a designated fixed location or private property such as Murrieta Canyon Academy Project, stationary-source (operational) noise such as the expected roof-top air conditioning units, outdoor student activity, basketball court activity and parking lot vehicle movements activity are typically evaluated against standards established under a jurisdiction's Municipal Code. Section 16.30.090 of the City of Murrieta Municipal Code contains the exterior noise level standards for nearby noise sensitive residential land uses as shown on Table 3-1.

TABLE 3-1: OPERATIONAL NOISE STANDARDS

City	Receiving Land Use	Noise Level Standards (dBA Leq)[1]	
		Daytime	Nighttime
Murrieta	Residential	50	45

[1] City of Murrieta Municipal Code, Section 16.30.090 Exterior Noise Standards (Appendix 3.1). Leq represents a steady state sound level containing the same total energy as a time varying signal over a given period. "Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

For the noise sensitive residential land uses, the Municipal Code identifies a noise level standard of 55 dBA L_{eq}, during the daytime hours of 7:00 a.m. to 10:00 p.m. and 45 dBA L_{eq} during the nighttime hour of 10:00 p.m. to 7:00 a.m. (12) The City of Murrieta Municipal Code Performance Standards for noise are included in Appendix 3.1.

3.5 CONSTRUCTION NOISE STANDARDS

To analyze noise impacts originating from the construction of the Murrieta Canyon Academy Project, noise from construction activities are typically limited to the hours of operation established under the Municipal Code. The Municipal Code noise standards for construction are described below for the City of Murrieta to determine the potential noise impacts at the nearby sensitive receiver locations. The construction-related noise standards are summarized on Table 3-2. The City of Murrieta has established maximum noise levels for mobile and stationary construction equipment. Section 16.30.130 of the Municipal Code identifies limits on noise levels from construction activities for mobile and stationary equipment, respectively.

For single-family residential development, mobile equipment noise levels may not exceed 75 dBA L_{max} and stationary equipment noise levels may not exceed 60 dBA L_{max} during the daytime hours. (12) In addition, the Municipal Code identifies hours during which mobile and stationary equipment may operate, between 7:00 a.m. to 8:00 p.m. daily, with no activity allowed on Sundays or holidays (City of Murrieta Municipal Code, Section 16.30.130(A)(2)(a)(1)). The City of Murrieta Municipal Code is included in Appendix 3.1.

TABLE 3-2: CONSTRUCTION NOISE STANDARDS

Construction Source	Receiving Land Use	Noise Level Standards (dBA Lmax)[3]	
		Daytime	Nighttime
Mobile Equipment[1]	Residential	75	60
Stationary[2]	Residential	50	45

[1] Nonscheduled, intermittent, short-term operation (less than ten days) of mobile equipment.
[2] Repetitively scheduled and relatively long-term operation periods (three days or more) of stationary equipment.
[3] City of Murrieta Municipal Code, Section 16.30.130(A)(Appendix 3.1).
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

3.6 CONSTRUCTION VIBRATION STANDARDS

The City of Murrieta Municipal Code, Section 16.30.130 (K), states that *operating or permitting the operation of any device that creates a vibration that is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet from the source if on public space or public right-of-way* is prohibited. The Municipal Code defines the vibration perception threshold to be a motion velocity of 0.01 in/sec over the range of one to 100 Hz. (12)

4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

B. Generation of excessive ground-borne vibration or ground-borne noise levels?

C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

While the City of Murrieta General Plan Guidelines provide direction on noise compatibility and establish noise standards by land use type that are sufficient to assess the significance of noise impacts, they do not define the levels at which increases are considered substantial for use under Guideline A. CEQA Appendix G Guideline C applies to nearby public and private airports, if any, and the Project's land use compatibility.

4.1 NOISE-SENSITIVE RECEIVERS

Noise level increases resulting from the Project are evaluated based on the Appendix G CEQA Guidelines described above at the closest sensitive receiver locations. Under CEQA, consideration must be given to the magnitude of the increase, the existing ambient noise levels, and the location of noise-sensitive receivers to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes *that there is no single noise increase that renders the noise impact significant.* (13) Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise or of the corresponding human reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called *ambient* environment.

In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will typically be judged. The Federal Interagency Committee on Noise (FICON) (14) developed guidance to be used for the assessment of project-generated increases in noise levels that consider the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (CNEL) and equivalent continuous noise level (L_{eq}).

As previously stated, the approach used in this noise study recognizes *that there is no single noise increase that renders the noise impact significant*, based on a 2008 California Court of Appeal ruling on Gray v. County of Madera. (13) For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur if the noise criteria may be exceeded. Therefore, for this analysis, FICON identifies a *readily perceptible* 5 dBA or greater project-related noise level increase is considered a significant impact when the noise criteria for a given land use is exceeded. Per the FICON, in areas where the without project noise levels range from 60 to 65 dBA, a 3 dBA *barely perceptible* noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if the noise criteria for a given land use is exceeded, since it likely contributes to an existing noise exposure exceedance.

4.2 SIGNIFICANCE CRITERIA SUMMARY

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-1 shows the significance criteria summary matrix.

OFF-SITE TRAFFIC NOISE

- When the noise levels at existing and future noise-sensitive land uses (e.g. residential, etc.):
    1. are less than 60 dBA CNEL and the Project creates a *readily perceptible* 5 dBA CNEL or greater Project-related noise level increase; or
    2. range from 60 to 65 dBA CNEL and the Project creates a *barely perceptible* 3 dBA CNEL or greater Project-related noise level increase; or
    3. already exceed 65 dBA CNEL, and the Project creates a community noise level increase of greater than 1.5 dBA CNEL (FICON, 1992).

ON-SITE TRAFFIC NOISE

- If the on-site noise levels:
    1. exceed the exterior land use compatibility criteria of the City of Murrieta General Plan Noise Element, Table 11-2, for Project land uses; and
    2. exceed an interior noise level of 45 dBA CNEL for residential uses within the Project site (California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2 as discussed in Section 3.2).

OPERATIONAL NOISE

- If Project-related operational (stationary-source) noise levels exceed an exterior noise level standard of 55 dBA L_{eq}, during the daytime hours of 7:00 a.m. to 10:00 p.m. and 45 dBA L_{eq} during the nighttime hour of 10:00 p.m. to 7:00 a.m. (City of Murrieta Municipal Code Section 16.30.090).

CONSTRUCTION NOISE AND VIBRATION

- If Project-related construction activities:
    1. occur anytime other than between the permitted hours of 7:00 a.m. to 8:00 p.m. daily, with no activity allowed on Sundays or holidays (City of Murrieta Municipal Code, Section 16.30.130(A)(2)(a)(1)); or
    2. create noise levels which exceed the mobile 75 dBA L_{max} or stationary 60 dBA L_{max} equipment noise level limits at the nearby sensitive residential land uses (City of Murrieta Municipal Code, Section 16.30.130 (A)).
- If short-term Project generated construction vibration levels could exceed the City of Murrieta maximum acceptable vibration standard of 0.01 in/sec RMS at sensitive receiver locations (City of Murrieta Municipal Code, Section 16.30.130 (K)).

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Land Use	Condition(s)	Significance Criteria	
			Daytime	**Nighttime**
Off-Site Traffic	Noise-Sensitive[1]	If ambient is < 60 dBA CNEL	≥ 5 dBA CNEL Project increase	
		If ambient is 60 - 65 dBA CNEL	≥ 3 dBA CNEL Project increase	
		If ambient is > 65 dBA CNEL	≥ 1.5 dBA CNEL Project increase	
On-Site Traffic	Residential	Exterior Noise Level Criteria[2]	See Exhibit 3-A	
		Interior Noise Level Standard[3]	45 dBA CNEL	
Operational		Exterior Noise Level Standards[4]	50 dBA L_{eq}	45 dBA L_{eq}
Construction		Mobile Equipment Noise Level Threshold[5]	75 dBA L_{max}	
		Stationary Equipment Noise Level Threshold[5]	60 dBA L_{max}	
		Vibration Level Threshold[6]	0.01 in/sec RMS	

[1] FICON, 1992.
[2] City of Murrieta General Plan Noise Element, Table 11-2.
[3] California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2.
[4] City of Murrieta Municipal Code, Section 16.30.090 Exterior Noise Standards (Appendix 3.1).
[5] City of Murrieta Municipal Code, Section 16.30.130 (A) (Appendix 3.1).
[6] City of Murrieta Municipal Code, Section 16.30.130 (K) (Appendix 3.1).
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

This page intentionally left blank

5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, 24-hour noise level measurements were taken at five locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Wednesday, September 18th, 2019. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (15)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent every part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources*. (4) Further, FTA guidance states, t*hat it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community*. (10)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (10) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels and is necessary to assess potential noise impacts due to the Project's contribution to the ambient noise levels.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (L_{eq}). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location. Appendix 5.2 provides a summary of the existing hourly ambient noise levels described below:

- Location L1 represents the noise levels northeast of project side on dirt road adjacent to Douglas Avenue and Fullerton Road. The noise levels at this location consist primarily of traffic noise from Fullerton Road and Douglas Avenue as well as parking lot movements from Murrieta Valley High School. The noise level measurements collected show an overall 24-hour exterior noise level of 50.3 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 47.6 dBA L_{eq} with an average nighttime noise level of 42.5 dBA L_{eq}.
- Location L2 represents the noise levels south of the Project site on Hayes Avenue near existing residential homes. The noise levels at this location consist primarily of traffic noise from Hayes Avenue. The noise level measurements collected show an overall 24-hour exterior noise level of 64.6 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 61.1 dBA L_{eq} with an average nighttime noise level of 57.2 dBA L_{eq}.
- Location L3 represents the noise levels southwest of Project site on Hayes Avenue near existing residential homes. The noise level measurements collected show an overall 24-hour exterior noise level of 62.1 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 60.0 dBA L_{eq} with an average nighttime noise level of 53.9 dBA L_{eq}. The noise levels at this location consist primarily of traffic noise from Hayes Avenue and Sherry Lane.
- Location L4 represents the noise levels west of the Project site on Hayes Avenue near existing residential homes and Thompson Middle School. The noise level measurements collected show an overall 24-hour exterior noise level of 64.1 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 61.8 dBA L_{eq} with an average nighttime noise level of 56.2 dBA L_{eq}. The noise levels at this location consist primarily of traffic noise from Hayes Avenue and Semillon Lane.
- Location L5 represents the noise levels northwest of the Project site on Nighthawk Way near existing residential homes. The 24-hour CNEL indicates that the overall exterior noise level is 63.1 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 60.3 dBA L_{eq} with an average nighttime noise level of 55.6 dBA L_{eq}. Traffic on Nighthawk Way represents the primary source of noise at this location.

Table 5-1 provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L_1, L_2, L_5, L_8, L_{25}, L_{50}, L_{90}, L_{95}, and L_{99} percentile noise levels observed during the daytime and nighttime periods.

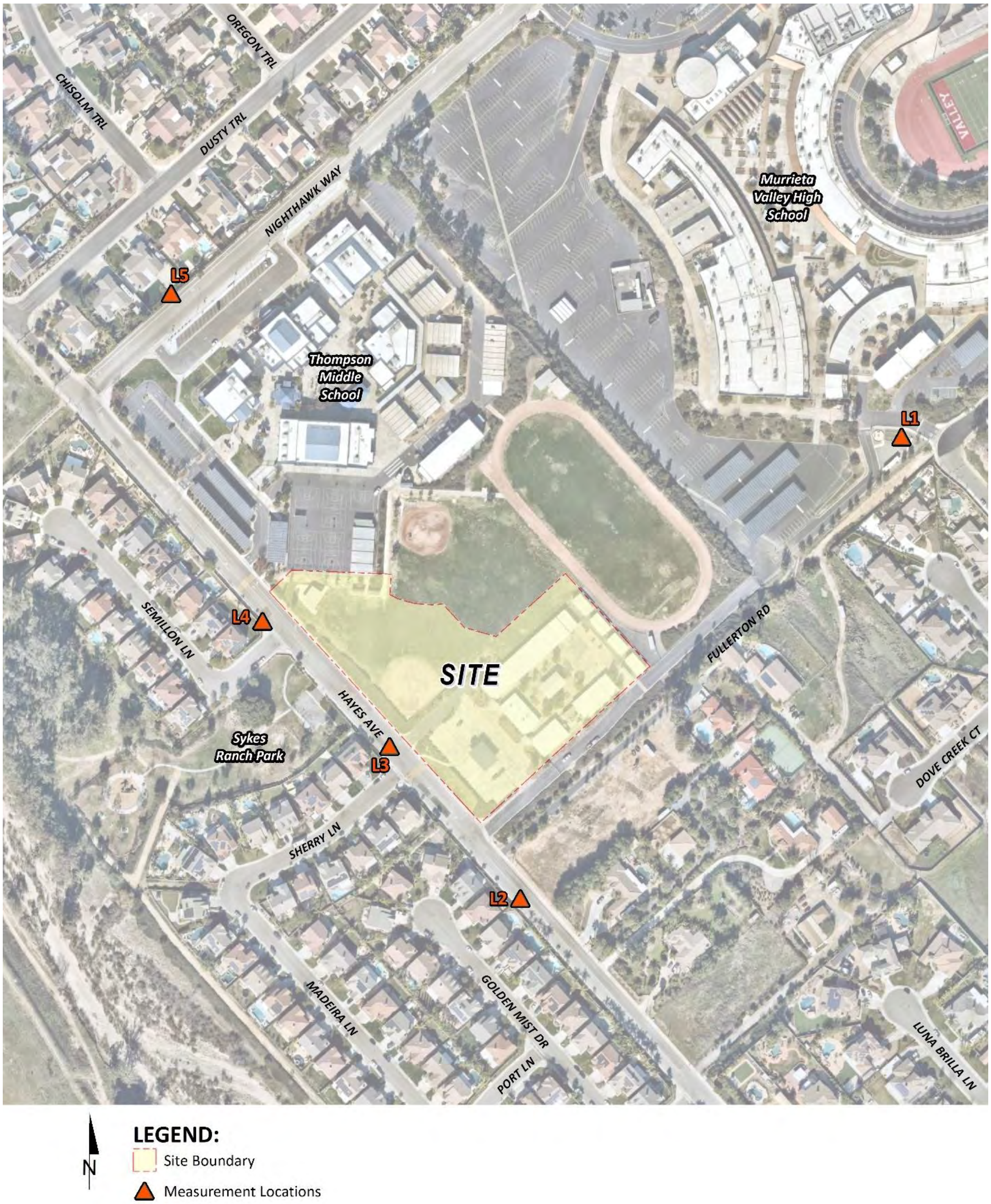
The background ambient noise levels in the Project study area are dominated by the transportation-related noise associated with surface streets Hayes Avenue and Nighthawk Way. The 24-hour existing noise level measurement results are shown on Table 5-1.

TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Description	Energy Average Noise Level (dBA L_{eq})[2]		CNEL
		Daytime	Nighttime	
L1	Located northeast of project side on dirt road adjacent to Douglas Avenue and Fullerton Road.	47.6	42.5	50.3
L2	Located south of the Project site on Hayes Avenue near existing residential homes.	61.1	57.2	64.6
L3	Located southwest of Project site on Hayes Avenue near existing residential homes.	60.0	53.9	62.1
L4	Located west of the Project site on Hayes Avenue near existing residential homes and Thompson Middle School.	61.8	56.2	64.1
L5	Located northwest of the Project site on Nighthawk Way near existing residential homes.	60.3	55.6	63.1

[1] See Exhibit 5-A for the noise level measurement locations.
[2] Energy (logarithmic) average levels. The long-term 24-hour measurement worksheets are included in Appendix 5.2.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS



6 METHODS AND PROCEDURES

The following section outlines the methods and procedures used to model and analyze the future traffic noise environment. Consistent with the City of Murrieta General Plan *Land Use Compatibility for Community Noise Exposure* matrix, all transportation related noise levels are presented in terms of the 24-hour CNEL's.

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The expected roadway noise level increases from vehicular traffic were calculated by Urban Crossroads, Inc. using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (16) The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emission Levels. (17) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period. Research conducted by Caltrans has shown that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model used in this analysis. (18)

6.1.1 OFF-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

Table 6-1 presents the roadway parameters used to assess the Project's off-site transportation noise impacts. Table 6-1 identifies the 3 off-site study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications per the City of Murrieta General Plan Circulation Element, and the posted vehicle speeds. Consistent with *Murrieta Canyon Academy Expansion Traffic Impact Study* prepared by RK Engineering Group (19) the off-site traffic noise analysis includes the following traffic scenarios.

- Existing (2019)
- Existing Plus Project (E+P)
- Project Buildout Year Plus Ambient Growth
- Project Buildout Year Plus Ambient Growth Plus Project
- Project Buildout Year Plus Ambient Growth Plus Cumulative Projects
- Project Buildout Year Plus Ambient Growth Plus Cumulative Projects Plus Project

The average daily traffic (ADT) volumes used for this study are presented on Table 6-2. Table 6-3 provides the time of day (daytime, evening, and nighttime) vehicle splits and Table 6-4 presents the traffic flow distributions (vehicle mix) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks, and heavy trucks for input into the FHWA noise prediction model.

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Receiving Land Use[1]	Classification[1]	Centerline Distance to Receiving Land Use (Feet)[2]	Vehicle Speed (mph)
1	Hayes Av.	s/o Nighthawk Wy.	SFR/P-OS	Collector	33'	30
2	Hayes Av.	s/o Sherry Ln.	SFR	Collector	33'	30
3	Hayes Av.	s/o Fullerton Rd.	SFR	Collector	33'	30

[1] Sources: City of Murrieta General Plan Land Use Map.
[2] Based upon the right-of-way distances for each roadway classification provided in the General Plan Circulation Element.
"SFR"= Single-Family Residential; "P-OS"= Parks and Open Space.

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic Volumes[1]					
			Existing		Project Buildout Year + Ambient Growth		Project Buildout Growth + Ambient Growth + Cumulative	
			Without Project	With Project	Without Project	With Project	Without Project	With Project
1	Hayes Av.	s/o Nighthawk Wy.	2,222	2,566	2,405	2,749	2,405	2,749
2	Hayes Av.	s/o Sherry Ln.	2,344	2,751	2,537	2,944	2,537	2,944
3	Hayes Av.	s/o Fullerton Rd.	2,683	3,589	2,904	3,810	2,904	3,810

[1] Source: Murrieta Canyon Academy Expansion Traffic Impact Study, RK Engineering Group, Inc.

TABLE 6-3: TIME OF DAY VEHICLE SPLITS

Vehicle Type	Time of Day Splits[1]			Total of Time of Day Splits
	Daytime	Evening	Nighttime	
Autos	75.55%	13.96%	10.49%	100.00%
Medium Trucks	48.92%	2.17%	48.91%	100.00%
Heavy Trucks	47.30%	5.40%	47.30%	100.00%

[1] Source: County of Riverside Office of Industrial Hygiene, 2017.
"Daytime" = 7:00 a.m. to 7:00 p.m.; "Evening" = 7:00 p.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

TABLE 6-4: TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX)

Roadway	Total % Traffic Flow			Total
	Autos	Medium Trucks	Heavy Trucks	
Secondary, Collector[1]	97.42%	1.84%	0.74%	100.00%

[1] Source: County of Riverside Office of Industrial Hygiene, 2017.

The ADT volumes vary for each roadway segment based on the existing and future horizon year traffic volumes plus the project traffic volumes for each traffic scenario. The future on-site traffic noise impacts are assessed using the maximum capacity design standard for highways and major roads. However, this analysis relies on a comparative analysis of the off-site traffic noise impacts, without and with project ADT traffic volumes from the Project traffic study. The use of the maximum capacity design standards is typically reserved for determining the future long-range on-site traffic noise impacts, not the comparative contributions associated with the off-site Project traffic noise level impacts.

6.1.2 ON-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

The on-site roadway parameters including the ADT volumes used for this analysis are presented on Table 6-1. Based on the City of Murrieta General Plan Circulation Element, Exhibit 5-10, Hayes Avenue is classified as 2-lane Collector Roadways. (20) To predict the future on-site noise environment at the Project site, the City of Murrieta General Plan Circulation Element Table 5-2 *Daily Roadway Capacity Values* were used. The traffic volumes shown on Table 6-5 reflect future long-range traffic conditions needed to assess the future on-site traffic noise environment and to identify potential mitigation measures (if any) that address the worst-case future conditions. For the purposes of this analysis, soft site conditions were used to analyze the on-site traffic noise impacts for the Project study area. Soft site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. Research conducted by Caltrans has shown that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model used in this analysis. (18)

Table 6-5 presents the on-site roadway parameters including the ADT volumes used for this study. The on-site roadway parameters are based on the City of Murrieta General Plan Circulation Element roadway classifications. The maximum two-way traffic volumes at a level of service C, were obtained from Table 5-2 of the City of Murrieta General Plan Circulation Element (20) and reflect future long-range traffic conditions needed to assess the on-site traffic noise environment and to identify the appropriate noise mitigation measures that address the worst-case future noise conditions.

TABLE 6-5: ON-SITE ROADWAY PARAMETERS

Roadway	Lanes	Classification[1]	Average Daily Traffic Volume[2]	Posted Speed Limits (mph)	Site Conditions
Hayes Ave.	2	Collector	10,400	30	Soft

[1] Road classifications based upon the City of Murrieta General Plan Circulation Element, Exhibit 5-10.
[2] Level of Service C maximum two-way volumes from the City of Murrieta General Plan Circulation Element, Table 5-2.

6.2 VIBRATION ASSESSMENT

This analysis focuses on the potential ground-borne vibration associated with vehicular traffic and construction activities. Ground-borne vibration levels from automobile traffic are generally overshadowed by vibration generated by heavy trucks that roll over the same uneven roadway surfaces. However, due to the rapid drop-off rate of ground-borne vibration and the short duration of the associated events, vehicular traffic-induced ground-borne vibration is rarely perceptible beyond the roadway right-of-way, and rarely results in vibration levels that cause damage to buildings in the vicinity.

However, while vehicular traffic is rarely perceptible, construction has the potential to result in varying degrees of temporary ground vibration, depending on the specific construction activities and equipment used. Ground vibration levels associated with various types of construction equipment are summarized on Table 6-6. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the potential Project construction vibration levels using the following vibration assessment methods defined by the FTA. The FTA provides the following equation: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

TABLE 6-6: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment

7 OFF-SITE TRAFFIC NOISE ANALYSIS

To assess the off-site transportation CNEL noise level impacts associated with development of the proposed Project, noise contours were developed based on *Murrieta Canyon Academy Expansion Traffic Impact Study*. (19) Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contours were developed for the following traffic scenarios:

- Existing Without / With Project: This scenario refers to the existing present-day noise conditions, without and with the development of the full Project. The existing with Project scenario will not actually occur since the Project would not be fully constructed and operational until Project Buildout Year 2023 conditions.
- Project Buildout plus Ambient 2023 Without / With Project: This scenario refers to the existing noise conditions plus the estimated 3 years of background growth in ambient traffic conditions without and with the development of the full Project.
- Project Buildout Plus Ambient Plus Cumulative 2023 Without / With Project: This scenario refers to the existing plus ambient plus cumulative noise conditions at 2023 without and with the proposed Project.

7.1 TRAFFIC NOISE CONTOURS

Noise contours were used to assess the Project's incremental traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. The noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA noise levels. The noise contours do not consider the effect of any existing noise barriers or topography that may attenuate ambient noise levels. In addition, because the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from the surrounding stationary noise sources within the Project study area. Tables 7-1 and 7-6 present a summary of the exterior traffic noise levels for each traffic condition. Appendix 7.1 includes the traffic noise level contours worksheets for each traffic condition.

TABLE 7-1: EXISTING WITHOUT PROJECT CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Hayes Av.	s/o Nighthawk Wy.	SFR/P-OS	60.8	RW	RW	37
2	Hayes Av.	s/o Sherry Ln.	SFR	61.0	RW	RW	39
3	Hayes Av.	s/o Fullerton Rd.	SFR	61.6	RW	RW	42

[1] Sources: City of Murrieta General Plan Land Use Map.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road. "SFR"= Single-Family Residential; "P-OS"= Parks and Open Space.

TABLE 7-2: EXISTING WITH PROJECT CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Hayes Av.	s/o Nighthawk Wy.	SFR/P-OS	61.4	RW	RW	41
2	Hayes Av.	s/o Sherry Ln.	SFR	61.7	RW	RW	43
3	Hayes Av.	s/o Fullerton Rd.	SFR	62.9	RW	RW	51

[1] Sources: City of Murrieta General Plan Land Use Map.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road. "SFR"= Single-Family Residential; "P-OS"= Parks and Open Space.

TABLE 7-3: PROJECT BUILDOUT PLUS AMBIENT WITHOUT PROJECT CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Hayes Av.	s/o Nighthawk Wy.	SFR/P-OS	61.1	RW	RW	39
2	Hayes Av.	s/o Sherry Ln.	SFR	61.4	RW	RW	41
3	Hayes Av.	s/o Fullerton Rd.	SFR	62.0	RW	RW	45

[1] Sources: City of Murrieta General Plan Land Use Map.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road. "SFR"= Single-Family Residential; "P-OS"= Parks and Open Space.

TABLE 7-4: PROJECT BUILDOUT PLUS AMBIENT WITH PROJECT CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Hayes Av.	s/o Nighthawk Wy.	SFR/P-OS	61.7	RW	RW	43
2	Hayes Av.	s/o Sherry Ln.	SFR	62.0	RW	RW	45
3	Hayes Av.	s/o Fullerton Rd.	SFR	63.1	RW	RW	53

[1] Sources: City of Murrieta General Plan Land Use Map.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road. "SFR"= Single-Family Residential; "P-OS"= Parks and Open Space.

TABLE 7-5: PROJECT BUILDOUT PLUS AMBIENT PLUS CUMULATIVE WITHOUT PROJECT CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Hayes Av.	s/o Nighthawk Wy.	SFR/P-OS	61.1	RW	RW	39
2	Hayes Av.	s/o Sherry Ln.	SFR	61.4	RW	RW	41
3	Hayes Av.	s/o Fullerton Rd.	SFR	62.0	RW	RW	45

[1] Sources: City of Murrieta General Plan Land Use Map.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road. "SFR"= Single-Family Residential; "P-OS"= Parks and Open Space.

TABLE 7-6: PROJECT BUILDOUT PLUS AMBIENT PLUS CUMULATIVE WITH PROJECT CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Nearest Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Hayes Av.	s/o Nighthawk Wy.	SFR/P-OS	61.7	RW	RW	43
2	Hayes Av.	s/o Sherry Ln.	SFR	62.0	RW	RW	45
3	Hayes Av.	s/o Fullerton Rd.	SFR	63.1	RW	RW	53

[1] Sources: City of Murrieta General Plan Land Use Map.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest receiving land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road. "SFR"= Single-Family Residential; "P-OS"= Parks and Open Space.

7.2 EXISTING PROJECT TRAFFIC NOISE LEVEL INCREASES

An analysis of existing traffic noise levels plus traffic noise generated by the proposed Project has been included in this report for informational purposes and to fully analyze all the existing traffic scenarios identified in the *Murrieta Canyon Academy Traffic Impact ExpansionStudy* prepared by Urban Crossroads, Inc. However, the analysis of existing off-site traffic noise levels plus traffic noise generated by the proposed Project scenario will not actually occur since the Project would not be fully constructed and operational until future year 2023 plus cumulative conditions. Table 7-1 shows the Existing without Project conditions CNEL noise levels. The Existing 2019 without Project exterior noise levels are expected to range from 60.8 to 61.6 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-2 shows the Existing 2019 with Project conditions range from 61.4 to 62.9 dBA CNEL. Table 7-7 shows that the Project off-site traffic noise level increases range from 0.6 to 1.3 dBA CNEL on the study area roadway segments.

7.3 PROJECT BUILDOUT PLUS AMBIENT TRAFFIC NOISE LEVEL INCREASES

Table 7-3 presents the Project Buildout Plus Ambient 2023 without Project conditions CNEL noise levels. The Project Buildout Plus Ambient 2023 without Project exterior noise levels are expected to range from 61.1 to 62.0 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-4 shows the Project Buildout Plus Ambient 2023 with Project conditions range from 61.7 to 63.1 dBA CNEL. Table 7-8 shows that the Project off-site traffic noise level increases range from 0.6 to 1.1 dBA CNEL.

7.4 PROJECT BUILDOUT PLUS AMBIENT PLUS CUMULATIVE TRAFFIC NOISE LEVEL INCREASES

Table 7-5 presents the Project Buildout Plus Ambient Plus Cumulative 2023 without Project conditions CNEL noise levels. The Project Buildout Plus Ambient Plus Cumulative 2023 without Project exterior noise levels are expected to range from 61.1 to 62.0 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-6 shows the Project Buildout Plus Ambient Plus Cumulative 2023 with Project conditions range from 61.7 to 63.1 dBA CNEL. Table 7-9 shows that the Project off-site traffic noise level increases range from 0.6 to 1.1 dBA CNEL. Based on the significance criteria for off-site traffic noise presented in Table 4-1, land uses adjacent to the study area roadway segments would experience *less than significant* noise level impacts due to unmitigated Project-related traffic noise levels.

TABLE 7-7: EXISTING WITH PROJECT TRAFFIC NOISE LEVEL INCREASES

ID	Road	Segment	Receiving Land Use[1]	Noise-Sensitive Land Use?	CNEL at Receiving Land Use (dBA)[1]			Incremental Noise Level Increase Threshold[2]	
					No Project	With Project	Project Addition	Limit	Exceeded?
1	Hayes Av.	s/o Nighthawk Wy.	SFR/P-OS	Yes	60.8	61.4	0.6	3.0	No
2	Hayes Av.	s/o Sherry Ln.	SFR	Yes	61.0	61.7	0.7	3.0	No
3	Hayes Av.	s/o Fullerton Rd.	SFR	Yes	61.6	62.9	1.3	3.0	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[2] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?
"SFR"= Single-Family Residential; "P-OS"= Parks and Open Space.

TABLE 7-8: PROJECT BUILDOUT PLUS AMBIENT WITH PROJECT TRAFFIC NOISE INCREASES

ID	Road	Segment	Receiving Land Use[1]	Noise-Sensitive Land Use?	CNEL at Receiving Land Use (dBA)[1]			Incremental Noise Level Increase Threshold[2]	
					No Project	With Project	Project Addition	Limit	Exceeded?
1	Hayes Av.	s/o Nighthawk Wy.	SFR/P-OS	Yes	61.1	61.7	0.6	3.0	No
2	Hayes Av.	s/o Sherry Ln.	SFR	Yes	61.4	62.0	0.6	3.0	No
3	Hayes Av.	s/o Fullerton Rd.	SFR	Yes	62.0	63.1	1.1	3.0	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[2] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?
"SFR"= Single-Family Residential; "P-OS"= Parks and Open Space.

TABLE 7-9: PROJECT BUILDOUT PLUS AMBIENT PLUS CUMULATIVE TRAFFIC NOISE LEVEL INCREASES

ID	Road	Segment	Receiving Land Use[1]	Noise-Sensitive Land Use?	CNEL at Receiving Land Use (dBA)[1]			Incremental Noise Level Increase Threshold[2]	
					No Project	With Project	Project Addition	Limit	Exceeded?
1	Hayes Av.	s/o Nighthawk Wy.	SFR/P-OS	Yes	61.1	61.7	0.6	3.0	No
2	Hayes Av.	s/o Sherry Ln.	SFR	Yes	61.4	62.0	0.6	3.0	No
3	Hayes Av.	s/o Fullerton Rd.	SFR	Yes	62.0	63.1	1.1	3.0	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[2] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?
"SFR"= Single-Family Residential; "P-OS"= Parks and Open Space.

8 ON-SITE TRAFFIC NOISE IMPACTS

An on-site exterior noise impact analysis has been completed to determine the noise exposure levels that would result from adjacent traffic noise sources in the Project study area, and to identify potential noise mitigation measures that would achieve acceptable Project exterior and interior noise levels. The primary source of traffic noise affecting the Project site is anticipated to be from Haynes Avenue. The Project would also be exposed to nominal traffic noise from the Project's internal local streets. However, due to the distance, topography and low traffic volume/speed, traffic noise from these roads will not make a substantive contribution to ambient noise conditions. This section analyzes on-site exterior and interior noise levels at the Project buildings.

8.1 EXTERIOR NOISE ANALYSIS

Using the FHWA traffic noise prediction model, and the parameters outlined in Section 6, the expected future exterior noise levels at the first-floor building façades were calculated. Table 8-1 presents a summary of future exterior noise level impacts at the first-floor receiver locations. The on-site transportation noise level impacts indicate that the unmitigated exterior noise levels will range from 63.5 to 64.2 dBA CNEL. The on-site traffic noise analysis calculations are provided in Appendix 8.1.

No exterior noise mitigation is required to satisfy the City of Murrieta General Plan Noise Element exterior land use/noise level compatibility criteria for the planned school use. As shown on Table 8-1, the classrooms and labs facing Hayes will experience *normally acceptable* exterior noise levels of less than 70.0 dBA CNEL. Therefore, because of the future unmitigated exterior traffic noise levels at the Project site, additional interior noise analysis is required to satisfy the General Plan Noise Element *normally acceptable* land use compatibility requirements. (2)

TABLE 8-1: UNMITIGATED EXTERIOR TRAFFIC NOISE LEVELS

Receiver Location	Roadway	First-Floor Unmitigated Noise Level (dBA CNEL)	Noise Element Land Use Compatibility[1]	Resulting Requirements[1]
Classroom	Hayes Ave.	63.5	*Normally Acceptable*	Interior Analysis
Lab	Hayes Ave.	64.2	*Normally Acceptable*	Interior Analysis

[1] Based on the Table 11-2 land use compatibility criteria for Schools (City of Murrieta General Plan Noise Element as shown on Exhibit 3-A).

8.2 INTERIOR NOISE ANALYSIS

To ensure that the interior noise levels comply with the City of Murrieta interior noise level standards, future noise levels were calculated at the first and second-floor building façades.

8.2.1 NOISE REDUCTION METHODOLOGY

The interior noise level is the difference between the predicted exterior noise level at the building façade and the noise reduction of the structure. Typical building construction will provide a Noise Reduction (NR) of approximately 12 dBA with "windows open" and a minimum 25 dBA noise reduction with "windows closed." (6) (21) However, sound leaks, cracks and openings within the window assembly can greatly diminish its effectiveness in reducing noise. Several methods are used to improve interior noise reduction, including: [1] weather-stripped solid core exterior doors; [2] upgraded dual glazed windows; [3] mechanical ventilation/air conditioning; and [4] exterior wall/roof assembles free of cut outs or openings.

8.2.2 INTERIOR NOISE LEVEL ASSESSMENT

Tables 8-2 and 8-3 show that the buildings within the Project will require a windows-closed condition and a means of mechanical ventilation (e.g. air conditioning). Table 8-2 shows that the future exterior noise levels at the first-floor building façades are expected to range from 63.5 to 64.2 dBA CNEL. The first-floor interior noise level analysis shows that the City of Murrieta 45 dBA CNEL interior noise level standard can be satisfied using standard building construction providing windows and sliding glass doors with minimum STC ratings of 27. Table 8-3 shows the future unmitigated noise levels at the second-floor building façades are expected to range from 63.3 to 64.0 dBA CNEL. The second-floor interior noise level analysis shows that the City of Murrieta 45 dBA CNEL interior noise level standard can be satisfied using standard building construction providing windows and sliding glass doors with minimum STC ratings of 27.

TABLE 8-2: FIRST-FLOOR INTERIOR NOISE IMPACTS (CNEL)

Receiver Location	Noise Level at Façade[1]	Required Interior Noise Reduction[2]	Estimated Interior Noise Reduction[3]	Upgraded Windows[4]	Interior Noise Level[5]
Classroom	63.5	18.5	25.0	No	38.5
Lab	64.2	19.2	25.0	No	39.2

[1] Exterior noise level at the façade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.
[3] A minimum of 25 dBA noise reduction is assumed with standard building construction.
[4] Does the required interior noise reduction trigger upgraded windows with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.

TABLE 8-3: SECOND-FLOOR INTERIOR NOISE IMPACTS (CNEL)

Receiver Location	Noise Level at Façade[1]	Required Interior Noise Reduction[2]	Estimated Interior Noise Reduction[3]	Upgraded Windows[4]	Interior Noise Level[5]
Classroom	63.3	18.3	25.0	No	38.3
Lab	64.0	19.0	25.0	No	39.0

[1] Exterior noise level at the façade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.
[3] A minimum of 25 dBA noise reduction is assumed with standard building construction.
[4] Does the required interior noise reduction trigger upgraded windows with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.

This page intentionally left blank

9 SENSITIVE RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following sensitive receiver locations, as shown on Exhibit 9-A, were identified as representative locations for analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

To describe the potential off-site Project noise levels, eight receiver locations in the vicinity of the Project site were identified. All distances are measured from the Project site boundary to the outdoor living areas (e.g., private backyards) or at the building façade, whichever is closer to the Project site. The selection of receiver locations is based on FHWA guidelines and is consistent with additional guidance provided by Caltrans and the FTA, as previously described in Section 5.2. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures. Distance is measured in a straight line from the project boundary to each receiver location.

R1: Location R1 represents the existing noise sensitive Murrieta Valley High, approximately 526 feet northeast of the Project site. A 24-hour noise measurement was taken near this location, L1, to describe the existing ambient noise environment.

R2: Location R2 represents the existing noise sensitive residence at 24200 Hayes Avenue, approximately 142 feet east of the Project site. Receiver R2 is placed at the residential building façade. A 24-hour noise measurement was taken near this location, L2, to describe the existing ambient noise environment.

R3: Location R3 represents the existing noise sensitive residence at 24104 Golden Mist Drive, approximately 156 feet south of the Project site. Receiver R3 is placed behind the existing 6-foot high noise barrier in the private outdoor living area (backyard). A 24-hour noise measurement near this location, L2, is used to describe the existing ambient noise environment.

R4: Location R4 represents the existing noise sensitive residence at 42512 Sherry Lane, approximately 85 feet southwest of the Project site. Receiver R4 is placed behind the existing 6-foot high noise barrier in the private outdoor living area (backyard). A 24-hour noise measurement near this location, L2, is used to describe the existing ambient noise environment.

R5: Location R5 represents the existing noise sensitive residence at 42515 Sherry Lane, approximately 91 feet west of the Project site. Receiver R5 is placed behind the existing

6-foot high noise barrier in the private outdoor living area (backyard). A 24-hour noise measurement near this location, L3, is used to describe the existing ambient noise environment.

R6: Location R6 represents the existing noise sensitive residence at 24112 Semillon Lane, approximately 86 feet west of the Project site. Receiver R6 is placed behind the existing 6-foot high noise barrier in the private outdoor living area (backyard). A 24-hour noise measurement near this location, L4, is used to describe the existing ambient noise environment.

R7: Location R7 represents the existing noise sensitive residence at 42491 Dusty Trail, approximately 641 feet northwest of the Project site. Receiver R7 is placed behind the existing 6-foot high noise barrier in the private outdoor living area (backyard). A 24-hour noise measurement near this location, L5, is used to describe the existing ambient noise environment.

R8: Location R8 represents the existing noise sensitive Thompson Middle School, approximately 239 feet north of the Project site. A 24-hour noise measurement was taken near this location, L4, to describe the existing ambient noise environment.

EXHIBIT 9-A: RECEIVER LOCATIONS

LEGEND:

- Site Boundary
- Receiver Locations
- Distance from receiver to Project site boundary (in feet)
- Existing 6-Foot High Barrier

This page intentionally left blank

10 OPERATIONAL NOISE IMPACTS

This section analyzes the potential stationary-source operational noise impacts at the nearby receiver locations, identified in Section 9, resulting from the operation of the proposed Murrieta Canyon Academy Project. Exhibit 10-A identifies the representative noise source locations used to assess the operational noise levels.

10.1 OPERATIONAL NOISE SOURCES

This operational noise analysis is intended to describe noise level impacts associated with the expected typical daytime school activities at the Project site. The on-site Project-related noise sources are expected to include: roof-top air conditioning units, outdoor student activity, basketball court activity and parking lot vehicle movements activity.

10.2 REFERENCE NOISE LEVELS

To estimate the Project operational noise impacts, reference noise level measurements were collected from similar types of activities to represent the noise levels expected with the development of the proposed Project. This section provides a detailed description of the reference noise level measurements shown on Table 10-1 used to estimate the Project operational noise impacts. It is important to note that the following projected noise levels assume the worst-case noise environment with the roof-top air conditioning units, outdoor student activity, basketball court activity and parking lot vehicle movements activity all operating at the same time. These sources of noise activity will likely vary throughout the day.

10.2.1 MEASUREMENT PROCEDURES

The reference noise level measurements presented in this section were collected using a Larson Davis LxT Type 1 precisions sound level meter (serial number 01146). The LxT sound level meter was calibrated using a Larson-Davis calibrator, Model CAL 200, was programmed in "slow" mode to record noise levels in "A" weighted form and was located at approximately five feet above the ground elevation for each measurement. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (15)

TABLE 10-1: REFERENCE NOISE LEVEL MEASUREMENTS

Noise Source[1]	Duration (hh:mm:ss)	Ref. Distance (Feet)	Noise Source Height (Feet)	Min./Hour[2]		Reference Noise Level (dBA L_{eq})		Sound Power Level (dBA)[3]
				Day	Night	@ Ref. Dist.	@ 50 Feet	
Roof-Top Air Conditioning Units	96:00:00	5'	5'	39	0	77.2	57.2	88.9
Outdoor Student Activity	00:04:24	25'	6'	60	0	66.5	60.5	92.2
Basketball Court Activity	00:03:07	20'	5'	60	0	60.0	52.0	83.7
Parking Lot Vehicle Movements	01:00:00	10'	5'	60	0	52.2	41.7	73.4

[1] As measured by Urban Crossroads, Inc.
[2] Anticipated duration (minutes within the hour) of noise activity during typical hourly conditions expected at the Project site.
"Day" = 7:00 a.m. to 10:00 p.m.; "Night" = 10:00 p.m. to 7:00 a.m.
[3] Sound power level represents the total amount of acoustical energy (noise level) produced by a sound source independent of distance or surroundings. Sound power levels calculated using the CadnaA noise model at the reference distance to the noise source.

10.2.2 ROOF-TOP AIR CONDITIONING UNITS

To assess the noise levels created by the roof-top air conditioning units within the planned commercial retail land uses within the Project site, reference noise levels measurements were taken at the Santee Walmart. Located at 170 Town Center Parkway in the City of Santee, the noise level measurements describe a single mechanical roof-top air conditioning unit on the roof of the existing Walmart store. The reference noise level represents a Lennox SCA120 series 10-ton model packaged air conditioning unit. At 5 feet from the roof-top air conditioning unit, the exterior noise levels were measured at 77.2 dBA L_{eq}. At the uniform reference distance of 50 feet, the reference noise levels are 57.2 dBA L_{eq}. Based on the typical operating conditions observed over a four-day measurement period, the roof-top air conditioning units are estimated to operate for and average 39 minutes per hour during the daytime hours. These operating conditions reflect peak summer cooling requirements with measured temperatures approaching 96 degrees Fahrenheit (°F) with average daytime temperatures of 82°F. For this noise analysis, the air conditioning units are expected to be located on the roof of the Project buildings.

10.2.3 OUTDOOR STUDENT ACTIVITY

To describe the potential noise levels associated with the outdoor student activity, a reference noise level measurement was collected by Urban Crossroads, Inc. The reference noise levels include children and adults talking, and children playing on swings, slides, and other playground equipment. Using a uniform reference distance of 50 feet, the reference play area activity noise level is 60.5 dBA Leq. Noise associated with outdoor student activity is expected for 60 minutes per hour during all daytime hours from 7:00 a.m. to 10:00 p.m.

EXHIBIT 10-A: OPERATIONAL NOISE SOURCE LOCATIONS

10.2.4 BASKETBALL COURT ACTIVITY

To describe the potential noise levels associated with the Project's basketball courts, a reference noise level measurement was collected by Urban Crossroads, Inc. The reference noise level measurement includes children playing on one half of a full basketball court, and adults playing basketball on the other half. Using a uniform reference distance of 50 feet, the reference basketball court activity noise level is 52.0 dBA Leq. Noise associated with basketball court activity is expected for 60 minutes per hour during all daytime hours from 7:00 a.m. to 10:00 p.m.

10.2.5 PARKING LOT VEHICLE MOVEMENTS

To determine the noise levels associated with parking lot vehicle movements, Urban Crossroads collected reference noise level measurements over a 24-hour period at the parking lot. During the peak hour of activity, parking lot vehicle movements were measured at 41.7 dBA L_{eq} at 50 feet. Noise associated with parking lot vehicle movements is expected for 60 minutes per hour during all daytime hours from 7:00 a.m. to 10:00 p.m.

10.3 CADNAA NOISE PREDICTION MODEL

To fully describe the exterior operational noise levels from the Project, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, georeferenced Nearmap aerial imagery, topography, buildings, and barriers in its calculations to predict outdoor noise levels.

Using the ISO 9613 protocol, CadnaA will calculate the distance from each noise source to the noise receiver locations, using the ground absorption, distance, and barrier/building attenuation inputs to provide a summary of noise level at each receiver and the partial noise level contributions by noise source. Consistent with the ISO 9613 protocol, the CadnaA noise prediction model relies on the reference sound power level (PWL) to describe individual noise sources. While sound pressure levels (e.g. L_{eq}) quantify in decibels the intensity of given sound sources at a reference distance, sound power levels (PWL) are connected to the sound source and are independent of distance. Sound pressure levels vary substantially with distance from the source and diminish as a result of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustical energy emitted by the sound source and is an absolute value that is not affected by the environment.

The operational noise level calculations provided in this noise study account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. Hard site conditions are used in the operational noise analysis which result in noise levels that attenuate (or decrease) at a rate of 6 dBA for each doubling of distance from a point source. A default ground attenuation factor of 1.0 was used in the CadnaA noise analysis to account for hard site conditions. Appendix 10.1 includes the detailed noise model inputs used to estimate the Project operational noise levels presented in this section.

10.4 PROJECT OPERATIONAL NOISE LEVELS

Using the reference noise levels to represent the proposed Project operations that include roof-top air conditioning units, outdoor student activity, basketball court activity and parking lot vehicle movements activity, Urban Crossroads, Inc. calculated the operational source noise levels that are expected to be generated at the Project site and the Project-related noise level increases that would be experienced at each of the sensitive receiver locations. Tables 10-2 shows the Project operational noise levels during the daytime hours of 7:00 a.m. to 10:00 p.m. The daytime hourly noise levels at the off-site receiver locations are expected to range from 32.9 to 49.7 dBA L_{eq}. No Project activities are expected during the nighttime hours from 10:00 p.m. to 7:00 a.m.

TABLE 10-2: DAYTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA Leq)							
	R1	R2	R3	R4	R5	R6	R7	R8
Roof-Top Air Conditioning Units	36.0	38.3	40.4	42.1	46.2	44.1	30.6	44.5
Outdoor Student Activity	44.2	37.7	36.4	40.9	37.7	29.5	28.7	48.0
Basketball Court Activity	31.0	29.1	22.4	18.4	18.9	18.2	19.0	34.8
Parking Lot Vehicle Movements	18.5	23.7	24.6	25.5	26.6	12.5	4.2	18.3
Total (All Noise Sources)	**45.0**	**41.4**	**42.0**	**44.6**	**46.8**	**44.3**	**32.9**	**49.7**

[1] See Exhibit 10-A for the noise source locations. CadnaA noise model calculations are included in Appendix 10.1.

10.5 PROJECT OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only operational noise levels are evaluated against exterior noise level thresholds based on the City of Murrieta exterior noise level standards at nearby noise-sensitive receiver locations. Table 10-3 shows the operational noise levels associated with Murrieta Canyon Academy Project will satisfy the City of Murrieta 50 dBA L_{eq} daytime exterior noise level standards at all nearby receiver locations. Therefore, the operational noise impacts are considered *less than significant*.

TABLE 10-3: OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Receiving Land Use	Project Operational Noise Levels (dBA Leq)[2]	Noise Level Standards (dBA Leq)[3]	Noise Level Standards Exceeded?[4]
R1	School	45.0	50	No
R2	Residential	41.4	50	No
R3	Residential	42.0	50	No
R4	Residential	44.6	50	No
R5	Residential	46.8	50	No
R6	Residential	44.3	50	No
R7	Residential	32.9	50	No
R8	School	49.7	50	No

[1] See Exhibit 9-A for the receiver locations.
[2] Proposed Project daytime operational noise levels as shown on Tables 10-2.
[3] Exterior noise level standards by land use, as shown on Table 4-1.
[4] Do the estimated Project operational noise source activities exceed the noise level standards?
"Daytime" = 7:00 a.m. to 10:00 p.m.

10.6 PROJECT OPERATIONAL NOISE LEVEL INCREASES

To describe the Project operational noise level increases, the Project operational noise levels are combined with the existing ambient noise levels measurements for the nearby receiver locations potentially impacted by Project operational noise sources. Since the units used to measure noise, decibels (dB), are logarithmic units, the Project-operational and existing ambient noise levels cannot be combined using standard arithmetic equations. (4) Instead, they must be logarithmically added using the following base equation:

$$SPL_{Total} = 10\log_{10}[10^{SPL1/10} + 10^{SPL2/10} + \ldots 10^{SPLn/10}]$$

Where "SPL1," "SPL2," etc. are equal to the sound pressure levels being combined, or in this case, the Project-operational and existing ambient noise levels. The difference between the combined Project and ambient noise levels describe the Project noise level increases to the existing ambient noise environment. Noise levels that would be experienced at receiver locations when Project-source noise is added to the daytime ambient conditions are presented on Table 10-4. As indicated on Table 10-4, the Project will generate a daytime operational noise level increases ranging from 0.0 to 1.9 dBA L_{eq} at the nearby receiver locations. Project-related operational noise level increases will satisfy the operational noise level increase significance criteria presented in Table 4-1. Therefore, the incremental Project operational noise level increases are considered *less than significant* at all receiver locations.

.

TABLE 10-4: DAYTIME PROJECT OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Noise Sensitive Land Use?	Increase Criteria[7]	Increase Criteria Exceeded?[7]
R1	45.0	L1	47.6	49.5	1.9	No	5.0	No
R2	41.4	L2	61.1	61.1	0.0	No	5.0	No
R3	42.0	L2	61.1	61.2	0.1	No	5.0	No
R4	44.6	L2	61.1	61.2	0.1	No	5.0	No
R5	46.8	L3	60.0	60.2	0.2	No	5.0	No
R6	44.3	L4	61.8	61.9	0.1	No	5.0	No
R7	32.9	L5	60.3	60.3	0.0	No	5.0	No
R8	49.7	L4	61.8	62.1	0.3	No	5.0	No

[1] See Exhibit 9-A for the receiver locations.
[2] Total Project daytime operational noise levels as shown on Table 10-2.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

This page intentionally left blank

11 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 11-A shows the mobile equipment construction noise source locations in relation to the nearby sensitive receiver locations previously described in Section 9. Exhibit 11-B presents the stationary equipment noise source locations.

11.1 CONSTRUCTION NOISE LEVELS

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers, and portable generators that when combined can reach high levels. The number and mix of construction equipment is expected to occur in the following stages:

- Demolition
- Site Preparation
- Grading
- Building Construction
- Paving
- Architectural Coating

This construction noise analysis was prepared using reference noise level measurements taken by Urban Crossroads, Inc. to describe the typical construction activity noise levels for each stage of Project construction. The construction reference noise level measurements represent a list of typical construction activity noise levels. Noise levels generated by heavy construction equipment can range from approximately 68 dBA to more than 80 dBA when measured at 50 feet. However, these noise levels diminish with distance from the construction site at a rate of 6 dBA per doubling of distance. For example, a noise level of 80 dBA measured at 50 feet from the noise source to the receiver would be reduced to 74 dBA at 100 feet from the source to the receiver, and would be further reduced to 68 dBA at 200 feet from the source to the receiver.

11.2 CONSTRUCTION REFERENCE NOISE LEVELS

To describe the Project construction noise levels, measurements were collected for similar activities at several construction sites. Table 11-1 provides a summary of the construction reference noise level measurements. Since the reference noise levels were collected at varying distances of 30 feet and 50 feet, all construction noise level measurements presented on Table 11-1 have been adjusted for consistency to describe a uniform reference distance of 50 feet.

EXHIBIT 11-A: MOBILE EQUIPMENT CONSTRUCTION NOISE SOURCE LOCATIONS

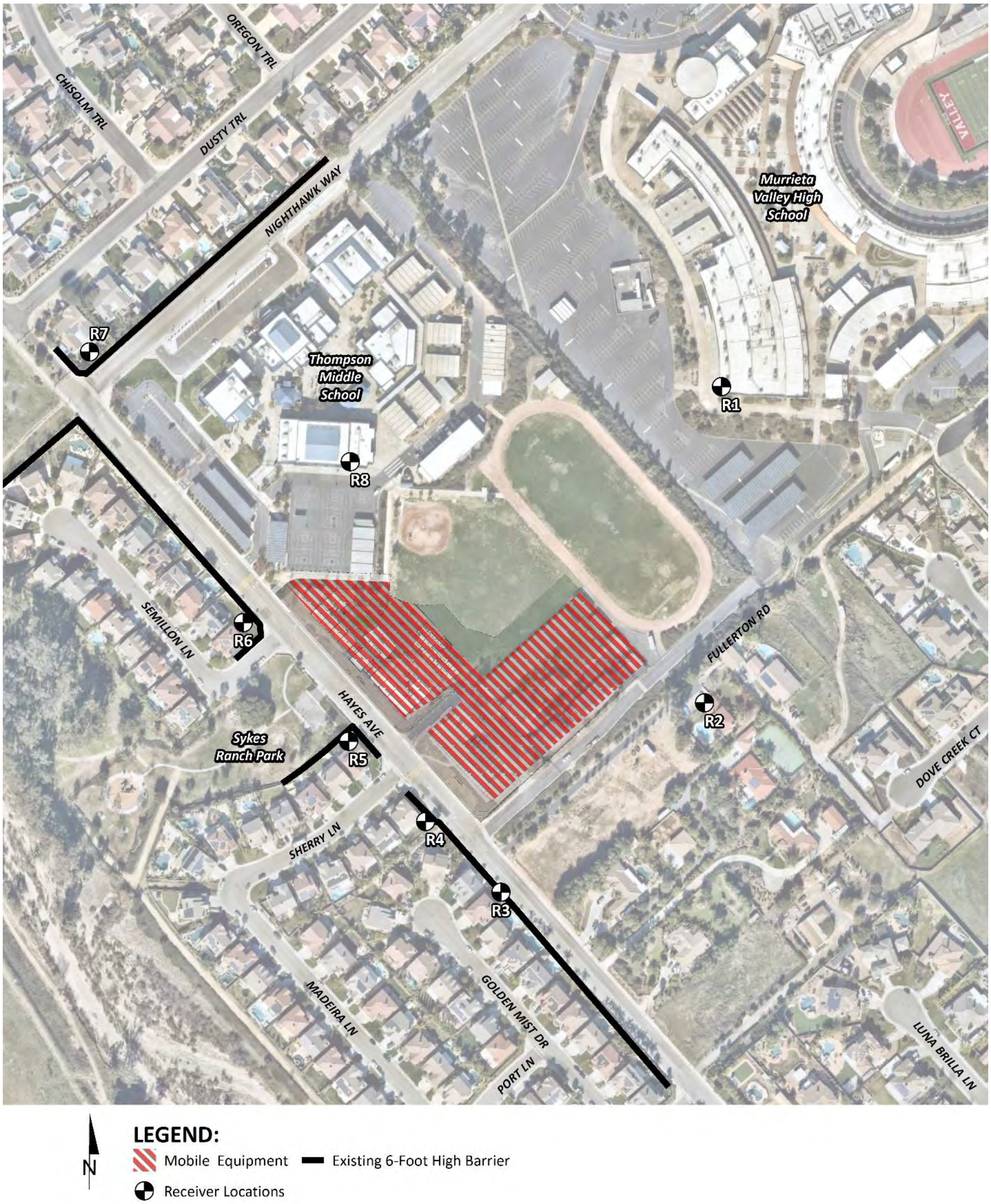


EXHIBIT 11-B: STATIONARY EQUIPMENT CONSTRUCTION NOISE SOURCE LOCATIONS

TABLE 11-1: CONSTRUCTION REFERENCE NOISE LEVELS

Source	Construction Stage	Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{max})	Highest Reference Noise Level (dBA L_{max})
Mobile Equipment	Demolition	Demolition Activity	81.6	81.6
		Backhoe	72.0	
		Water Truck Pass-By & Backup Alarm	77.9	
	Site Preparation	Scraper, Water Truck, & Dozer Activity	83.3	83.3
		Backhoe	72.0	
		Water Truck Pass-By & Backup Alarm	77.9	
	Grading	Rough Grading Activities	80.4	80.4
		Water Truck Pass-By & Backup Alarm	77.9	
		Construction Vehicle Maintenance Activities	70.4	
	Paving	Concrete Mixer Backup Alarms & Air Brakes	78.8	78.8
		Concrete Mixer Truck Movements	73.1	
		Concrete Mixer Pour & Paving Activities	71.9	
Stationary Equipment	Building Construction	Foundation Trenching	70.5	72.3
		Framing	72.3	
		Crane	65.2	
	Architectural Coating	Air Compressors	67.0	67.0
		Generator	67.0	
		Crane	65.2	

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.

11.3 CONSTRUCTION NOISE ANALYSIS

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction mobile and stationary equipment noise level impacts at the nearby sensitive receiver locations were completed. To assess the worst-case construction noise levels, the Project construction noise analysis relies on the highest noise level impacts when the equipment with the highest reference noise level is operating at the closest point from the edge of primary construction activity (Project site boundary) to each receiver location. As shown on Table 11-2, the construction noise levels are expected to range from 56.0 to 75.0 dBA L_{max} at the nearby receiver locations. Appendix 11.1 includes the detailed CadnaA construction noise model inputs.

TABLE 11-2: CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})						
	Mobile Equipment				Stationary Equipment		Highest Levels[2]
	Demolition	Site Preparation	Grading	Paving	Building Construction	Architectural Coating	
R1	67.4	69.1	66.2	64.6	49.6	44.3	69.1
R2	69.5	71.2	68.3	66.7	47.5	42.2	71.2
R3	69.6	71.3	68.4	66.8	49.8	44.5	71.3
R4	70.6	72.3	69.4	67.8	52.2	46.9	72.3
R5	73.3	75.0	72.1	70.5	59.1	53.8	75.0
R6	68.1	69.8	66.9	65.3	52.8	47.5	69.8
R7	54.3	56.0	53.1	51.5	37.1	31.8	56.0
R8	70.9	72.6	69.7	68.1	54.6	49.3	72.6

[1] Noise receiver locations are shown on Exhibit 11-A.
[2] Construction noise level calculations based on distance from the primary construction activity area to nearby receiver locations. CadnaA construction noise model inputs are included in Appendix 11.1.

11.4 CONSTRUCTION NOISE LEVEL COMPLIANCE

Table 11-3 shows the highest construction noise levels at the potentially impacted receiver locations are expected to range from 56.0 to 75.0 dBA L_{max} from mobile equipment as shown on Exhibit 11-A, and 37.1 to 59.1 dBA L_{max} for stationary equipment as shown on Exhibit 11-B. The analysis shows that the Project related construction equipment noise levels will satisfy the City of Murrieta Municipal Code construction noise level standards of 75 dBA L_{max} for mobile equipment and the 60 dBA L_{max} standards for stationary equipment at all receiver locations. Therefore, the noise impacts due to unmitigated Project construction noise levels is considered a *less than significant.*

The construction noise analysis presents a conservative approach with the highest noise-level-producing equipment for each stage of Project construction operating at the closest point from primary construction activity to the nearby sensitive receiver locations. This scenario is unlikely to occur during typical construction activities and likely overstates the construction noise levels which will be experienced at each receiver location. With the construction noise abatement measures identified in the executive summary of this noise study, the worst-case construction noise level increases at the nearby residential receivers would be reduced.

TABLE 11-3: CONSTRUCTION NOISE LEVEL COMPLIANCE

Receiver Location[1]	Land Use Category	Highest Construction Activity Noise Levels[2]		Noise Level Threshold[3]		Threshold Exceeded?[4]	
		Mobile Equipment	Stationary Equipment	Mobile Equipment	Stationary Equipment	Mobile Equipment	Stationary Equipment
R1	School	69.1	49.6	75	60	No	No
R2	Residential	71.2	47.5	75	60	No	No
R3	Residential	71.3	49.8	75	60	No	No
R4	Residential	72.3	52.2	75	60	No	No
R5	Residential	75.0	59.1	75	60	No	No
R6	Residential	69.8	52.8	75	60	No	No
R7	Residential	56.0	37.1	75	60	No	No
R8	School	72.6	54.6	75	60	No	No

[1] Noise receiver locations are shown on Exhibit 11-A.
[2] Highest construction noise levels dBA L_{max} of mobile and stationary equipment, as shown on Table 11-2.
[3] Construction noise standards as shown on Table 3-2.
[4] Do the estimated Project construction noise levels exceed the construction noise level thresholds?

11.5 CONSTRUCTION VIBRATION IMPACTS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. The proposed Project's construction activities most likely to cause vibration impacts are:

- Heavy Construction Equipment: Although all heavy mobile construction equipment has the potential of causing at least some perceptible vibration while operating close to buildings, the vibration is usually short-term and is not of sufficient magnitude to cause building damage.
- Trucks: Trucks hauling building materials to construction sites can be sources of vibration intrusion if the haul routes pass through residential neighborhoods on streets with bumps or potholes. Repairing the bumps and potholes generally eliminates the problem.

Ground-borne vibration levels resulting from construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration. Construction activities that would have the potential to generate low levels of ground-borne vibration within the Project site include grading. Using the vibration source level of construction equipment provided on Table 6-6 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. To assess the human perception of vibration levels in PPV, as previously discussed in Section 3, the velocities are converted to RMS vibration levels based on the Caltrans *Transportation and Construction Vibration Guidance Manual* (22) conversion factor of 0.71.

At distances ranging from 125 to 656 feet from the Project construction activities, construction vibration velocity levels are estimated to range from 0.000 to 0.006 in/sec RMS and will remain below the threshold of 0.01 in/sec RMS at all receiver locations, as shown on Table 11-4. Therefore, the Project-related vibration impacts are considered *less than significant* during the construction activities at the Project site. Moreover, the impacts at the site of the closest sensitive receivers are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating adjacent to the Project site perimeter.

TABLE 11-4: CONSTRUCTION VIBRATION LEVELS

Receiver[1]	Distance to Const. Activity (Feet)	Receiver Levels (in/sec) RMS[2]					Threshold (in/sec) RMS[3]	Threshold Exceeded?[4]
		Small Bulldozer (< 80k lbs)	Jack-hammer	Loaded Trucks	Large Bulldozer (> 80k lbs)	Highest Vibration Level		
R1	534'	0.000	0.000	0.001	0.001	0.001	0.01	No
R2	154'	0.000	0.002	0.004	0.004	0.004	0.01	No
R3	197'	0.000	0.001	0.002	0.003	0.003	0.01	No
R4	133'	0.000	0.002	0.004	0.005	0.005	0.01	No
R5	125'	0.000	0.002	0.005	0.006	0.006	0.01	No
R6	125'	0.000	0.002	0.005	0.006	0.006	0.01	No
R7	656'	0.000	0.000	0.000	0.000	0.000	0.01	No
R8	256'	0.000	0.001	0.002	0.002	0.002	0.01	No

[1] Receiver locations are shown on Exhibit 11-A.

[2] Based on the Vibration Source Levels of Construction Equipment included on Table 6-6. Vibration levels in PPV are converted to RMS velocity using a 0.71 conversion factor identified in the Caltrans Transportation and Construction Vibration Guidance Manual.

[3] City of Murrieta Municipal Code, Section 16.30.130 (K) (Appendix 3.1).

[4] Does the vibration level exceed the maximum acceptable vibration threshold?

This page intentionally left blank

12 REFERENCES

1. **State of California.** *California Environmental Quality Act, Appendix G.* 2018.
2. **City of Murrieta.** *General Plan Noise Element.* July 2011.
3. **Harris, Cyril M.** *Noise Control in Buildings.* s.l. : McGraw-Hill, Inc., 1994.
4. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
5. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
6. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* December 2011.
7. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
8. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
9. **Occupational Safety and Health Administration.** *Standard 29 CRF, Part 1910.*
10. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment.* September 2018.
11. **Office of Planning and Research.** *State of California General Plan Guidlines.* 2017.
12. **City of Murrieta.** *Municipal Code, Chapter 16.30 Noise.*
13. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
14. **Federal Interagency Committee on Noise.** *Federal Agency Review of Selected Airport Noise Analysis Issues.* August 1992.
15. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
16. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
17. **California Department of Transportation Environmental Program, Office of Environmental Engineering.** *Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction.* September 1995. TAN 95-03.
18. **California Department of Transportation.** *Traffic Noise Attenuation as a Function of Ground and Vegetation Final Report.* June 1995. FHWA/CA/TL-95/23.
19. **RK Engineering Group, Inc.** *Murrieta Canyon Academy Expansion Traffic Impact Study.* March 2020.
20. **City of Murrieta.** *General Plan Circulation Element.* July 2011.
21. **California Department of Transportation.** *Traffic Noise Analysis Protocol.* May 2011.
22. —. *Transportation and Construction Vibration Guidance Manual.* April 2020.

13 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Murrieta Canyon Academy Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5979.

Bill Lawson, P.E., INCE
Principal
URBAN CROSSROADS, INC.
260 E. Baker Street, Suite 200
Costa Mesa, CA 92626
(949) 336-5979
blawson@urbanxroads.com

EDUCATION

Master of Science in Civil and Environmental Engineering
California Polytechnic State University, San Luis Obispo • December, 1993

Bachelor of Science in City and Regional Planning
California Polytechnic State University, San Luis Obispo • June, 1992

PROFESSIONAL REGISTRATIONS

PE – Registered Professional Traffic Engineer – TR 2537 • January, 2009
AICP – American Institute of Certified Planners – 013011 • June, 1997–January 1, 2012
PTP – Professional Transportation Planner • May, 2007 – May, 2013
INCE – Institute of Noise Control Engineering • March, 2004

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
ITE – Institute of Transportation Engineers

PROFESSIONAL CERTIFICATIONS

Certified Acoustical Consultant – County of Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

This page intentionally left blank

APPENDIX 3.1:

CITY OF MURRIETA MUNICIPAL CODE

This page intentionally left blank

16.30 Noise

Sections:

16.30.010 Purpose.

The purpose of this chapter is to establish standards to protect the health, safety, and welfare of those living and working in the city and to implement policies of the general plan noise element.
(Ord. 182 § 2 (part), 1997)

16.30.020 Declaration of Policy.

Excessive noise levels are detrimental to the health and safety of individuals. Noise is considered a public nuisance and the city discourages unnecessary, excessive or annoying noises from all sources. Creating, maintaining, causing or allowing to be created. caused or maintained any noise or vibration in a manner prohibited by the provisions of this chapter is a public nuisance and shall be punishable as a misdemeanor.
(Ord. 182 § 2 (part), 1997)

16.30.030 Definitions.

The following words. terms and phrases. when used in this chapter, shall have the meanings ascribed to them in this chapter, except where the context clearly indicates a different meaning:

A-Weighted Sound Level. The sound level in decibels as measured on a sound level meter using the A-weighting network. The level so read is designated dB(A) or dBA.

Ambient Noise Histogram. The composite of all noise from sources near and far, excluding the alleged intrusive noise source. In this context, the ambient noise histogram shall constitute the normal or existing level of environmental noise at a given location.

Cumulative Period. An additive period of time composed of individual time segments which may be continuous or interrupted.

Decibel. A unit for measuring the amplitude of a sound, equal to twenty (20) times the logarithm to the base of ten of the ratio of the pressure of the sound measured to the reference pressure, which is twenty (20) micropascals.

Emergency Machinery, Vehicle or Alarm. Any machinery, vehicle or alarm used, employed, performed or operated in an effort to protect, provide or restore safe conditions in the community, or work by private or public utilities when restoring utility service.

Emergency Work. Work performed for the purpose of preventing or alleviating the physical trauma or property damage threatened or caused by an emergency.

Fixed Noise Source. A stationary device which creates sounds while fixed or motionless, including, but not limited to, residential, agricultural, industrial and commercial machinery and equipment, pumps, fans, compressors, air conditioners and refrigeration equipment.

Impulsive Noise. A sound of short duration, usually less than one second and of high intensity, with an abrupt onset and rapid decay.

Intrusive Noise. The alleged offensive noise that intrudes over and above the existing ambient noise at the receptor property.

Mobile Noise Source. A noise source other than a fixed noise source.
Noise Disturbance. An alleged intrusive noise that violates an applicable noise standard of this chapter. Noise Histogram. A graphical representation of the distribution of frequency of occurrence of all noise levels near and far measured over a given period of time.
Noise Level (L_N). The noise level expressed in decibels that exceeds the specified (L,) value a percentage of total time measured. For example, an L25 noise level means that noise level that is exceeded twenty-five (25) percent of the time measured.
Noise-Sensitive Area. An area designated for the purpose of ensuring exceptional quiet (e.g.. around hospitals, nursing homes, libraries, and similar uses).
NoiseZone. A defined area of a generally consistent land use.
Pure Tone Noise. A sound that can be judged as audible as a single pitch or a set of single pitches by the code enforcement officer. For the purposes of this chapter, a pure tone shall exist if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the sound-pressure levels of the two contiguous one-third octave bands by five dB for center frequencies of five hundred (500) Hertz and above, and by eight dB for center frequencies between one hundred sixty (160) and four hundred (400) Hertz, and by fifteen (15) dB for center frequencies less than or equal to one hundred twenty-five (125) Hertz.
Sound Level Meter. An instrument, including a microphone, an amplifier, an output meter and frequency weighting network, for the measurement of sound levels, that satisfies the requirements pertinent for Type S2A meters in American National Standards Institute specifications for sound level meters.
Vibration. The minimum ground or structure-borne vibrational motion necessary to cause a normal person to be aware of the vibration including, but not limited to, sensation by touch or visual observations of moving objects. The perception threshold shall be presumed to be a motion velocity of 0.01 in/sec over the range of one to one hundred (100) Hertz.
Weekday. Any day. Monday through Friday, that is not a legal holiday.
(Ord. 182 § 2 (part), 1997)

16.30.040 Enforcement of Regulations.

The code enforcement officer shall have primary responsibility for the enforcement of the noise regulations contained in this chapter. The code enforcement officer shall make all noise-level measurements required for the enforcement of this chapter.
(Ord. 182 § 2 (part), 1997)

16.30.050 Initial Violations.

In the event of an initial violation of the provisions of this chapter, a written notice of violation shall be given the alleged violator. specifying the time by which the condition shall be corrected or an application for a permit or variance shall be filed. No further action shall be taken if the cause of the violation has been removed, the condition abated, or fully corrected within the time period specified in the written notice.
(Ord. 182 § 2 (part), 1997)

16.30.060 Activities Exempt from Regulations.

The following activities shall be exempt from the provisions of this chapter:

A. **Emergency Exemption.** The emission of sound for the purpose of alerting persons to the existence of an emergency, or the emission of sound in the performance of emergency work.

B. **Warning Device.** Warning devices necessary for the protection of public safety, (e.g., police, tire and ambulance sirens, and train horns).

C. **Outdoor Activities.** Activities conducted on public playgrounds and public or private school grounds. including, but not limited to, school athletic and school entertainment events.

D. **Motion Picture Production and Related Activities.** Activities in connection to production of motion pictures.

E. **Railroad Activities.** All locomotives and rail cars operated by any railroad which is regulated by the state Public Utilities Commission.

F. **Federal or State Pre-Exempted Activities.** Any activity, to the extent regulation thereof has been pre-empted by state or federal law,

G. **Public Health and Safety Activities.** All transportation, flood control, and utility company maintenance and construction operations at any time on public right-of-way, and those situations that may occur on private real property deemed necessary to serve the best interest of the public and to protect the public's health and well being, including, but not limited to, street sweeping, debris and limb removal, removal of downed wires, restoring electrical service, repairing traffic signals, unplugging sewers, house moving, vacuuming catchbasins, removal of damaged poles and vehicles, repair of water hydrants and mains, gas lines, oil lines, sewers, etc.

H. Motor, Vehicles on Public Right-of-Way and Private Property. Except as provided in this chapter, all vehicles operating in a legal manner in compliance with local, state, and federal vehicle noise regulations within the public right-of-way or on private property.

1. Minor Maintenance to Residential Real Property. Noise sources associated with the minor maintenance of residential real property, provided the activities take place between the hours of seven a.m. and eight p.m. on any day except Sunday, or between the hours of nine a.m. and eight p.m. on Sunday.

(Ord. 182 § 2 (part), 1997)

16.30.070 Decibel Measurement.

Decibel measurements made in compliance with the provisions of this chapter shall be based on a reference sound-pressure of twenty (20) micropascals, as measured with a sound level meter using the A-weighted network (scale) at slow response, or at the fast response when measuring impulsive sound levels and vibrations.

(Ord. 182 § 2 (part). 1997)

16.30.080 Noise Zones Designated.

Receptor properties described in this chapter are hereby assigned to the following noise zones:

A. Noise zone I, noise-sensitive area:
B. Noise zone II, residential properties;
C. Noise zone III, commercial properties: and
D. Noise zone IV, industrial properties.

(Ord. 182 § 2 (part), 1997)

16.30.090 Exterior Noise Standards.

A. Standards for Noise Zones. Unless otherwise provided in this chapter, the following exterior noise levels shall apply to all receptor properties within a designated noise zone:

TABLE 3-6
EXTERIOR NOISE STANDARDS

Noise Zone	Designated Noise Zone Land Use (Receptor Property)	Time Interval	Allowed Exterior Noise Level (dB)
I	Noise-sensitive area	Anytime	45
II	Residential properties Residential properties within five hundred (500) feet of a kennel(s)	10:00 p.m. to 7:00 a.m. (nighttime) 7:00 a.m. to 10:00 p.m. (daytime) 7:00 a.m. to 10:00 p.m.	45 50 70
III	Commercial properties	10:00 p.m. to 7:00 a.m. (nighttime) 7:00 a.m. to 10:00 p.m. (daytime)	55 60
IV	Industrial properties	Anytime	70

B. Noise Standards. No person shall operate or cause to be operated. any source of sound at any location within the city or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by a person that causes the noise level, when measured on any other property to exceed the following exterior noise standards:

1. **Standard No.1**. Standard No. 1 shall be the exterior noise level which shall not be exceeded for a cumulative period of more than thirty (30) minutes in any hour. Standard No. 1 may be the applicable noise level from Table 3-6 above.
2. **Standard No. 2.** Standard No. 2 shall be the exterior noise level which shall not be exceeded for a cumulative period of more than fifteen (15) minutes in any hour. Standard No. 2 shall be the applicable noise level from Table 3-6 above, plus five dB.
3. **Standard No.3.** Standard No. 3 shall be the exterior noise level which shall not be exceeded for a cumulative period of more than five minutes in any hour. Standard No. 3 shall be the applicable noise level from Table 3-6 above plus ten dB.
4. **Standard No.4.** Standard No. 4 shall be the exterior noise level which shall not be exceeded for a cumulative period of more than one minute in any hour. Standard No. 4 shall be the applicable noise level from Table 3-6 above plus fifteen (15) dB.
5. **Standard No. 5.** Standard No. 5 shall be the exterior noise level which shall not be exceeded for any period of time. Standard No. 5 shall be the applicable noise level from Table 3-6 above plus twenty (20) dB.

C. Noise at Zone Boundaries. If the measurement location is on a boundary property between two different zoning districts, the exterior noise level utilized in subsection B of this chapter to determine the exterior standard shall be the arithmetic mean of the exterior noise levels. as specified in Table 3-6, of the subject zones.

D. Measurement of Ambient Noise Histogram. The ambient noise histogram shall be measured at the same location along the property line utilized in subsection B. above, with the alleged intruding noise source inoperative. If the alleged intruding noise source cannot be turned off, the ambient noise histogram shall be estimated by performing a measurement in the same general area of the alleged intruding noise source but at a sufficient distance so that the noise from the alleged intruding noise source is at least ten dB below the ambient noise histogram.

E. Abatement Notice in Lieu of Citation. If the intrusive noise exceeds the exterior noise standards provided in subsections A and B above, at a specific receptor property and the code enforcement officer has reason to believe that this violation was unanticipated and due to abnormal conditions, the code enforcement officer shall issue an abatement notice in lieu of a citation. lithe specific violation is abated, no citation shall be is-sued. If the specific violation is not abated, the code enforcement officer shall issue a citation.

(Ord. 182 § 2 (part), 1997)

16.30.100 Interior Noise Standards for Multi-Family Residential.

A. Noise Standards for Residential Units. No person shall operate or cause to be operated within a residential unit. any source of sound, or allow the creation of any noise, that causes the noise level when measured inside a neighboring receiving residential unit to exceed the following standards:

1. **Standard No.1.** The applicable interior noise level for cumulative period of more than five minutes in any hour;
2. **Standard No.2**. The applicable interior noise level plus five dB for a cumulative period of more than one minute in any hour; or
3. **Standard No.3.** The applicable interior noise level plus ten dB for any period of time.

B. Interior Noise Levels for Multi-Family Residential. The following interior noise levels shall apply within multi-family dwellings with windows in their normal seasonal configuration.

Noise Zone	Designated Land Use	Time Interval	Allowable Interior Noise Level(dBl
All	Multi-family Residential	10:00 p.m.—7:00 a.m. 7:00 a.m.—10:00 p.m.	40 45

If the measured ambient noise level reflected by the L_{50} exceeds that permissible within the interior noise standards in subsection A above. the allowable interior noise level shall be increased in five dB increments to reflect the ambient noise level (L5„).
(Ord. 182 § 2 (part), 1997)

16.30.110 Correction for Certain Types of Sounds.

For any source of sound that emits a pure tone or impulsive noise, the allowed noise levels provided in Sections 1 6.30.090 (Exterior Noise Standards) and 16.30.100 (Interior Noise Standards for Multi-family Residential) shall be reduced by five decibels.
(Ord. 182 § 2 (part). 1997)

16.30.120 Measurement Methods.

A. A-weighting Scale. The noise level shall be measured at a position(s) at any point on the receiver's property utilizing the A-weighting scale of the sound-level meter and the slow meter response (use fast response for impulsive type sounds). Calibration of the measurement equipment, utilizing an acoustic calibrator, shall be performed immediately prior to recording any noise data.

B. Microphone Location. The microphone shall be located four to five feet above the ground and ten feet or more from the nearest reflective surface except in those cases where another elevation is deemed appropriate.

C. Interior Noise. Interior noise measurements shall be made within the affected residential unit. The measurements shall be made at a point at least four feet from the wall, ceiling or floor nearest the noise source, with windows in the normal seasonal configuration.
(Ord. 182 § 2 (part), 1997)

16.30.130 Acts Deemed Violations of Chapter.

The following acts are a violation of this chapter.

A. Construction Noise.

1. Operating or causing the operation of tools or equipment used in construction, drilling, repair, alteration, or demolition work between weekday hours of eight p.m. and seven a.m., or at any time on Sundays or holidays so that the sound creates a noise disturbance across a residential or commercial property line, except for emergency work of public service utilities.

2. Construction activities shall be conducted in a manner that the maximum noise levels at the affected structures will not exceed those listed in the following schedule:

a. Residential Structures:

1) Mobile Equipment. Maximum noise levels for nonscheduled, intermittent, short-term operation (less than ten days) of mobile equipment:

	Single-family Residential	Multi-family Residential	Commercial
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	75 dBA	80 dBA	85 dBA
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays	60 dBA	64 dBA	70 dBA

2) Stationary Equipment. Maximum noise level for repetitively scheduled and relatively long-term operation periods (three days or more) of stationary equipment:

	Single-family Residential	Multi-family Residential	Commercial
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	60 dBA	65 dBA	70 dBA
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays	50 dBA	55 dBA	60 dBA

b. Business Structures. Maximum noise levels for nonscheduled, intermittent, short-term operation of mobile equipment: daily. including Sundays and legal holidays, all hours: maximum of eighty-five (85) dBA.

3. All mobile or stationary internal combustion engine powered equipment or machinery shall be equipped with suitable exhaust and air-intake silencers in proper working order.

B. Loading and Unloading Operations. Loading, unloading, opening, closing or other handling of boxes. crates, containers, building materials, garbage cans or similar objects between the hours of ten p.m. and six am. in a manner to cause a noise disturbance is prohibited.

C. Noise Disturbances in Noise-Sensitive Zones. Creating or causing the creation of a noise disturbance within a noise-sensitive zone is prohibited, provided that conspicuous signs are displayed indicating the presence of the zone. Noise-sensitive zones shall be indicated by the display of conspicuous signs in at least three separate locations within five hundred (500) feet of the institution or facility (e.g., health care facility)

D. Places of Public Entertainment. Operating, playing, or permitting the operation or playing of a radio, television. phonograph, drum, musical instrument, sound amplifier or similar device that produces, reproduces, or amplifies sound in a place of public entertainment at a sound level greater than ninety-five (95) dBA, (read by the slow response on a sound level meter) at any point that is normally occupied by a customer is prohibited, unless conspicuous signs are located near each public entrance stating, "Warning: Sound Levels Within May Cause Hearing Impairment."

E. Emergency Signaling Devices.

1. The intentional sounding or permitting the sounding outdoors of an emergency signaling device, including fire, burglar or civil defense alarm, siren, whistle, or similar stationary emergency signaling device, except for emergency purposes or for testing is prohibited.

2. Testing of a stationary emergency signaling device shall not occur before seven a.m. or after seven p.m. Testing shall use only the minimum cycle test time. Test time shall not exceed sixty (60) seconds. Testing of the complete emergency signaling system, including the functioning of the signaling device, and the personnel response to the signaling device, shall not occur more than once in each calendar month. Testing shall not occur before seven a.m. or after ten p.m.

3. Sounding or permitting the sounding of an exterior burglar or fire alarm, or motor vehicle burglar alarm
is prohibited, unless the alarm is terminated within fifteen (15) minutes of activation.

F. Stationary Nonemergency Signaling Devices. Sounding or permitting the sounding of an electronically amplified signal from a stationary bell, chime, siren. whistle, or similar device intended primarily for nonemergency purposes, from any place, for more than ten consecutive seconds in any hourly period is prohibited.

G. Refuse Collection Vehicles.

1. Operating or permitting the operation of the compacting mechanism of any motor vehicle that compacts refuse and that creates, during the compacting cycle, a sound level in excess of eighty-six (86) dBA when measured at fifty (50) feet from any point of the vehicle is prohibited.

2. Collecting refuse, or operating or permitting the operation of the compacting mechanism of any motor vehicle that compacts refuse between the hours often p.m. and six a.m. the following day in a residential area or noise-sensitive zone is prohibited.

H. Sweepers and Associated Equipment. Operating or permitting the operation of sweepers or associated sweeping equipment (i.e., blowers) between the hours often p.m. and six a.m. the following day in, or adjacent to, a residential area or noise-sensitive area is prohibited.

I. Residential Air Conditioning·or Refrigeration Equipment. Operating or permitting the operation of air conditioning or refrigeration equipment in a manner that exceeds the following sound levels is prohibited:

Measurement Location	Maximum Noise level
Any point on neighboring property line, five feet above grade level, no closer than three feet from any wall.	55
Center of neighboring patio, five feet above grade level, no closer than three feet from any wall.	50

Outside the neighboring living area window nearest the equipment location, not more than three feet from the window opening, but at least three feet from any other surface.	50

J. Vehicle or Motorboat Repairs and Testing. Repairing, rebuilding, modifying or testing any motor vehicle, motorcycle or motorboat in a manner as to cause a noise disturbance across property lines or within a noise-sensitive zone is prohibited.

K. Vibration. Operating or permitting the operation of any device that creates vibration that is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property, or at one hundred fifty (150) feet from the source if on a public space or public right-of-way is prohibited. The perception threshold shall be a motion velocity of 0.01 in/sec over the range of 1 to 100 Hertz.

(Ord. 544 § 3, 2019; Ord. 182 §2 (part), 1997)

16.30.140 Modification of Standards.

Modifications to the requirements of this chapter may be granted by the director for a period of up to two years, subject to any terms, conditions, or requirements to minimize adverse effects on the surrounding neighborhood reasonable. Modifications may be granted only if one of the following findings can be made:

A. Additional time is necessary for the applicant to alter or modify the activity, operation, or noise source to comply with this chapter: or

B. The activity, operation, or noise source cannot feasibly be done in a manner that would comply with the provisions of this chapter. and no other reasonable alternative is available to the applicant.

This page intentionally left blank

APPENDIX 5.1:

STUDY AREA PHOTOS

This page intentionally left blank

JN: 12532 Study Area Photos

L1_E
33, 33' 43.280000", 117, 13' 46.200000"

L1_N
33, 33' 43.740000", 117, 13' 46.310000"

L1_S
33, 33' 43.280000", 117, 13' 46.200000"

L1_W
33, 33' 43.150000", 117, 13' 46.140000"

L2_E
33, 33' 33.370000", 117, 13' 55.840000"

L2_N
33, 34' 3.760000", 117, 12' 57.500000"

L2_S
33, 33' 33.290000", 117, 13' 55.920000"

L2_W
33, 33' 33.370000", 117, 13' 55.840000"

L3_E
33, 33' 36.600000", 117, 13' 59.030000"

L3_N
33, 33' 36.690000", 117, 13' 58.860000"

L3_S
33, 33' 36.610000", 117, 13' 58.940000"

L3_W
33, 33' 36.600000", 117, 13' 59.030000"

L4_E
33, 33' 39.200000", 117, 14' 2.350000"

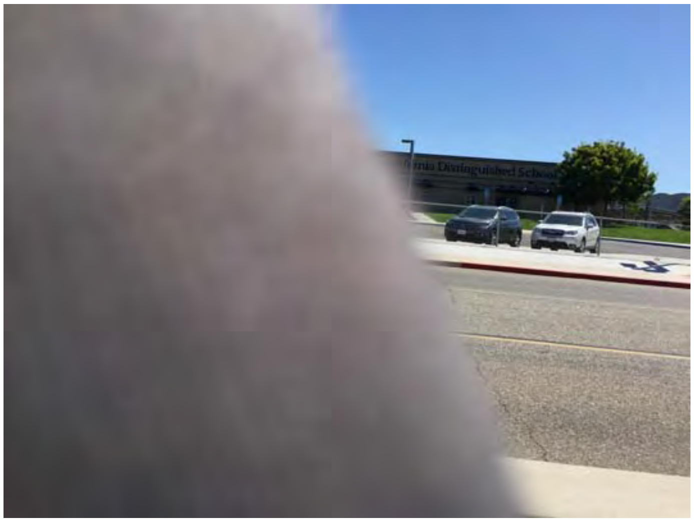
L4_N
33, 33' 39.250000", 117, 14' 2.380000"

L4_S
33, 33' 39.250000", 117, 14' 2.380000"

L4_W
33, 33' 39.200000", 117, 14' 2.350000"

L5_E
33, 33' 46.210000", 117, 14' 4.880000"

L5_N
33, 33' 43.970000", 117, 14' 6.550000"



L5_S
33, 33' 46.210000", 117, 14' 4.820000"

L5_W
33, 33' 46.190000", 117, 14' 4.930000"

APPENDIX 5.2:

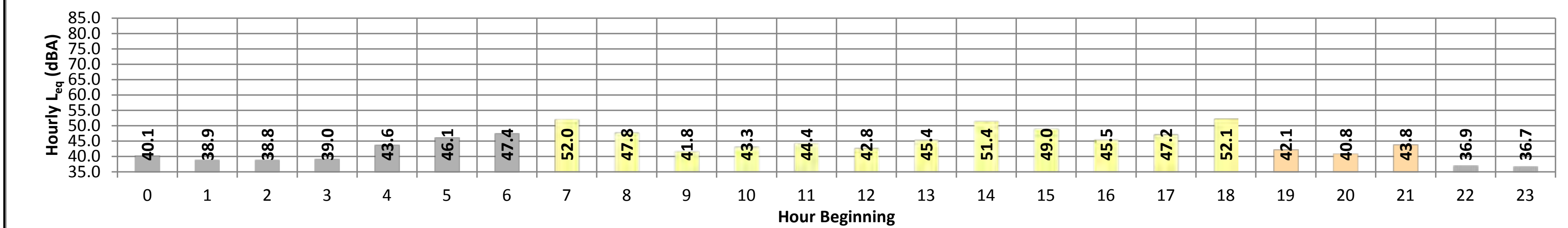
NOISE LEVEL MEASUREMENT WORKSHEETS

This page intentionally left blank

24-Hour Noise Level Measurement Summary

Date: Wednesday, September 18, 2019
Project: Murrieta Canyon Academy
Location: L1 - Located northeast of project side on dirt road adjacent to Douglas Avenue and Fullerton Road.
Meter: Piccolo II
JN: 12532
Analyst: P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	40.1	48.2	37.5	47.6	46.8	44.3	42.5	39.7	38.9	38.0	37.8	37.6	40.1	10.0	50.1
	1	38.9	41.2	37.4	41.0	40.8	40.4	40.2	39.2	38.6	37.9	37.7	37.5	38.9	10.0	48.9
	2	38.8	41.4	37.2	41.1	40.9	40.5	40.2	39.3	38.5	37.6	37.5	37.3	38.8	10.0	48.8
	3	39.0	41.3	37.6	41.0	40.8	40.4	40.1	39.4	38.8	38.1	37.9	37.7	39.0	10.0	49.0
	4	43.6	46.7	41.7	46.4	46.2	45.6	45.3	44.1	43.4	42.2	42.0	41.8	43.6	10.0	53.6
	5	46.1	49.4	44.2	49.1	48.9	48.3	47.9	46.3	45.6	44.7	44.6	44.3	46.1	10.0	56.1
	6	47.4	51.9	45.6	51.4	51.0	49.9	49.2	47.6	46.8	46.0	45.8	45.6	47.4	10.0	57.4
Day	7	52.0	61.3	47.0	61.0	60.3	57.9	56.0	50.8	49.1	47.7	47.5	47.2	52.0	0.0	52.0
	8	47.8	56.4	42.3	56.1	55.7	54.2	52.2	47.1	44.9	43.0	42.7	42.4	47.8	0.0	47.8
	9	41.8	46.7	38.5	46.3	45.9	45.0	44.5	42.4	40.9	39.2	39.0	38.7	41.8	0.0	41.8
	10	43.3	50.1	39.0	49.7	49.3	47.9	46.0	43.6	42.0	39.6	39.4	39.1	43.3	0.0	43.3
	11	44.4	50.4	40.2	49.8	49.3	48.2	47.5	45.6	43.2	40.9	40.7	40.4	44.4	0.0	44.4
	12	42.8	50.4	39.9	49.3	48.2	46.0	45.0	43.1	41.9	40.5	40.3	40.0	42.8	0.0	42.8
	13	45.4	50.9	40.7	50.5	50.1	49.0	48.5	46.3	44.5	41.6	41.2	40.8	45.4	0.0	45.4
	14	51.4	61.6	44.0	60.8	60.0	57.7	55.8	51.0	48.1	45.2	44.7	44.2	51.4	0.0	51.4
	15	49.0	57.1	44.0	56.5	55.8	53.9	52.5	49.3	47.2	44.7	44.4	44.1	49.0	0.0	49.0
	16	45.5	52.2	40.7	51.7	51.2	49.9	48.9	46.2	44.1	41.6	41.2	40.8	45.5	0.0	45.5
	17	47.2	54.7	41.2	54.1	53.3	51.8	50.4	48.1	45.9	42.4	41.8	41.3	47.2	0.0	47.2
	18	52.1	61.6	37.6	60.9	60.4	59.4	58.3	52.4	42.5	38.4	38.1	37.7	52.1	0.0	52.1
Evening	19	42.1	51.2	37.7	50.5	49.7	47.4	44.7	41.8	40.2	38.4	38.2	37.8	42.1	5.0	47.1
	20	40.8	45.9	37.6	45.4	45.0	44.0	43.4	41.5	40.1	38.3	38.0	37.7	40.8	5.0	45.8
	21	43.8	49.5	36.8	49.2	49.0	48.3	47.8	45.5	42.5	37.7	37.3	36.9	43.8	5.0	48.8
Night	22	36.9	42.5	34.3	42.1	41.5	40.3	39.6	37.2	36.0	34.9	34.7	34.4	36.9	10.0	46.9
	23	36.7	40.7	34.9	40.3	40.0	39.1	38.5	37.0	36.2	35.4	35.2	35.0	36.7	10.0	46.7

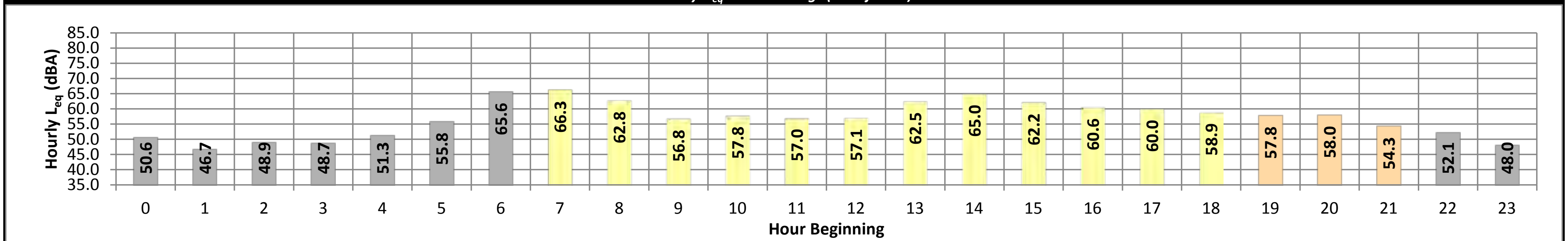
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	41.8	46.7	37.6	46.3	45.9	45.0	44.5	42.4	40.9	38.4	38.1	37.7
	Max	52.1	61.6	47.0	61.0	60.4	59.4	58.3	52.4	49.1	47.7	47.5	47.2
Energy Average		48.3	Average:		53.9	53.3	51.7	50.5	47.2	44.5	42.1	41.7	41.4
Evening	Min	40.8	45.9	36.8	45.4	45.0	44.0	43.4	41.5	40.1	37.7	37.3	36.9
	Max	43.8	51.2	37.7	50.5	49.7	48.3	47.8	45.5	42.5	38.4	38.2	37.8
Energy Average		42.4	Average:		48.4	47.9	46.6	45.3	42.9	40.9	38.1	37.8	37.5
Night	Min	36.7	40.7	34.3	40.3	40.0	39.1	38.5	37.0	36.0	34.9	34.7	34.4
	Max	47.4	51.9	45.6	51.4	51.0	49.9	49.2	47.6	46.8	46.0	45.8	45.6
Energy Average		42.5	Average:		44.4	44.1	43.2	42.6	41.1	40.3	39.4	39.2	39.0

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
46.3	47.6	42.5
24-Hour CNEL (dBA)		
50.3		

24-Hour Noise Level Measurement Summary

Date: Wednesday, September 18, 2019
Project: Murietta Canyon Academy
Location: L2 - Located south of the Project site on Hayes Avenue near existing residential homes.
Meter: Piccolo I
JN: 12532
Analyst: P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	50.6	77.2	37.8	63.0	55.0	45.0	43.0	42.0	40.0	39.0	39.0	39.0	50.6	10.0	60.6
	1	46.7	75.4	39.5	48.0	47.0	46.0	45.0	44.0	42.0	40.0	40.0	39.0	46.7	10.0	56.7
	2	48.9	73.8	38.2	57.0	50.0	47.0	46.0	42.0	40.0	39.0	39.0	39.0	48.9	10.0	58.9
	3	48.7	71.9	40.7	57.0	51.0	47.0	47.0	46.0	45.0	43.0	42.0	41.0	48.7	10.0	58.7
	4	51.3	77.2	44.3	59.0	54.0	50.0	49.0	48.0	47.0	45.0	45.0	45.0	51.3	10.0	61.3
	5	55.8	82.4	45.3	68.0	64.0	54.0	51.0	49.0	48.0	47.0	46.0	46.0	55.8	10.0	65.8
	6	65.6	83.7	46.8	73.0	72.0	71.0	70.0	66.0	61.0	49.0	48.0	48.0	65.6	10.0	75.6
Day	7	66.3	79.8	44.8	74.0	73.0	71.0	70.0	67.0	63.0	50.0	47.0	45.0	66.3	0.0	66.3
	8	62.8	83.6	39.4	72.0	71.0	69.0	68.0	61.0	50.0	40.0	39.0	39.0	62.8	0.0	62.8
	9	56.8	74.6	39.2	69.0	66.0	64.0	61.0	51.0	44.0	40.0	39.0	39.0	56.8	0.0	56.8
	10	57.8	79.5	37.8	70.0	68.0	64.0	61.0	49.0	43.0	39.0	39.0	39.0	57.8	0.0	57.8
	11	57.0	75.9	37.8	69.0	68.0	64.0	61.0	49.0	43.0	39.0	39.0	38.0	57.0	0.0	57.0
	12	57.1	74.5	38.8	69.0	68.0	64.0	62.0	49.0	44.0	41.0	40.0	39.0	57.1	0.0	57.1
	13	62.5	83.2	40.6	72.0	70.0	68.0	67.0	62.0	53.0	43.0	42.0	41.0	62.5	0.0	62.5
	14	65.0	85.5	42.5	74.0	72.0	69.0	68.0	64.0	62.0	49.0	47.0	43.0	65.0	0.0	65.0
	15	62.2	85.2	42.5	73.0	71.0	69.0	67.0	56.0	48.0	44.0	44.0	43.0	62.2	0.0	62.2
	16	60.6	79.9	42.5	73.0	71.0	67.0	65.0	54.0	48.0	44.0	44.0	43.0	60.6	0.0	60.6
	17	60.0	76.7	40.8	72.0	70.0	68.0	65.0	54.0	46.0	42.0	42.0	41.0	60.0	0.0	60.0
	18	58.9	80.9	39.5	71.0	69.0	66.0	63.0	50.0	43.0	41.0	41.0	40.0	58.9	0.0	58.9
Evening	19	57.8	79.0	39.4	71.0	69.0	64.0	60.0	48.0	43.0	40.0	40.0	39.0	57.8	5.0	62.8
	20	58.0	77.7	37.8	71.0	69.0	65.0	61.0	44.0	41.0	39.0	39.0	39.0	58.0	5.0	63.0
	21	54.3	77.1	37.8	68.0	65.0	56.0	49.0	41.0	40.0	38.0	37.0	37.0	54.3	5.0	59.3
Night	22	52.1	77.5	37.7	65.0	59.0	48.0	43.0	40.0	39.0	37.0	37.0	37.0	52.1	10.0	62.1
	23	48.0	73.7	37.7	56.0	46.0	42.0	41.0	40.0	39.0	37.0	37.0	37.0	48.0	10.0	58.0

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	56.8	74.5	37.8	69.0	66.0	64.0	61.0	49.0	43.0	39.0	39.0	38.0
	Max	66.3	85.5	44.8	74.0	73.0	71.0	70.0	67.0	63.0	50.0	47.0	45.0
Energy Average		61.7	Average:		71.5	69.8	66.9	64.8	55.5	48.9	42.7	41.9	40.8
Evening	Min	54.3	77.1	37.8	68.0	65.0	56.0	49.0	41.0	40.0	38.0	37.0	37.0
	Max	58.0	79.0	39.4	71.0	69.0	65.0	61.0	48.0	43.0	40.0	40.0	39.0
Energy Average		57.0	Average:		70.0	67.7	61.7	56.7	44.3	41.3	39.0	38.7	38.3
Night	Min	46.7	71.9	37.7	48.0	46.0	42.0	41.0	40.0	39.0	37.0	37.0	37.0
	Max	65.6	83.7	46.8	73.0	72.0	71.0	70.0	66.0	61.0	49.0	48.0	48.0
Energy Average		57.2	Average:		60.7	55.3	50.0	48.3	46.3	44.6	41.8	41.4	41.2

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
60.0	61.1	57.2

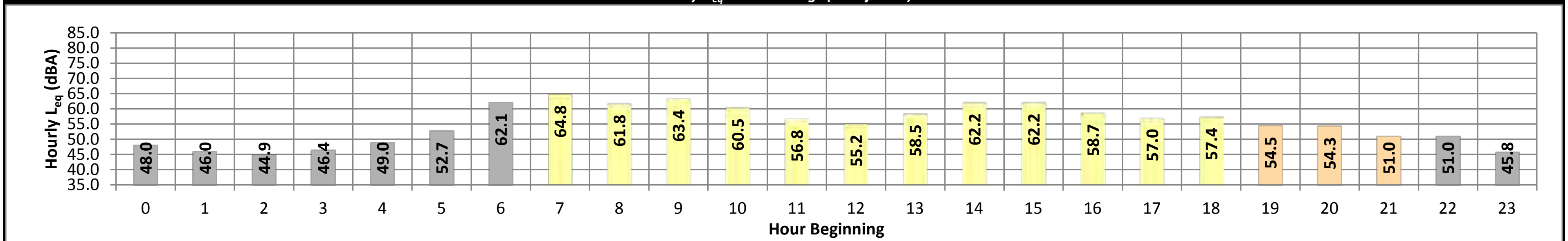
24-Hour CNEL (dBA)

64.6

24-Hour Noise Level Measurement Summary

Date: Wednesday, September 18, 2019
Project: Murietta Canyon Academy
Location: L3 - Located southwest of Project site on Hayes Avenue near existing residential homes.
Meter: Piccolo I
JN: 12532
Analyst: P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	48.0	75.4	38.9	59.0	53.0	45.0	43.0	42.0	41.0	39.0	39.0	39.0	48.0	10.0	58.0
	1	46.0	73.3	39.1	53.0	49.0	45.0	45.0	43.0	42.0	40.0	39.0	39.0	46.0	10.0	56.0
	2	44.9	69.7	36.2	53.0	50.0	46.0	45.0	42.0	41.0	39.0	39.0	38.0	44.9	10.0	54.9
	3	46.4	68.2	39.7	54.0	49.0	46.0	46.0	45.0	44.0	42.0	41.0	40.0	46.4	10.0	56.4
	4	49.0	73.8	44.0	54.0	51.0	49.0	48.0	47.0	46.0	45.0	45.0	44.0	49.0	10.0	59.0
	5	52.7	71.5	45.2	65.0	61.0	55.0	53.0	50.0	48.0	47.0	46.0	46.0	52.7	10.0	62.7
	6	62.1	82.3	48.0	71.0	70.0	68.0	66.0	61.0	55.0	50.0	49.0	49.0	62.1	10.0	72.1
Day	7	64.8	88.0	47.3	73.0	71.0	69.0	68.0	64.0	60.0	52.0	50.0	48.0	64.8	0.0	64.8
	8	61.8	81.2	40.4	70.0	69.0	67.0	66.0	61.0	58.0	42.0	41.0	41.0	61.8	0.0	61.8
	9	63.4	80.7	39.2	76.0	74.0	70.0	68.0	54.0	47.0	42.0	41.0	41.0	63.4	0.0	63.4
	10	60.5	80.4	36.6	72.0	71.0	68.0	64.0	52.0	46.0	40.0	39.0	39.0	60.5	0.0	60.5
	11	56.8	82.6	36.2	67.0	65.0	61.0	58.0	50.0	45.0	39.0	39.0	37.0	56.8	0.0	56.8
	12	55.2	79.6	36.9	67.0	65.0	61.0	58.0	50.0	45.0	41.0	40.0	39.0	55.2	0.0	55.2
	13	58.5	81.8	39.1	69.0	67.0	64.0	62.0	56.0	50.0	43.0	42.0	40.0	58.5	0.0	58.5
	14	62.2	89.3	41.3	72.0	70.0	67.0	65.0	60.0	56.0	49.0	47.0	43.0	62.2	0.0	62.2
	15	62.2	91.7	39.2	71.0	69.0	66.0	63.0	55.0	47.0	42.0	42.0	40.0	62.2	0.0	62.2
	16	58.7	78.9	40.8	71.0	68.0	64.0	62.0	55.0	49.0	43.0	43.0	42.0	58.7	0.0	58.7
	17	57.0	80.2	39.2	68.0	66.0	63.0	61.0	53.0	48.0	43.0	42.0	41.0	57.0	0.0	57.0
	18	57.4	79.2	37.5	69.0	67.0	63.0	60.0	52.0	46.0	41.0	40.0	39.0	57.4	0.0	57.4
Evening	19	54.5	74.0	36.2	67.0	65.0	60.0	57.0	48.0	42.0	39.0	39.0	37.0	54.5	5.0	59.5
	20	54.3	77.6	36.2	68.0	64.0	58.0	55.0	46.0	40.0	39.0	38.0	36.0	54.3	5.0	59.3
	21	51.0	72.4	36.2	65.0	61.0	53.0	48.0	40.0	39.0	36.0	36.0	36.0	51.0	5.0	56.0
Night	22	51.0	80.4	36.2	63.0	58.0	47.0	42.0	39.0	38.0	36.0	36.0	36.0	51.0	10.0	61.0
	23	45.8	71.9	36.2	55.0	48.0	42.0	41.0	39.0	39.0	36.0	36.0	36.0	45.8	10.0	55.8

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	55.2	78.9	36.2	67.0	65.0	61.0	58.0	50.0	45.0	39.0	39.0	37.0
	Max	64.8	91.7	47.3	76.0	74.0	70.0	68.0	64.0	60.0	52.0	50.0	48.0
Energy Average		60.8	Average:		70.4	68.5	65.3	62.9	55.2	49.8	43.1	42.2	40.8
Evening	Min	51.0	72.4	36.2	65.0	61.0	53.0	48.0	40.0	39.0	36.0	36.0	36.0
	Max	54.5	77.6	36.2	68.0	65.0	60.0	57.0	48.0	42.0	39.0	39.0	37.0
Energy Average		53.5	Average:		66.7	63.3	57.0	53.3	44.7	40.3	38.0	37.7	36.3
Night	Min	44.9	68.2	36.2	53.0	48.0	42.0	41.0	39.0	38.0	36.0	36.0	36.0
	Max	62.1	82.3	48.0	71.0	70.0	68.0	66.0	61.0	55.0	50.0	49.0	49.0
Energy Average		53.9	Average:		58.6	54.3	49.2	47.7	45.3	43.8	41.6	41.1	40.8

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
58.6	60.0	53.9

24-Hour CNEL (dBA)
62.1

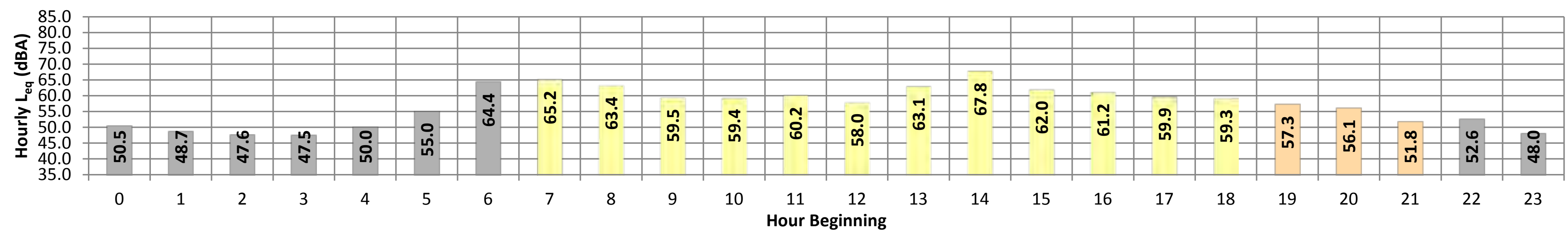
\\Uxr-fs\ucdata\UcJobs_12100-12500_12500\12532\Field Work\Measurements\12532_L3_M

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Date: Wednesday, September 18, 2019
Project: Murietta Canyon Academy
Location: L4 - Located west of the Project site on Hayes Avenue near existing residential homes and Thompson Middle School.
Meter: Piccolo I
JN: 12532
Analyst: P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	50.5	77.8	38.8	63.0	56.0	46.0	44.0	41.0	40.0	39.0	39.0	39.0	50.5	10.0	60.5
	1	48.7	76.5	39.1	49.0	47.0	46.0	45.0	43.0	42.0	40.0	39.0	39.0	48.7	10.0	58.7
	2	47.6	75.6	36.1	55.0	51.0	47.0	45.0	43.0	40.0	39.0	39.0	37.0	47.6	10.0	57.6
	3	47.5	72.1	39.1	53.0	49.0	47.0	46.0	45.0	44.0	41.0	40.0	39.0	47.5	10.0	57.5
	4	50.0	76.0	44.1	56.0	52.0	50.0	49.0	48.0	46.0	45.0	45.0	44.0	50.0	10.0	60.0
	5	55.0	73.9	45.0	68.0	65.0	58.0	55.0	50.0	48.0	46.0	46.0	45.0	55.0	10.0	65.0
	6	64.4	87.6	48.1	73.0	72.0	70.0	69.0	64.0	59.0	50.0	50.0	49.0	64.4	10.0	74.4
Day	7	65.2	82.1	47.9	74.0	72.0	70.0	69.0	65.0	61.0	53.0	52.0	49.0	65.2	0.0	65.2
	8	63.4	78.3	40.8	72.0	71.0	69.0	68.0	64.0	59.0	43.0	42.0	41.0	63.4	0.0	63.4
	9	59.5	85.8	41.8	71.0	69.0	65.0	62.0	55.0	49.0	44.0	43.0	42.0	59.5	0.0	59.5
	10	59.4	81.6	39.1	71.0	69.0	66.0	62.0	51.0	46.0	41.0	40.0	39.0	59.4	0.0	59.4
	11	60.2	87.8	39.0	71.0	69.0	65.0	62.0	53.0	48.0	41.0	40.0	39.0	60.2	0.0	60.2
	12	58.0	75.8	39.1	70.0	68.0	65.0	62.0	53.0	48.0	43.0	42.0	40.0	58.0	0.0	58.0
	13	63.1	91.1	40.6	73.0	71.0	68.0	66.0	58.0	50.0	43.0	42.0	41.0	63.1	0.0	63.1
	14	67.8	96.3	43.6	75.0	72.0	69.0	67.0	63.0	62.0	51.0	49.0	45.0	67.8	0.0	67.8
	15	62.0	85.2	40.9	73.0	71.0	68.0	66.0	57.0	49.0	44.0	43.0	42.0	62.0	0.0	62.0
	16	61.2	82.1	40.9	73.0	71.0	67.0	65.0	55.0	49.0	44.0	43.0	42.0	61.2	0.0	61.2
	17	59.9	77.0	40.9	71.0	70.0	67.0	65.0	55.0	49.0	44.0	43.0	42.0	59.9	0.0	59.9
	18	59.3	79.6	40.6	71.0	69.0	66.0	63.0	54.0	49.0	44.0	43.0	41.0	59.3	0.0	59.3
Evening	19	57.3	77.2	39.1	70.0	68.0	63.0	59.0	48.0	43.0	40.0	40.0	39.0	57.3	5.0	62.3
	20	56.1	78.1	38.9	70.0	67.0	60.0	56.0	45.0	41.0	39.0	39.0	39.0	56.1	5.0	61.1
	21	51.8	74.3	36.1	65.0	62.0	54.0	49.0	42.0	40.0	37.0	36.0	36.0	51.8	5.0	56.8
Night	22	52.6	78.9	36.1	65.0	60.0	52.0	45.0	40.0	39.0	36.0	36.0	36.0	52.6	10.0	62.6
	23	48.0	74.1	36.1	58.0	50.0	43.0	42.0	40.0	39.0	38.0	36.0	36.0	48.0	10.0	58.0

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	58.0	75.8	39.0	70.0	68.0	65.0	62.0	51.0	46.0	41.0	40.0	39.0
	Max	67.8	96.3	47.9	75.0	72.0	70.0	69.0	65.0	62.0	53.0	52.0	49.0
Energy Average		62.6	Average:		72.1	70.2	67.1	64.8	56.9	51.6	44.6	43.5	41.9
Evening	Min	51.8	74.3	36.1	65.0	62.0	54.0	49.0	42.0	40.0	37.0	36.0	36.0
	Max	57.3	78.1	39.1	70.0	68.0	63.0	59.0	48.0	43.0	40.0	40.0	39.0
Energy Average		55.6	Average:		68.3	65.7	59.0	54.7	45.0	41.3	38.7	38.3	38.0
Night	Min	47.5	72.1	36.1	49.0	47.0	43.0	42.0	40.0	39.0	36.0	36.0	36.0
	Max	64.4	87.6	48.1	73.0	72.0	70.0	69.0	64.0	59.0	50.0	50.0	49.0
Energy Average		56.2	Average:		60.0	55.8	51.0	48.9	46.0	44.1	41.6	41.1	40.4

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
60.4	61.8	56.2

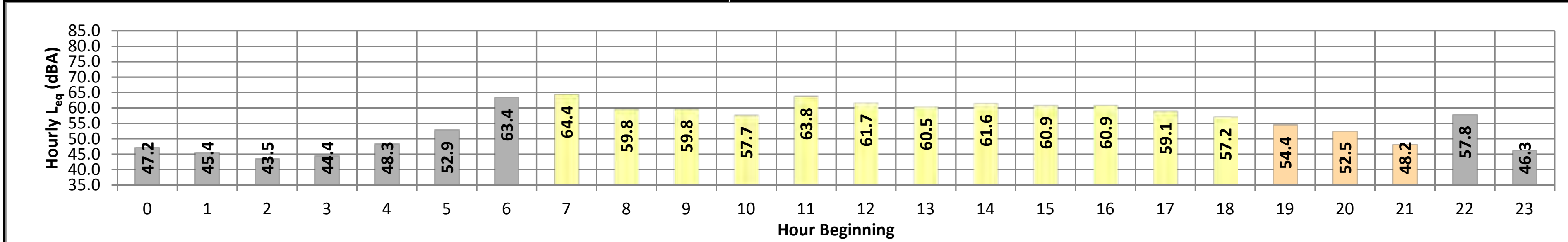
24-Hour CNEL (dBA)
64.1

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Date: Wednesday, September 18, 2019
Project: Murietta Canyon Academy
Location: L5 - Located northwest of the Project site on Nighthawk Way near existing residential homes.
Meter: Piccolo I
JN: 12532
Analyst: P. Mara

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	47.2	73.8	38.9	57.0	49.0	43.0	42.0	40.0	40.0	39.0	39.0	39.0	47.2	10.0	57.2
	1	45.4	72.5	38.9	49.0	45.0	44.0	43.0	43.0	42.0	40.0	39.0	39.0	45.4	10.0	55.4
	2	43.5	67.9	38.9	48.0	45.0	43.0	43.0	42.0	40.0	39.0	39.0	39.0	43.5	10.0	53.5
	3	44.4	64.1	38.9	49.0	47.0	46.0	45.0	44.0	43.0	40.0	40.0	39.0	44.4	10.0	54.4
	4	48.3	71.6	43.6	56.0	53.0	50.0	48.0	47.0	46.0	45.0	44.0	44.0	48.3	10.0	58.3
	5	52.9	74.8	44.9	64.0	61.0	56.0	52.0	49.0	48.0	46.0	46.0	46.0	52.9	10.0	62.9
	6	63.4	85.5	46.7	73.0	71.0	68.0	67.0	63.0	57.0	50.0	50.0	48.0	63.4	10.0	73.4
Day	7	64.4	83.8	45.7	73.0	72.0	69.0	68.0	64.0	60.0	51.0	50.0	48.0	64.4	0.0	64.4
	8	59.8	79.1	42.8	69.0	68.0	66.0	65.0	59.0	49.0	44.0	44.0	43.0	59.8	0.0	59.8
	9	59.8	87.4	42.5	70.0	69.0	64.0	61.0	52.0	47.0	44.0	43.0	43.0	59.8	0.0	59.8
	10	57.7	79.0	40.7	69.0	67.0	63.0	60.0	51.0	47.0	44.0	43.0	42.0	57.7	0.0	57.7
	11	63.8	80.4	41.5	73.0	72.0	71.0	70.0	63.0	49.0	44.0	43.0	42.0	63.8	0.0	63.8
	12	61.7	79.6	44.9	71.0	70.0	69.0	67.0	60.0	53.0	48.0	47.0	46.0	61.7	0.0	61.7
	13	60.5	80.0	45.8	71.0	69.0	67.0	65.0	58.0	51.0	47.0	47.0	46.0	60.5	0.0	60.5
	14	61.6	77.9	47.3	70.0	68.0	66.0	64.0	61.0	59.0	53.0	50.0	48.0	61.6	0.0	61.6
	15	60.9	84.8	44.4	71.0	69.0	66.0	63.0	56.0	50.0	46.0	46.0	45.0	60.9	0.0	60.9
	16	60.9	87.0	41.9	71.0	69.0	66.0	64.0	56.0	50.0	44.0	44.0	42.0	60.9	0.0	60.9
	17	59.1	82.8	39.0	70.0	69.0	66.0	63.0	53.0	46.0	42.0	41.0	40.0	59.1	0.0	59.1
	18	57.2	79.4	38.9	69.0	67.0	63.0	60.0	48.0	44.0	40.0	40.0	39.0	57.2	0.0	57.2
Evening	19	54.4	75.5	36.0	68.0	65.0	59.0	55.0	45.0	42.0	39.0	39.0	38.0	54.4	5.0	59.4
	20	52.5	73.4	36.0	66.0	63.0	56.0	51.0	43.0	42.0	39.0	39.0	37.0	52.5	5.0	57.5
	21	48.2	71.5	36.0	61.0	57.0	50.0	46.0	43.0	39.0	36.0	36.0	36.0	48.2	5.0	53.2
Night	22	57.8	89.4	36.0	64.0	58.0	48.0	45.0	43.0	41.0	39.0	36.0	36.0	57.8	10.0	67.8
	23	46.3	71.9	36.0	54.0	46.0	44.0	43.0	42.0	39.0	39.0	38.0	37.0	46.3	10.0	56.3

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	57.2	77.9	38.9	69.0	67.0	63.0	60.0	48.0	44.0	40.0	40.0	39.0
	Max	64.4	87.4	47.3	73.0	72.0	71.0	70.0	64.0	60.0	53.0	50.0	48.0
Energy Average		61.1	Average:		70.6	69.1	66.3	64.2	56.8	50.4	45.6	44.8	43.7
Evening	Min	48.2	71.5	36.0	61.0	57.0	50.0	46.0	43.0	39.0	36.0	36.0	36.0
	Max	54.4	75.5	36.0	68.0	65.0	59.0	55.0	45.0	42.0	39.0	39.0	38.0
Energy Average		52.4	Average:		65.0	61.7	55.0	50.7	43.7	41.0	38.0	38.0	37.0
Night	Min	43.5	64.1	36.0	48.0	45.0	43.0	42.0	40.0	39.0	39.0	36.0	36.0
	Max	63.4	89.4	46.7	73.0	71.0	68.0	67.0	63.0	57.0	50.0	50.0	48.0
Energy Average		55.6	Average:		57.1	52.8	49.1	47.6	45.9	44.0	41.9	41.2	40.8

L_{eq} (dBA)		
24-Hour	Daytime	Nighttime
59.0	60.3	55.6

24-Hour CNEL (dBA)
63.1

\\Uxr-fs\ucdata\UcJobs_12100-12500_12500\12532\Field Work\Measurements\12532_L5_T

URBAN CROSSROADS

This page intentionally left blank

APPENDIX 7.1:

OFF-SITE TRAFFIC NOISE LEVEL CALCULATIONS

This page intentionally left blank

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Hayes Av.
Road Segment: s/o Nighthawk Wy.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS	
Highway Data		**Site Conditions (Hard = 10, Soft = 15)**	
Average Daily Traffic (Adt):	2222 vehicles	Autos:	15
Peak Hour Percentage:	10.00%	Medium Trucks (2 Axles):	15
Peak Hour Volume:	222 vehicles	Heavy Trucks (3+ Axles):	15
Vehicle Speed:	30 mph		
Near/Far Lane Distance:	12 feet		

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-6.72	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-23.96	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-27.92	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.5	54.5	53.1	47.1	55.6	56.2
Medium Trucks:	51.0	47.1	39.6	48.4	54.5	54.6
Heavy Trucks:	53.5	49.4	46.0	50.7	56.9	57.0
Vehicle Noise:	59.0	56.2	54.1	53.8	60.5	60.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	17	36	77
CNEL:	8	17	37	80

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Hayes Av.
Road Segment: s/o Sherry Ln.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS	
Highway Data		**Site Conditions (Hard = 10, Soft = 15)**	
Average Daily Traffic (Adt):	2344 vehicles	Autos:	15
Peak Hour Percentage:	10.00%	Medium Trucks (2 Axles):	15
Peak Hour Volume:	234 vehicles	Heavy Trucks (3+ Axles):	15
Vehicle Speed:	30 mph		
Near/Far Lane Distance:	12 feet		

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-6.49	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-23.73	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-27.68	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.7	54.7	53.4	47.4	55.8	56.4
Medium Trucks:	51.2	47.3	39.8	48.6	54.8	54.8
Heavy Trucks:	53.7	49.7	46.3	50.9	57.1	57.2
Vehicle Noise:	59.2	56.4	54.3	54.0	60.8	61.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	17	37	80
CNEL:	8	18	39	83

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Hayes Av.
Road Segment: s/o Fullerton Rd.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS	
Highway Data		**Site Conditions (Hard = 10, Soft = 15)**	
Average Daily Traffic (Adt):	2683 vehicles	Autos:	15
Peak Hour Percentage:	10.00%	Medium Trucks (2 Axles):	15
Peak Hour Volume:	268 vehicles	Heavy Trucks (3+ Axles):	15
Vehicle Speed:	30 mph		
Near/Far Lane Distance:	12 feet		

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-5.90	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-23.14	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-27.10	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.3	55.3	54.0	47.9	56.4	57.0
Medium Trucks:	51.8	47.9	40.4	49.2	55.4	55.4
Heavy Trucks:	54.3	50.3	46.9	51.5	57.7	57.8
Vehicle Noise:	59.8	57.0	54.9	54.6	61.4	61.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	19	41	88
CNEL:	9	20	42	91

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Hayes Av.
Road Segment: s/o Nighthawk Wy.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS	
Highway Data		**Site Conditions (Hard = 10, Soft = 15)**	
Average Daily Traffic (Adt):	2566 vehicles	Autos:	15
Peak Hour Percentage:	10.00%	Medium Trucks (2 Axles):	15
Peak Hour Volume:	257 vehicles	Heavy Trucks (3+ Axles):	15
Vehicle Speed:	30 mph		
Near/Far Lane Distance:	12 feet		

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-6.10	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-23.34	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-27.29	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.1	55.1	53.8	47.8	56.2	56.8
Medium Trucks:	51.6	47.7	40.2	49.0	55.2	55.2
Heavy Trucks:	54.1	50.1	46.7	51.3	57.5	57.6
Vehicle Noise:	59.6	56.8	54.7	54.4	61.2	61.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	18	39	85
CNEL:	9	19	41	88

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Hayes Av.
Road Segment: s/o Sherry Ln.

Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2751 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	275 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	61.75	-5.80	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-23.03	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-26.99	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.4	55.4	54.1	48.1	56.5	57.1
Medium Trucks:	51.9	48.0	40.5	49.3	55.5	55.5
Heavy Trucks:	54.4	50.4	47.0	51.6	57.8	57.9
Vehicle Noise:	59.9	57.1	55.0	54.7	61.5	61.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	9	19	41	89
CNEL:	9	20	43	93

Monday, April 20, 2020

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Hayes Av.
Road Segment: s/o Fullerton Rd.

Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3589 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	359 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	61.75	-4.64	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-21.88	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-25.83	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.5	56.5	55.2	49.2	57.6	58.3
Medium Trucks:	53.1	49.2	41.7	50.4	56.6	56.7
Heavy Trucks:	55.6	51.5	48.1	52.8	59.0	59.1
Vehicle Noise:	61.1	58.3	56.2	55.8	62.6	62.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	11	23	49	106
CNEL:	11	24	51	111

Monday, April 20, 2020

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Buildout+Ambient
Road Name: Hayes Av.
Road Segment: s/o Nighthawk Wy.

Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2405 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	241 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	61.75	-6.38	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-23.62	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-27.57	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.8	54.8	53.5	47.5	55.9	56.5
Medium Trucks:	51.4	47.5	40.0	48.7	54.9	54.9
Heavy Trucks:	53.8	49.8	46.4	51.0	57.2	57.3
Vehicle Noise:	59.3	56.6	54.4	54.1	60.9	61.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	8	18	38	81
CNEL:	8	18	39	85

Monday, April 20, 2020

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Buildout+Ambient
Road Name: Hayes Av.
Road Segment: s/o Sherry Ln.

Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2537 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	254 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	61.75	-6.15	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-23.39	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-27.34	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.0	55.0	53.7	47.7	56.1	56.8
Medium Trucks:	51.6	47.7	40.2	48.9	55.1	55.1
Heavy Trucks:	54.1	50.0	46.6	51.3	57.5	57.6
Vehicle Noise:	59.6	56.8	54.7	54.3	61.1	61.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	8	18	39	84
CNEL:	9	19	41	88

Monday, April 20, 2020

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Buildout+Ambient
Road Name: Hayes Av.
Road Segment: s/o Fullerton Rd.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS	
Highway Data		**Site Conditions (Hard = 10, Soft = 15)**	
Average Daily Traffic (Adt):	2904 vehicles	Autos:	15
Peak Hour Percentage:	10.00%	Medium Trucks (2 Axles):	15
Peak Hour Volume:	290 vehicles	Heavy Trucks (3+ Axles):	15
Vehicle Speed:	30 mph		
Near/Far Lane Distance:	12 feet		
Site Data			
Barrier Height:	**0.0 feet**		
Barrier Type (0-Wall, 1-Berm):	0.0		
Centerline Dist. to Barrier:	33.0 feet		
Centerline Dist. to Observer:	33.0 feet		
Barrier Distance to Observer:	0.0 feet		
Observer Height (Above Pad):	5.0 feet		
Pad Elevation:	0.0 feet		
Road Elevation:	0.0 feet		
Road Grade:	0.0%		
Left View:	-90.0 degrees		
Right View:	90.0 degrees		

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-5.56	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-22.80	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-26.75	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.6	55.6	54.3	48.3	56.7	57.3
Medium Trucks:	52.2	48.3	40.8	49.5	55.7	55.7
Heavy Trucks:	54.7	50.6	47.2	51.9	58.1	58.2
Vehicle Noise:	60.2	57.4	55.2	54.9	61.7	62.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	20	43	92
CNEL:	10	21	45	96

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Buildout+Ambient+Project
Road Name: Hayes Av.
Road Segment: s/o Nighthawk Wy.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS	
Highway Data		**Site Conditions (Hard = 10, Soft = 15)**	
Average Daily Traffic (Adt):	2749 vehicles	Autos:	15
Peak Hour Percentage:	10.00%	Medium Trucks (2 Axles):	15
Peak Hour Volume:	275 vehicles	Heavy Trucks (3+ Axles):	15
Vehicle Speed:	30 mph		
Near/Far Lane Distance:	12 feet		
Site Data			
Barrier Height:	**0.0 feet**		
Barrier Type (0-Wall, 1-Berm):	0.0		
Centerline Dist. to Barrier:	33.0 feet		
Centerline Dist. to Observer:	33.0 feet		
Barrier Distance to Observer:	0.0 feet		
Observer Height (Above Pad):	5.0 feet		
Pad Elevation:	0.0 feet		
Road Elevation:	0.0 feet		
Road Grade:	0.0%		
Left View:	-90.0 degrees		
Right View:	90.0 degrees		

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-5.80	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-23.04	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-26.99	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.4	55.4	54.1	48.1	56.5	57.1
Medium Trucks:	51.9	48.0	40.5	49.3	55.5	55.5
Heavy Trucks:	54.4	50.4	47.0	51.6	57.8	57.9
Vehicle Noise:	59.9	57.1	55.0	54.7	61.5	61.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	19	41	89
CNEL:	9	20	43	93

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Buildout+Ambient+Project
Road Name: Hayes Av.
Road Segment: s/o Sherry Ln.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS	
Highway Data		**Site Conditions (Hard = 10, Soft = 15)**	
Average Daily Traffic (Adt):	2944 vehicles	Autos:	15
Peak Hour Percentage:	10.00%	Medium Trucks (2 Axles):	15
Peak Hour Volume:	294 vehicles	Heavy Trucks (3+ Axles):	15
Vehicle Speed:	30 mph		
Near/Far Lane Distance:	12 feet		
Site Data			
Barrier Height:	**0.0 feet**		
Barrier Type (0-Wall, 1-Berm):	0.0		
Centerline Dist. to Barrier:	33.0 feet		
Centerline Dist. to Observer:	33.0 feet		
Barrier Distance to Observer:	0.0 feet		
Observer Height (Above Pad):	5.0 feet		
Pad Elevation:	0.0 feet		
Road Elevation:	0.0 feet		
Road Grade:	0.0%		
Left View:	-90.0 degrees		
Right View:	90.0 degrees		

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-5.50	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-22.74	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-26.69	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.7	55.7	54.4	48.4	56.8	57.4
Medium Trucks:	52.2	48.3	40.8	49.6	55.8	55.8
Heavy Trucks:	54.7	50.7	47.3	51.9	58.1	58.2
Vehicle Noise:	60.2	57.4	55.3	55.0	61.8	62.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	20	43	93
CNEL:	10	21	45	97

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Buildout+Ambient+Project
Road Name: Hayes Av.
Road Segment: s/o Fullerton Rd.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS	
Highway Data		**Site Conditions (Hard = 10, Soft = 15)**	
Average Daily Traffic (Adt):	3810 vehicles	Autos:	15
Peak Hour Percentage:	10.00%	Medium Trucks (2 Axles):	15
Peak Hour Volume:	381 vehicles	Heavy Trucks (3+ Axles):	15
Vehicle Speed:	30 mph		
Near/Far Lane Distance:	12 feet		
Site Data			
Barrier Height:	**0.0 feet**		
Barrier Type (0-Wall, 1-Berm):	0.0		
Centerline Dist. to Barrier:	33.0 feet		
Centerline Dist. to Observer:	33.0 feet		
Barrier Distance to Observer:	0.0 feet		
Observer Height (Above Pad):	5.0 feet		
Pad Elevation:	0.0 feet		
Road Elevation:	0.0 feet		
Road Grade:	0.0%		
Left View:	-90.0 degrees		
Right View:	90.0 degrees		

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-4.38	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-21.62	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-25.58	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.8	56.8	55.5	49.5	57.9	58.5
Medium Trucks:	53.4	49.5	42.0	50.7	56.9	56.9
Heavy Trucks:	55.8	51.8	48.4	53.0	59.2	59.3
Vehicle Noise:	61.3	58.6	56.4	56.1	62.9	63.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	11	24	51	111
CNEL:	12	25	53	115

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Buildout+Ambient+Cumulative
Road Name: Hayes Av.
Road Segment: s/o Nighthawk Wy.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2405 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	241 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-6.38	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-23.62	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-27.57	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.8	54.8	53.5	47.5	55.9	56.5
Medium Trucks:	51.4	47.5	40.0	48.7	54.9	54.9
Heavy Trucks:	53.8	49.8	46.4	51.0	57.2	57.3
Vehicle Noise:	59.3	56.6	54.4	54.1	60.9	61.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	18	38	81
CNEL:	8	18	39	85

Monday, April 20, 2020

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Buildout+Ambient+Cumulative
Road Name: Hayes Av.
Road Segment: s/o Sherry Ln.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2537 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	254 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-6.15	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-23.39	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-27.34	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.0	55.0	53.7	47.7	56.1	56.8
Medium Trucks:	51.6	47.7	40.2	48.9	55.1	55.1
Heavy Trucks:	54.1	50.0	46.6	51.3	57.5	57.6
Vehicle Noise:	59.6	56.8	54.7	54.3	61.1	61.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	18	39	84
CNEL:	9	19	41	88

Monday, April 20, 2020

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Buildout+Ambient+Cumulative
Road Name: Hayes Av.
Road Segment: s/o Fullerton Rd.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2904 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	290 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-5.56	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-22.80	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-26.75	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.6	55.6	54.3	48.3	56.7	57.3
Medium Trucks:	52.2	48.3	40.8	49.5	55.7	55.7
Heavy Trucks:	54.7	50.6	47.2	51.9	58.1	58.2
Vehicle Noise:	60.2	57.4	55.2	54.9	61.7	62.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	20	43	92
CNEL:	10	21	45	96

Monday, April 20, 2020

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Buildout+Ambient+Cumulative+Pr
Road Name: Hayes Av.
Road Segment: s/o Nighthawk Wy.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2749 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	275 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-5.80	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-23.04	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-26.99	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.4	55.4	54.1	48.1	56.5	57.1
Medium Trucks:	51.9	48.0	40.5	49.3	55.5	55.5
Heavy Trucks:	54.4	50.4	47.0	51.6	57.8	57.9
Vehicle Noise:	59.9	57.1	55.0	54.7	61.5	61.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	19	41	89
CNEL:	9	20	43	93

Monday, April 20, 2020

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Buildout+Ambient+Cumulative+Pr
Road Name: Hayes Av.
Road Segment: s/o Sherry Ln.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2944 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	294 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-5.50	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-22.74	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-26.69	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.7	55.7	54.4	48.4	56.8	57.4
Medium Trucks:	52.2	48.3	40.8	49.6	55.8	55.8
Heavy Trucks:	54.7	50.7	47.3	51.9	58.1	58.2
Vehicle Noise:	60.2	57.4	55.3	55.0	61.8	62.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	20	43	93
CNEL:	10	21	45	97

Monday, April 20, 2020

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Buildout+Ambient+Cumulative+Pr
Road Name: Hayes Av.
Road Segment: s/o Fullerton Rd.
Project Name: Murrieta Canyon Academy
Job Number: 12532

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3810 vehicles
Peak Hour Percentage:	10.00%
Peak Hour Volume:	381 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	33.0 feet
Centerline Dist. to Observer:	33.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	32.833
Medium Trucks:	32.562
Heavy Trucks:	32.589

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	61.75	-4.38	2.64	-1.20	-4.52	0.000	0.000
Medium Trucks:	73.48	-21.62	2.69	-1.20	-4.86	0.000	0.000
Heavy Trucks:	79.92	-25.58	2.69	-1.20	-5.69	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.8	56.8	55.5	49.5	57.9	58.5
Medium Trucks:	53.4	49.5	42.0	50.7	56.9	56.9
Heavy Trucks:	55.8	51.8	48.4	53.0	59.2	59.3
Vehicle Noise:	61.3	58.6	56.4	56.1	62.9	63.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	11	24	51	111
CNEL:	12	25	53	115

Monday, April 20, 2020

This page intentionally left blank

APPENDIX 8.1:

ON-SITE TRAFFIC NOISE LEVEL CALCULATIONS

This page intentionally left blank

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Hayes Ave.
Lot No: CR

Project Name: Murrieta Canyon Acaemy
Job Number: 12532
Analyst: B. Lawson

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,040 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	58.0 feet
Centerline Dist. to Observer:	58.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,132.0 feet
Road Elevation:	1,127.0 feet
Barrier Elevation:	1,132.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	1,127.000
Medium Trucks:	1,129.297
Heavy Trucks:	1,135.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	58.549
Medium Trucks:	58.201
Heavy Trucks:	57.723

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	62.51	-0.02	-1.13	-1.20	-4.27	0.000	0.000
Medium Trucks:	73.11	-17.26	-1.09	-1.20	-4.46	0.000	0.000
Heavy Trucks:	78.76	-21.21	-1.04	-1.20	-4.93	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	60.2	58.2	56.8	50.8	59.2	59.9
Medium Trucks:	53.6	49.7	42.2	50.9	57.1	57.1
Heavy Trucks:	55.3	51.3	47.9	52.5	58.7	58.8
Vehicle Noise:	62.1	59.4	57.5	56.3	63.2	63.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	60.2	58.2	56.8	50.8	59.2	59.9
Medium Trucks:	53.6	49.7	42.2	50.9	57.1	57.1
Heavy Trucks:	55.3	51.3	47.9	52.5	58.7	58.8
Vehicle Noise:	62.1	59.4	57.5	56.3	63.2	63.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Hayes Ave.
Lot No: Lab

Project Name: Murrieta Canyon Acaemy
Job Number: 12532
Analyst: B. Lawson

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,040 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	52.0 feet
Centerline Dist. to Observer:	52.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,132.0 feet
Road Elevation:	1,127.0 feet
Barrier Elevation:	1,148.6 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	1,127.000
Medium Trucks:	1,129.297
Heavy Trucks:	1,135.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	52.612
Medium Trucks:	52.224
Heavy Trucks:	51.691

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	62.51	-0.02	-0.44	-1.20	-14.63	0.000	0.000
Medium Trucks:	73.11	-17.26	-0.39	-1.20	-14.19	0.000	0.000
Heavy Trucks:	78.76	-21.21	-0.32	-1.20	-13.02	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	60.9	58.8	57.5	51.5	59.9	60.6
Medium Trucks:	54.3	50.4	42.9	51.6	57.8	57.8
Heavy Trucks:	56.0	52.0	48.6	53.2	59.4	59.5
Vehicle Noise:	62.8	60.1	58.2	57.0	63.9	64.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	60.9	58.8	57.5	51.5	59.9	60.6
Medium Trucks:	54.3	50.4	42.9	51.6	57.8	57.8
Heavy Trucks:	56.0	52.0	48.6	53.2	59.4	59.5
Vehicle Noise:	62.8	60.1	58.2	57.0	63.9	64.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Hayes Ave.
Lot No: CR

Project Name: Murrieta Canyon Acaemy
Job Number: 12532
Analyst: B. Lawson

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,040 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	58.0 feet
Centerline Dist. to Observer:	58.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,132.0 feet
Road Elevation:	1,127.0 feet
Barrier Elevation:	1,132.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	1,127.000
Medium Trucks:	1,129.297
Heavy Trucks:	1,135.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	60.737
Medium Trucks:	60.058
Heavy Trucks:	58.727

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	62.51	-0.02	-1.37	-1.20	-10.94	0.000	0.000
Medium Trucks:	73.11	-17.26	-1.30	-1.20	-11.45	0.000	0.000
Heavy Trucks:	78.76	-21.21	-1.15	-1.20	-12.76	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.9	57.9	56.6	50.6	59.0	59.6
Medium Trucks:	53.4	49.5	42.0	50.7	56.9	56.9
Heavy Trucks:	55.2	51.2	47.8	52.4	58.6	58.7
Vehicle Noise:	61.8	59.2	57.3	56.1	63.0	63.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.9	57.9	56.6	50.6	59.0	59.6
Medium Trucks:	53.4	49.5	42.0	50.7	56.9	56.9
Heavy Trucks:	55.2	51.2	47.8	52.4	58.6	58.7
Vehicle Noise:	61.8	59.2	57.3	56.1	63.0	63.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Hayes Ave.
Lot No: Lab

Project Name: Murrieta Canyon Acaemy
Job Number: 12532
Analyst: B. Lawson

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,040 vehicles
Vehicle Speed:	30 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	52.0 feet
Centerline Dist. to Observer:	52.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,132.0 feet
Road Elevation:	1,127.0 feet
Barrier Elevation:	1,148.6 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	75.5%	14.0%	10.5%	97.42%
Medium Trucks:	48.9%	2.2%	48.9%	1.84%
Heavy Trucks:	47.3%	5.4%	47.3%	0.74%

Noise Source Elevations (in feet)

Autos:	1,127.000
Medium Trucks:	1,129.297
Heavy Trucks:	1,135.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	55.036
Medium Trucks:	54.286
Heavy Trucks:	52.810

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	62.51	-0.02	-0.73	-1.20	-3.47	0.000	0.000
Medium Trucks:	73.11	-17.26	-0.64	-1.20	-3.38	0.000	0.000
Heavy Trucks:	78.76	-21.21	-0.46	-1.20	-3.13	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	60.6	58.6	57.2	51.2	59.6	60.3
Medium Trucks:	54.0	50.1	42.6	51.4	57.5	57.6
Heavy Trucks:	55.9	51.8	48.4	53.1	59.3	59.4
Vehicle Noise:	62.5	59.9	57.9	56.8	63.7	64.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	60.6	58.6	57.2	51.2	59.6	60.3
Medium Trucks:	54.0	50.1	42.6	51.4	57.5	57.6
Heavy Trucks:	55.9	51.8	48.4	53.1	59.3	59.4
Vehicle Noise:	62.5	59.9	57.9	56.8	63.7	64.0

This page intentionally left blank

APPENDIX 10.1:

CADNAA OPERATIONAL NOISE MODEL INPUTS

This page intentionally left blank

12532

CadnaA Noise Prediction Model: 12532.cna
Date: 04.05.20
Analyst: B. Lawson

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	45.0	18.5	42.1	50.0	45.0	0.0				5.00	r	6262895.13	2149632.20	1155.41
RECEIVERS		R2	41.4	23.7	38.9	50.0	45.0	0.0				5.00	r	6262858.67	2148949.91	1149.30
RECEIVERS		R3	42.0	24.6	39.6	50.0	45.0	0.0				5.00	r	6262419.50	2148541.61	1125.08
RECEIVERS		R4	44.6	25.5	42.0	50.0	45.0	0.0				5.00	r	6262257.09	2148693.91	1132.55
RECEIVERS		R5	46.8	26.6	44.1	50.0	45.0	0.0				5.00	r	6262090.86	2148866.96	1135.71
RECEIVERS		R6	44.3	12.5	41.3	50.0	45.0	0.0				5.00	r	6261864.26	2149122.78	1137.13
RECEIVERS		R7	32.9	4.2	30.0	50.0	45.0	0.0				5.00	r	6261532.43	2149706.78	1137.13
RECEIVERS		R8	49.8	18.3	46.8	50.0	45.0	0.0				5.00	r	6262094.56	2149469.87	1161.25

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			K0	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night				X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(dB)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		AC01	88.9	88.9	88.9	Lw	88.9		585.00	0.00	0.00	0.0	5.00	g	6262031.30	2149143.01	1167.13
POINTSOURCE		AC02	88.9	88.9	88.9	Lw	88.9		585.00	0.00	0.00	0.0	5.00	g	6262211.14	2148945.18	1167.13
POINTSOURCE		AC03	88.9	88.9	88.9	Lw	88.9		585.00	0.00	0.00	0.0	5.00	g	6262122.86	2149041.64	1167.13
POINTSOURCE		AC04	88.9	88.9	88.9	Lw	88.9		585.00	0.00	0.00	0.0	5.00	g	6262157.19	2149080.06	1167.13
POINTSOURCE		AC05	88.9	88.9	88.9	Lw	88.9		585.00	0.00	0.00	0.0	5.00	g	6262266.73	2149075.98	1167.13
POINTSOURCE		BBALL01	83.7	83.7	83.7	Lw	83.7		900.00	0.00	0.00	0.0	5.00	r	6262115.50	2149183.88	1137.13
POINTSOURCE		BBALL02	83.7	83.7	83.7	Lw	83.7		900.00	0.00	0.00	0.0	5.00	r	6262165.37	2149183.06	1137.13
POINTSOURCE		PLAY03	92.2	92.2	92.2	Lw	92.2		900.00	0.00	0.00	0.0	5.00	r	6262122.04	2149127.47	1137.13
POINTSOURCE		PLAY04	92.2	92.2	92.2	Lw	92.2		900.00	0.00	0.00	0.0	5.00	r	6262346.84	2149002.40	1137.13
POINTSOURCE		PLAY05	92.2	92.2	92.2	Lw	92.2		900.00	0.00	0.00	0.0	5.00	r	6262188.82	2149140.40	1137.13
POINTSOURCE		PLAY06	92.2	92.2	92.2	Lw	92.2		900.00	0.00	0.00	0.0	5.00	r	6262220.55	2149104.61	1137.13

Area Source(s)

ID	Result. PWL			Result. PWL''			Lw / Li		Operating Time			Moving Pt. Src			Height
	Day	Evening	Night	Day	Evening	Night	Type	Value	Day	Special	Night	Number			
	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			(min)	(min)	(min)	Day	Evening	Night	(ft)
PARKING01	73.4	73.4	73.4	41.7	41.7	41.7	Lw	73.4							5
PARKING02	73.4	73.4	73.4	40.0	40.0	40.0	Lw	73.4							5

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
AREASOURCE	5.00	r			6262482.99	2148908.11	1146.27	1141.27
					6262654.58	2149065.74	1138.25	1133.25
					6262667.50	2149052.31	1138.32	1133.32
					6262682.49	2149064.19	1146.27	1141.27
					6262700.84	2149044.55	1146.27	1141.27
					6262686.62	2149031.63	1139.63	1134.63
					6262697.48	2149019.23	1139.98	1134.98
					6262677.84	2149001.66	1137.13	1132.13
					6262663.88	2149016.13	1137.13	1132.13
					6262656.13	2149008.64	1146.27	1141.27
					6262669.05	2148995.71	1137.19	1132.19
					6262525.12	2148864.70	1146.27	1141.27
AREASOURCE	5.00	r			6262259.49	2148886.39	1129.79	1124.79
					6262334.25	2148954.07	1135.08	1130.08
					6262338.97	2148950.39	1134.91	1129.91
					6262364.16	2148948.82	1136.14	1131.14
					6262457.80	2148846.26	1136.02	1131.02
					6262457.54	2148822.91	1134.03	1129.03
					6262463.83	2148816.62	1133.74	1128.74
					6262444.16	2148799.57	1132.55	1127.55
					6262435.77	2148795.11	1132.55	1127.55
					6262447.05	2148782.52	1132.55	1127.55
					6262408.49	2148747.37	1132.55	1127.55
					6262396.94	2148758.91	1132.04	1127.04
					6262386.19	2148749.46	1131.08	1126.08

Barrier(s)

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
BARRIERS		BARRIERS00001						6.00	r			6262507.24	2148440.40	1124.41	1118.41
												6262448.23	2148508.89	1124.41	1118.41

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
												6262284.99	2148692.68	1128.98	1122.98
												6262277.00	2148693.82	1133.55	1127.55
												6262215.35	2148756.61	1130.72	1124.72
BARRIERS		BARRIERS00002						6.00	r			6262157.13	2148833.09	1128.98	1122.98
												6262098.91	2148899.31	1130.61	1124.61
												6262041.83	2148847.93	1133.55	1127.55
												6261990.46	2148806.84	1133.55	1127.55
												6261947.08	2148776.02	1133.41	1127.41
BARRIERS		BARRIERS00003						6.00	r			6261846.75	2149044.68	1137.24	1131.24
												6261901.58	2149094.11	1138.13	1132.13
												6261899.26	2149118.82	1140.33	1134.33
												6261506.93	2149560.58	1142.70	1136.70
												6261376.09	2149448.44	1138.13	1132.13
BARRIERS		BARRIERS00004						6.00	r			6261458.28	2149714.27	1142.70	1136.70
												6261506.16	2149661.76	1142.70	1136.70
												6261524.70	2149660.21	1142.70	1136.70
												6262045.23	2150124.37	1151.84	1145.84

Building(s)

Name	M.	ID	RB	Residents	Absorption	Height		Coordinates			
						Begin		x	y	z	Ground
						(ft)		(ft)	(ft)	(ft)	(ft)
BUILDING		BUILDING00001	x	0		30.00	r	6262092.17	2149165.41	1162.13	1132.13
								6262071.34	2149146.38	1162.13	1132.13
								6262066.97	2149149.98	1162.13	1132.13
								6262061.06	2149145.35	1162.13	1132.13
								6262053.35	2149154.87	1162.13	1132.13
								6262047.17	2149149.21	1162.13	1132.13
								6262220.99	2148957.40	1162.13	1132.13
								6262227.41	2148963.32	1162.13	1132.13
								6262219.44	2148973.09	1162.13	1132.13
								6262224.59	2148977.97	1162.13	1132.13
								6262220.99	2148983.11	1162.13	1132.13
								6262241.55	2149001.63	1162.13	1132.13
								6262268.04	2148973.34	1162.13	1132.13
								6262211.99	2148920.12	1162.13	1132.13
								6262135.37	2149004.20	1162.13	1132.13
								6262136.91	2149005.74	1162.13	1132.13
								6262121.74	2149021.68	1162.13	1132.13
								6262117.11	2149016.28	1162.13	1132.13
								6262091.66	2149043.28	1162.13	1132.13
								6262097.83	2149048.94	1162.13	1132.13
								6262087.29	2149060.25	1162.13	1132.13
								6262086.77	2149059.48	1162.13	1132.13
								6262009.12	2149143.30	1162.13	1131.55
								6262065.43	2149194.98	1162.13	1132.13
BUILDING		BUILDING00002	x	0		30.00	r	6262119.68	2149093.67	1162.13	1132.13
								6262153.62	2149116.30	1162.13	1132.13
								6262194.25	2149072.08	1162.13	1132.13
								6262168.79	2149040.19	1162.13	1132.13
								6262156.71	2149053.82	1162.13	1132.13
								6262149.51	2149049.96	1162.13	1132.13
								6262126.62	2149075.16	1162.13	1132.13
								6262131.51	2149080.30	1162.13	1132.13
BUILDING		BUILDING00003	x	0		30.00	r	6262259.04	2149122.99	1162.13	1132.13
								6262304.81	2149073.62	1162.13	1132.13
								6262290.41	2149060.76	1162.13	1132.13
								6262332.83	2149014.74	1162.13	1132.13
								6262324.86	2149007.28	1162.13	1132.13
								6262323.32	2149008.83	1162.13	1132.13
								6262300.43	2148994.68	1162.13	1132.13
								6262228.18	2149072.85	1162.13	1132.13
								6262244.38	2149095.22	1162.13	1132.13
								6262236.93	2149103.19	1162.13	1132.13

APPENDIX 11.1:

CADNAA CONSTRUCTION NOISE MODEL INPUTS

This page intentionally left blank

12532

CadnaA Noise Prediction Model: 12532_MobileFinal.cna
Date: 01.05.20
Analyst: B. Lawson

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	69.1	69.1	75.8	75.0	60.0	0.0				5.00	r	6262895.13	2149632.20	1155.41
RECEIVERS		R2	71.2	71.2	77.9	75.0	60.0	0.0				5.00	r	6262858.67	2148949.91	1149.32
RECEIVERS		R3	71.3	71.3	78.0	75.0	60.0	0.0				5.00	r	6262419.50	2148541.61	1124.83
RECEIVERS		R4	72.3	72.3	79.0	75.0	60.0	0.0				5.00	r	6262257.09	2148693.91	1132.55
RECEIVERS		R5	75.0	75.0	81.6	75.0	60.0	0.0				5.00	r	6262090.86	2148866.96	1135.97
RECEIVERS		R6	69.8	69.8	76.4	75.0	60.0	0.0				5.00	r	6261864.26	2149122.78	1137.13
RECEIVERS		R7	56.0	56.0	62.6	75.0	60.0	0.0				5.00	r	6261532.43	2149706.78	1137.13
RECEIVERS		R8	72.5	72.5	79.2	75.0	60.0	0.0				5.00	r	6262094.56	2149469.87	1161.76

Area Source(s)

ID	Result. PWL			Result. PWL''			Lw / Li		Operating Time			Moving Pt. Src			Height
	Day	Evening	Night	Day	Evening	Night	Type	Value	Day	Special	Night	Number			
	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			(min)	(min)	(min)	Day	Evening	Night	(ft)
AREA SOURCE	125.6	125.6	125.6	83.3	83.3	83.3	Lw''	83.3							5

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
MOBILE	5.00	r			6261969.24	2149191.00	1137.13	1132.13
					6261955.72	2149205.23	1137.13	1132.13
					6261964.26	2149212.35	1137.13	1132.13
					6261982.75	2149218.04	1138.57	1133.57
					6262180.53	2149210.92	1137.13	1132.13
					6262178.39	2149183.89	1137.13	1132.13
					6262181.95	2149181.04	1137.13	1132.13
					6262199.02	2149173.22	1137.13	1132.13
					6262215.39	2149166.82	1137.13	1132.13
					6262236.02	2149161.84	1137.13	1132.13
					6262381.15	2149004.61	1146.27	1141.27
					6262593.15	2149191.72	1138.34	1133.34
					6262732.59	2149038.76	1137.13	1132.13
					6262399.65	2148737.12	1131.74	1126.74
					6262257.36	2148885.09	1129.57	1124.57
					6262335.62	2148954.10	1135.32	1130.32
					6262305.74	2148981.85	1137.13	1132.13
					6262282.97	2148964.06	1137.13	1132.13
					6262211.83	2148917.82	1137.13	1132.13

Barrier(s)

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
BARRIERS		BARRIERS00001						6.00	r			6262507.24	2148440.40	1124.41	1118.41
												6262448.23	2148508.89	1124.41	1118.41
												6262284.99	2148692.68	1128.98	1122.98
												6262277.00	2148693.82	1133.55	1127.55
												6262215.35	2148756.61	1130.64	1124.64
BARRIERS		BARRIERS00002										6262157.13	2148833.09	1133.55	1127.55
												6262098.91	2148899.31	1133.55	1127.55
												6262041.83	2148847.93	1133.55	1127.55
												6261990.46	2148806.84	1133.55	1127.55
												6261947.08	2148776.02	1133.40	1127.40
BARRIERS		BARRIERS00003						6.00	r			6261846.75	2149044.68	1137.39	1131.39
												6261901.58	2149094.11	1138.13	1132.13
												6261899.26	2149118.82	1140.33	1134.33
												6261506.93	2149560.58	1142.70	1136.70
												6261376.09	2149448.44	1138.13	1132.13
BARRIERS		BARRIERS00004						6.00	r			6261458.28	2149714.27	1142.70	1136.70
												6261506.16	2149661.76	1142.70	1136.70
												6261524.70	2149660.21	1142.70	1136.70
												6262045.23	2150124.37	1151.84	1145.84

12532

CadnaA Noise Prediction Model: 12532_StationaryFinal.cna
Date: 01.05.20
Analyst: B. Lawson

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	49.5	49.5	56.2	75.0	60.0	0.0				5.00	r	6262895.13	2149632.20	1155.41
RECEIVERS		R2	47.4	47.4	54.1	75.0	60.0	0.0				5.00	r	6262858.67	2148949.91	1149.32
RECEIVERS		R3	49.7	49.7	56.4	75.0	60.0	0.0				5.00	r	6262419.50	2148541.61	1124.83
RECEIVERS		R4	52.2	52.2	58.8	75.0	60.0	0.0				5.00	r	6262257.09	2148693.91	1132.55
RECEIVERS		R5	59.0	59.0	65.7	75.0	60.0	0.0				5.00	r	6262090.86	2148866.96	1135.97
RECEIVERS		R6	52.8	52.8	59.5	75.0	60.0	0.0				5.00	r	6261864.26	2149122.78	1137.13
RECEIVERS		R7	37.0	37.0	43.7	75.0	60.0	0.0				5.00	r	6261532.43	2149706.78	1137.13
RECEIVERS		R8	54.5	54.5	61.2	75.0	60.0	0.0				5.00	r	6262094.56	2149469.87	1161.76

Area Source(s)

ID	Result. PWL			Result. PWL''			Lw / Li		Operating Time			Moving Pt. Src			Height
	Day	Evening	Night	Day	Evening	Night	Type	Value	Day	Special	Night	Number			
	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			(min)	(min)	(min)	Day	Evening	Night	(ft)
SCHOOL	99.5	99.5	99.5	72.3	72.3	72.3	Lw"	72.3							5
SCHOOL	96.7	96.7	96.7	72.3	72.3	72.3	Lw"	72.3							5
SCHOOL	103.1	103.1	103.1	72.3	72.3	72.3	Lw"	72.3							5

Name	Height				Coordinates			
	Begin		End		x	y	z	Ground
	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
STATIONARY	5.00	r			6262228.18	2149072.85	1137.13	1132.13
					6262244.38	2149095.22	1137.13	1132.13
					6262236.93	2149103.19	1137.13	1132.13
					6262259.04	2149122.99	1137.13	1132.13
					6262304.81	2149073.62	1137.13	1132.13
					6262290.41	2149060.76	1137.13	1132.13
					6262332.83	2149014.74	1137.13	1132.13
					6262300.43	2148994.68	1137.13	1132.13
STATIONARY	5.00	r			6262119.68	2149093.67	1137.13	1132.13
					6262153.62	2149116.30	1137.13	1132.13
					6262194.25	2149072.08	1137.13	1132.13
					6262168.79	2149040.19	1137.13	1132.13
					6262156.71	2149053.82	1137.13	1132.13
					6262149.51	2149049.96	1137.13	1132.13
					6262126.62	2149075.16	1137.13	1132.13
					6262131.51	2149080.30	1137.13	1132.13
STATIONARY	5.00	r			6262065.43	2149194.98	1137.13	1132.13
					6262092.17	2149165.41	1137.13	1132.13
					6262071.34	2149146.38	1137.13	1132.13
					6262066.97	2149149.98	1137.13	1132.13
					6262061.06	2149145.35	1137.13	1132.13
					6262053.35	2149154.87	1137.13	1132.13
					6262047.17	2149149.21	1137.13	1132.13
					6262220.99	2148957.40	1137.13	1132.13
					6262227.41	2148963.32	1137.13	1132.13
					6262219.44	2148973.09	1137.13	1132.13
					6262224.59	2148977.97	1137.13	1132.13
					6262220.99	2148983.11	1137.13	1132.13
					6262241.55	2149001.63	1137.13	1132.13
					6262268.04	2148973.34	1137.13	1132.13
					6262211.83	2148917.82	1137.13	1132.13
					6262135.37	2149004.20	1137.13	1132.13
					6262136.91	2149005.74	1137.13	1132.13
					6262121.74	2149021.68	1137.13	1132.13
					6262117.11	2149016.28	1137.13	1132.13
					6262091.66	2149043.28	1137.13	1132.13
					6262097.83	2149048.94	1137.13	1132.13
					6262009.12	2149143.30	1136.55	1131.55

Barrier(s)

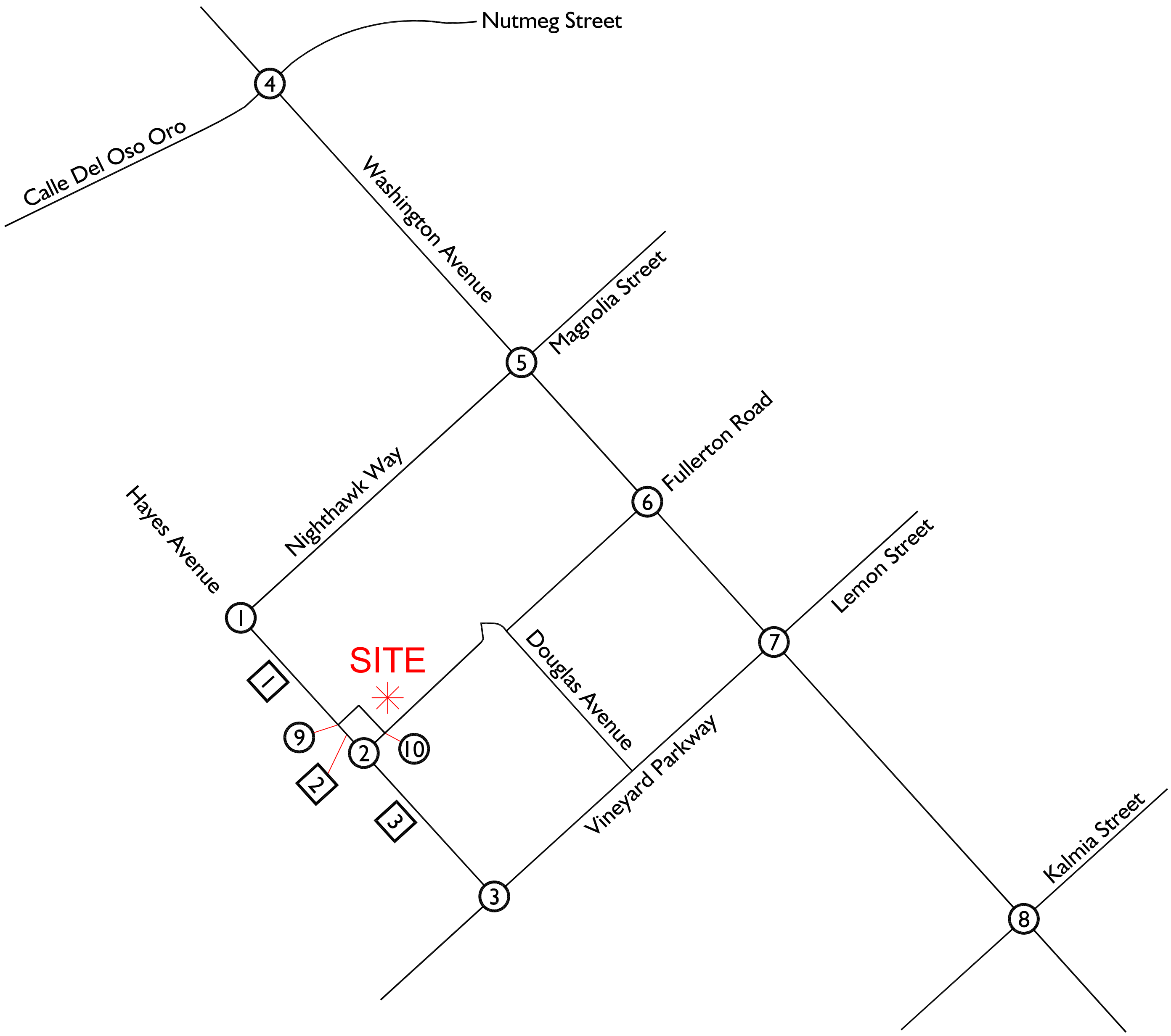
Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
BARRIERS		BARRIERS00001						6.00	r			6262507.24	2148440.40	1124.41	1118.41
												6262448.23	2148508.89	1124.41	1118.41
												6262284.99	2148692.68	1128.98	1122.98
												6262277.00	2148693.82	1133.55	1127.55
												6262215.35	2148756.61	1130.64	1124.64

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
BARRIERS		BARRIERS00002										6262157.13	2148833.09	1133.55	1127.55
												6262098.91	2148899.31	1133.55	1127.55
												6262041.83	2148847.93	1133.55	1127.55
												6261990.46	2148806.84	1133.55	1127.55
												6261947.08	2148776.02	1133.40	1127.40
BARRIERS		BARRIERS00003						6.00	r			6261846.75	2149044.68	1137.39	1131.39
												6261901.58	2149094.11	1138.13	1132.13
												6261899.26	2149118.82	1140.33	1134.33
												6261506.93	2149560.58	1142.70	1136.70
												6261376.09	2149448.44	1138.13	1132.13
BARRIERS		BARRIERS00004						6.00	r			6261458.28	2149714.27	1142.70	1136.70
												6261506.16	2149661.76	1142.70	1136.70
												6261524.70	2149660.21	1142.70	1136.70
												6262045.23	2150124.37	1151.84	1145.84

This page intentionally left blank

Appendix K: Murrieta Canyon Academy Traffic Impact Study

MURRIETA CANYON ACADEMY EXPANSION
TRAFFIC IMPACT STUDY
City of Murrieta, California



MURRIETA VALLEY UNIFIED SCHOOL DISTRICT
MURRIETA CANYON ACADEMY EXPANSION
TRAFFIC IMPACT STUDY
City of Murrieta, California

Prepared for:

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT
41870 McAlby Court
Murrieta, CA 92562

Prepared by:

RK ENGINEERING GROUP, INC.
4000 Westerly Place, Suite 280
Newport Beach, CA 92660

Alex Tabrizi, P.E., T.E.
Elias Bandek, E.I.T.

August 21, 2019

Table of Contents

Section **Page**

Table of Contents (continued)

List of Attachments

Exhibits

List of Attachments (continued)

Tables

List of Attachments (continued)

Appendices

1.0 Introduction

A. Purpose of Report and Study Objectives

The purpose of this traffic impact study is to evaluate the expansion of the Murrieta Canyon Academy (MCA) from a traffic circulation standpoint. The existing development is located within the City of Murrieta.

Study objectives include: (1) documentation of existing traffic conditions in the vicinity of the site; (2) evaluation of Existing Plus Project traffic conditions; (3) evaluation of traffic conditions in the Project Buildout Year With Ambient Growth Plus Project; (4) evaluation of traffic conditions in the Project Buildout Year With Ambient Growth With Cumulative Projects With and Without Project; and (5) determination of on-site and off-site improvements and system management actions needed to achieve City of Murrieta level of service requirements.

B. Site Location and Study Area

The project is located at 24150 Hayes Avenue, in the City of Murrieta. The project site is currently zoned for Civic/Institutional and would not require a zone change.

The study analysis area was determined based on requirements for City of Murrieta, and follows the City of Murrieta Traffic Impact Analysis Preparation Guide criteria. Exhibit 1-1 illustrates the site location and traffic analysis study area.

C. Expansion Project Description

The project would consist of expanding the currently existing Murrieta Canyon Academy to increase its capacity from 200 students to 500 students (increase in capacity by 300 students). The Murrieta Canyon Academy is an alternative high school which provides independent study and alternative high school and adult education. The traffic impact study has analyzed the project in one (1) complete phase and the expansion is expected to be completed in the year 2023. Vehicular access to the site will continue to be served by Hayes Avenue and Fullerton Road.

D. Level of Service

The current technical guide to the evaluation of traffic operations is the *Highway Capacity Manual 2010*. The HCM defines level of service as a qualitative measure which describes operational conditions within a traffic stream, generally in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. The criteria used to evaluate LOS (Level of Service) conditions vary based on the type of roadway and whether the traffic flow is considered interrupted or uninterrupted.

HCM level of service definitions are provided in Appendix A.

1. Intersections

The level of service is typically dependent on the quality of traffic flow at the intersections along a roadway. The HCM methodology expresses the level of service at an intersection in terms of delay time for the various intersection approaches. The HCM uses different procedures depending on the type of intersection control. The levels of service determined in this study are determined using the HCM methodology.

For signalized intersections, average control delay per vehicle is used to determine level of service. Levels of service at signalized study intersections have been evaluated using the HCM intersection analysis program.

Study area intersections which are stop sign controlled with stop control on the minor street only have been analyzed using the unsignalized intersection methodology of the HCM. For these intersections, the calculation of level of service is dependent on the occurrence of gaps occurring in the traffic flow of the main street. Using data collected describing the intersection configuration and traffic volumes at these locations; the level of service has been calculated. The level of service is determined based on worst individual movement or movements sharing a single lane. The relationship between level of service and delay is different than for signalized intersections.

The level of services are defined for the various analysis methodologies as follows:

LOS	Average Control Delay Per Vehicle (Seconds)	
	Signalized	Unsignalized
A	0.00 - 10.00	0.00 - 10.00
B	10.01 - 20.00	10.01 - 15.00
C	20.01 - 35.00	15.01 - 25.00
D	35.01 - 55.00	25.01 - 35.00
E	55.01 - 80.00	35.01 - 50.00
F	>80.01	>50.01

The City of Murrieta has adopted a Level of Service (LOS) D as the performance standards for its street and highway system. Therefore, per the City of Murrieta General Plan, all study intersections will be required to perform at LOS D or better.

For intersections not meeting the required LOS, mitigation measures are recommended, and the LOS is recalculated, to verify that the required LOS will be achieved.

2. Roadway Segments

The parameters for the roadway segment analysis have been referenced from the City of Murrieta's General Plan. The roadway segment analysis compares existing and future traffic volumes to the maximum two-way daily traffic volumes identified in the City of Murrieta General Plan Circulation Element. In accordance with the City's General Plan Circulation Element, LOS C or better shall be maintained along City roads and state highways. Therefore, for the purposes of this evaluation, LOS C is the minimum acceptable LOS for roadway segments. The following is the City of Murrieta's daily roadway capacity values for the study area roadway segments:

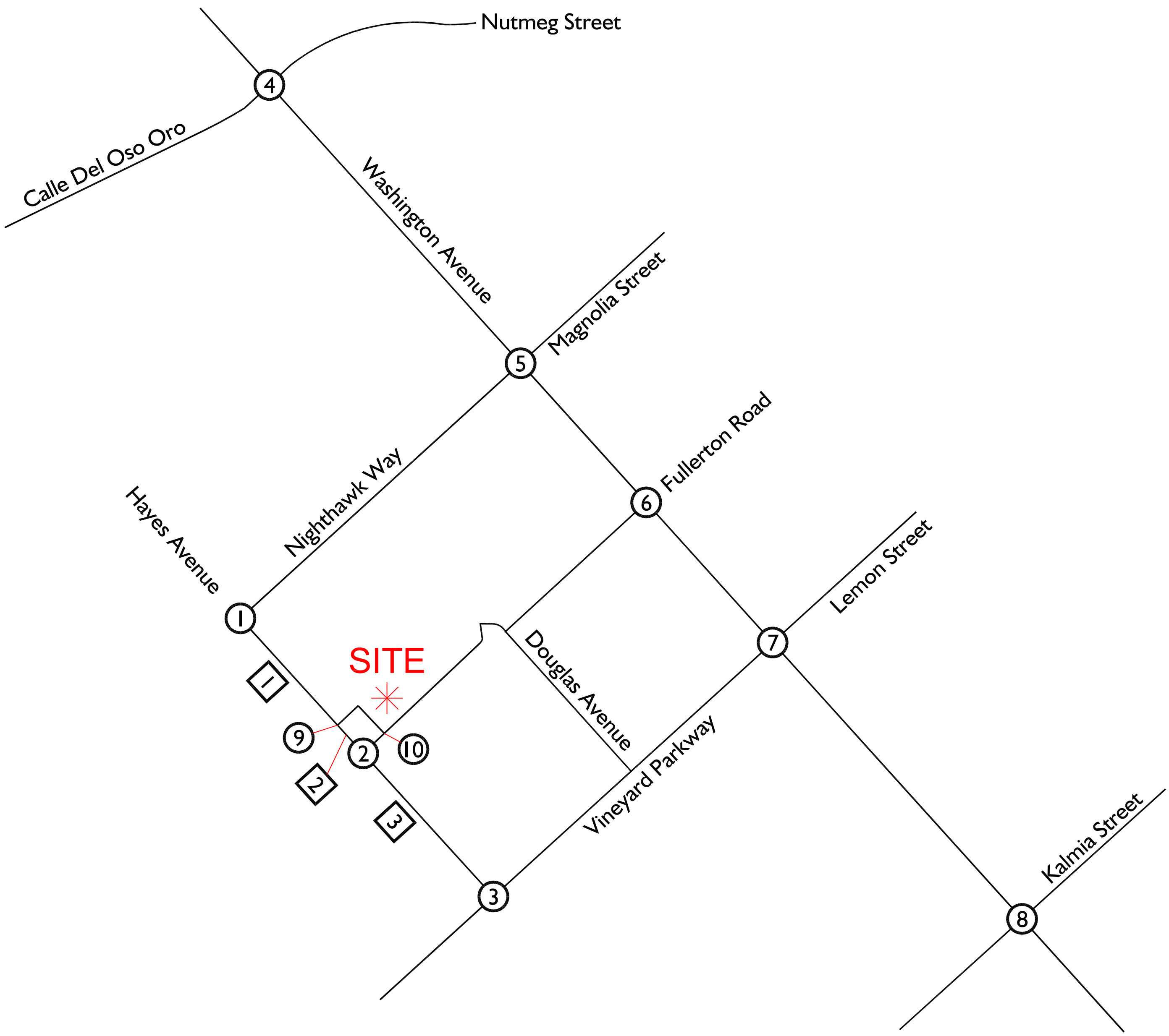
ROADWAY SEGMENT THRESHOLDS				
Roadway Classification	**Number of Lanes**	**Maximum Two-Way Traffic Volume (ADT)**		
		LOS C	**LOS D**	**LOS E**
Collector	2	10,400	11,700	13,000

Source: City of Murrieta General Plan

For roadway segments not meeting the required LOS, mitigation measures are recommended, and the LOS is recalculated, to verify that the required LOS will be achieved.

Exhibit 1-1

Location Map



Legend:

(1) = Study Area Intersection

[1] = Study Roadway Segment

N

2.0 Area Conditions

A. Study Area Intersections

The study area includes the following intersections:

	North-South Street	East-West Street
1.	Hayes Avenue	Nighthawk Way
2.	Hayes Avenue	Fullerton Road
3.	Hayes Avenue	Vineyard Parkway
4.	Washington Avenue	Nutmeg Street
5.	Washington Avenue	Nighthawk Way
6.	Washington Avenue	Fullerton Road
7.	Washington Avenue	Lemon Street
8.	Washington Avenue	Kalmia Street
9.	Hayes Avenue	Project Driveway 1
10.	Project Driveway 2	Fullerton Road

B. Study Area Roadway Segments

The study area includes the following roadway segments:

	Roadway	Segment
1.	Hayes Avenue	Nighthawk Way to Sherry Lane
2.	Hayes Avenue	Sherry Lane to Fullerton Road
3.	Hayes Avenue	Fullerton Road to Vineyard Parkway

C. Existing Traffic Controls and Intersection Geometrics

Exhibit 2-1 identifies the existing roadway conditions for the study area roadways. The number of through traffic lanes for existing roadways and the existing intersection controls are identified.

D. Existing Traffic Volumes

Existing AM and PM peak hour traffic volumes for study area intersections are shown on Exhibit 2-2. These volumes are based upon manual AM and PM peak hour turning movement counts compiled for RK in May 2019. Per industry standard, AM peak period counts are collected from 7:00 AM to 9:00 AM. PM peak period counts are collected from 4:00 PM to 6:00 PM.

The traffic counts were taken when school was in session. The traffic count worksheets are provided in Appendix B.

24-Hour Two-Way average daily traffic (ADT) volume counts were compiled for RK in May 2019. The ADT count worksheets are also provided in Appendix B.

E. Intersection Level of Service for Existing Conditions

Existing intersection level of service calculations are shown in Table 2-1 and are based upon manual AM and PM peak hour turning movement counts compiled for RK. The City of Murrieta requires Level of Service D or better.

As shown in Table 2-1, for Existing Conditions, all study area intersections are currently operating at Level of Service D or better during the peak hours.

HCM calculation worksheets for Existing Conditions are provided in Appendix C.

F. Roadway Segment Level of Service for Existing Conditions

The Roadway Segment Analysis for Existing Conditions is shown in Table 2-2 and is based upon measured ADT counts compiled for RK in May 2019. As previously noted, school was in session when the counts were taken. The minimum allowable Level of Service is C or better for all study area roadway segments.

As shown in Table 2-2, for Existing Conditions, the study area roadway segments are currently operating at an acceptable level of service based on the General Plan Classification of the roadway.

G. General Plan Circulation Element

Exhibit 2-3 shows the City of Murrieta General Plan 2035 Circulation Plan.

Exhibit 2-4 shows the City of Murrieta General Plan 2035 Typical Street Cross-Sections.

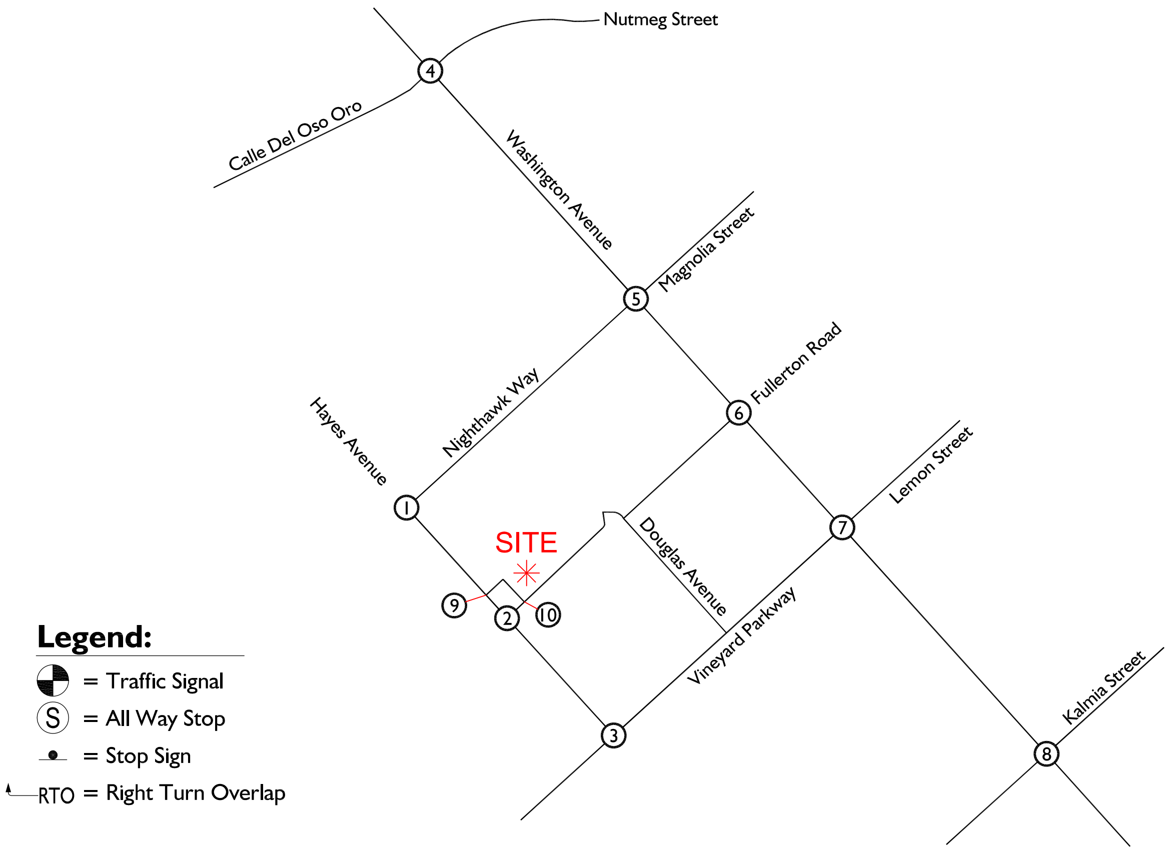
Exhibit 2-5 shows the City of Murrieta General Plan 2035 Trails and Bikeways Map. As can be seen from Exhibit 2-5, Hayes Avenue and Vineyard Parkway have Class II Bike Lanes.

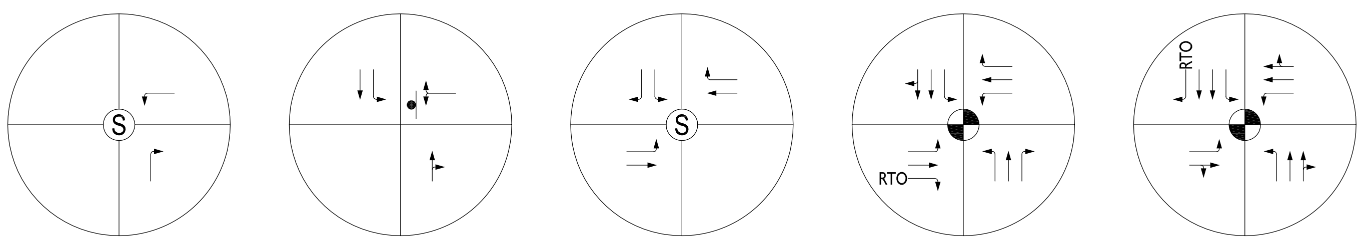
H. Public Transit Service

Public transit services in the study area are provided by the Riverside Transit Agency (RTA). Exhibit 2-6 provides the existing transit routes in the City of Murrieta, provided by the RTA. The following bus routes are currently operating in the vicinity of the project site:

- Route 23: Temecula – Murrieta – Wildomar

Existing Lane Geometry and Traffic Controls





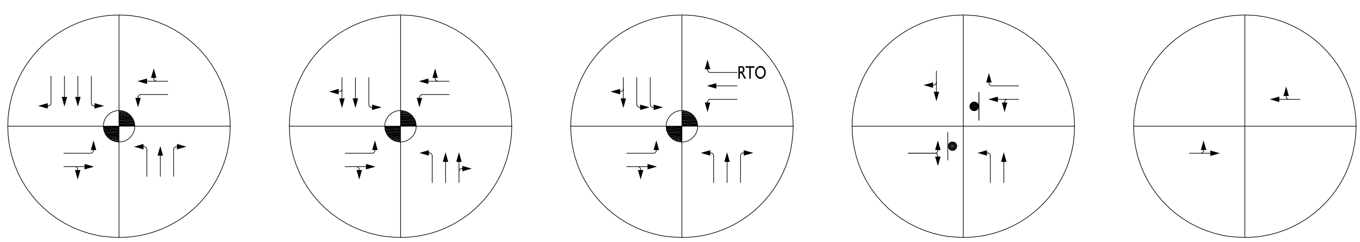
1. Hayes Ave. (NS) & Nighthawk Way (EW)

2. Hayes Ave. (NS) & Fullerton Rd. (EW)

3. Hayes Ave. (NS) & Vineyard Pkwy. (EW)

4. Washington Ave. (NS) & Nutmeg St. (EW)

5. Washington Ave. (NS) & Nighthawk Way (EW)



6. Washington Ave. (NS) & Fullerton Rd. (EW)

7. Washington Ave. (NS) & Lemon St. (EW)

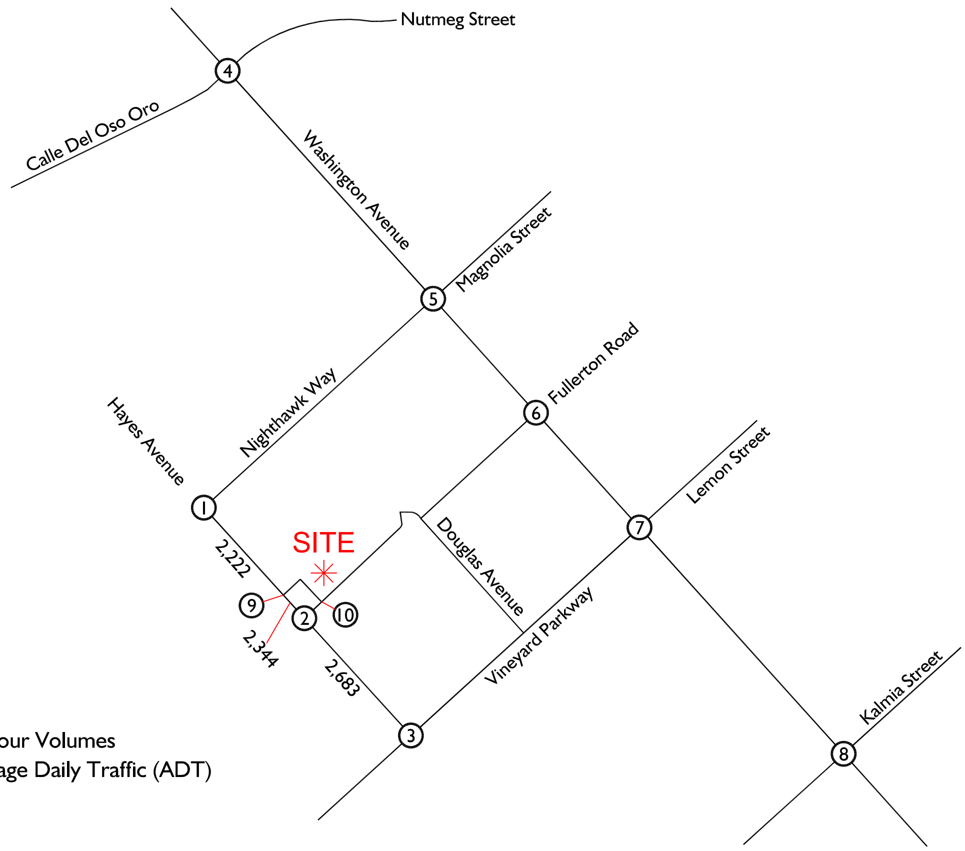
8. Washington Ave. (NS) & Kalmia St. (EW)

9. Hayes Ave. (NS) & Project Dwy. 1 (EW)

10. Project Dwy. 2 (NS) & Fullerton Rd. (EW)

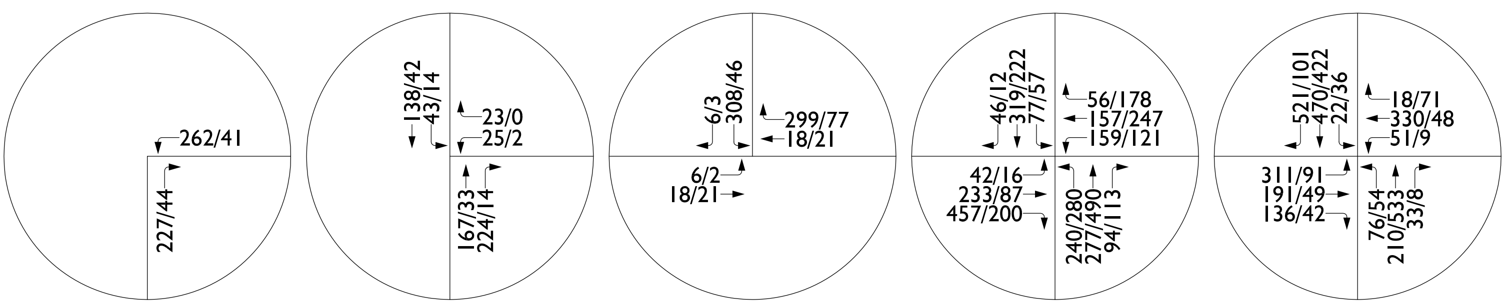
N

Exhibit 2-2
Existing Traffic Volumes



Legend:

10/20 = AM/PM Peak Hour Volumes
2,222 = Two-Way Average Daily Traffic (ADT)



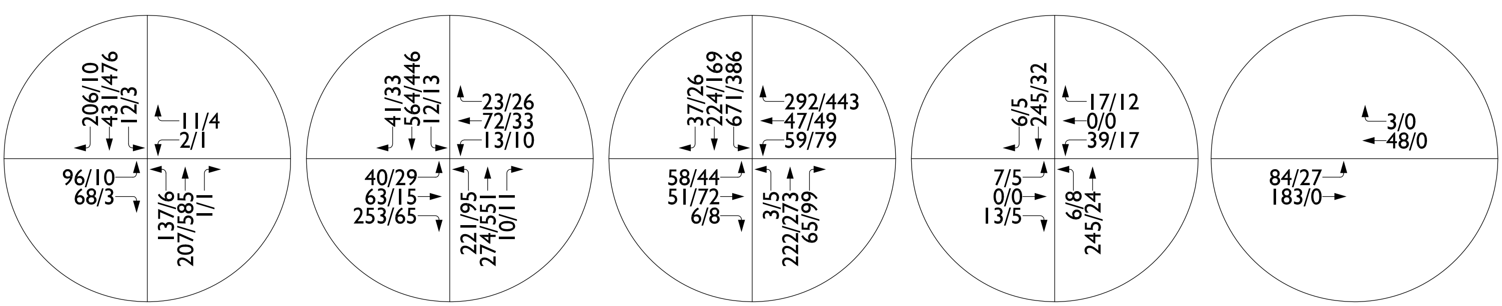
1. Hayes Ave. (NS) & Nighthawk Way (EW)

2. Hayes Ave. (NS) & Fullerton Rd. (EW)

3. Hayes Ave. (NS) & Vineyard Pkwy. (EW)

4. Washington Ave. (NS) & Nutmeg St. (EW)

5. Washington Ave. (NS) & Nighthawk Way (EW)



6. Washington Ave. (NS) & Fullerton Rd. (EW)

7. Washington Ave. (NS) & Lemon St. (EW)

8. Washington Ave. (NS) & Kalmia St. (EW)

9. Hayes Ave. (NS) & Project Dwy. 1 (EW)

10. Project Dwy. 2 (NS) & Fullerton Rd. (EW)

N

Exhibit 2-3

City of Murrieta General Plan 2035 Circulation Plan

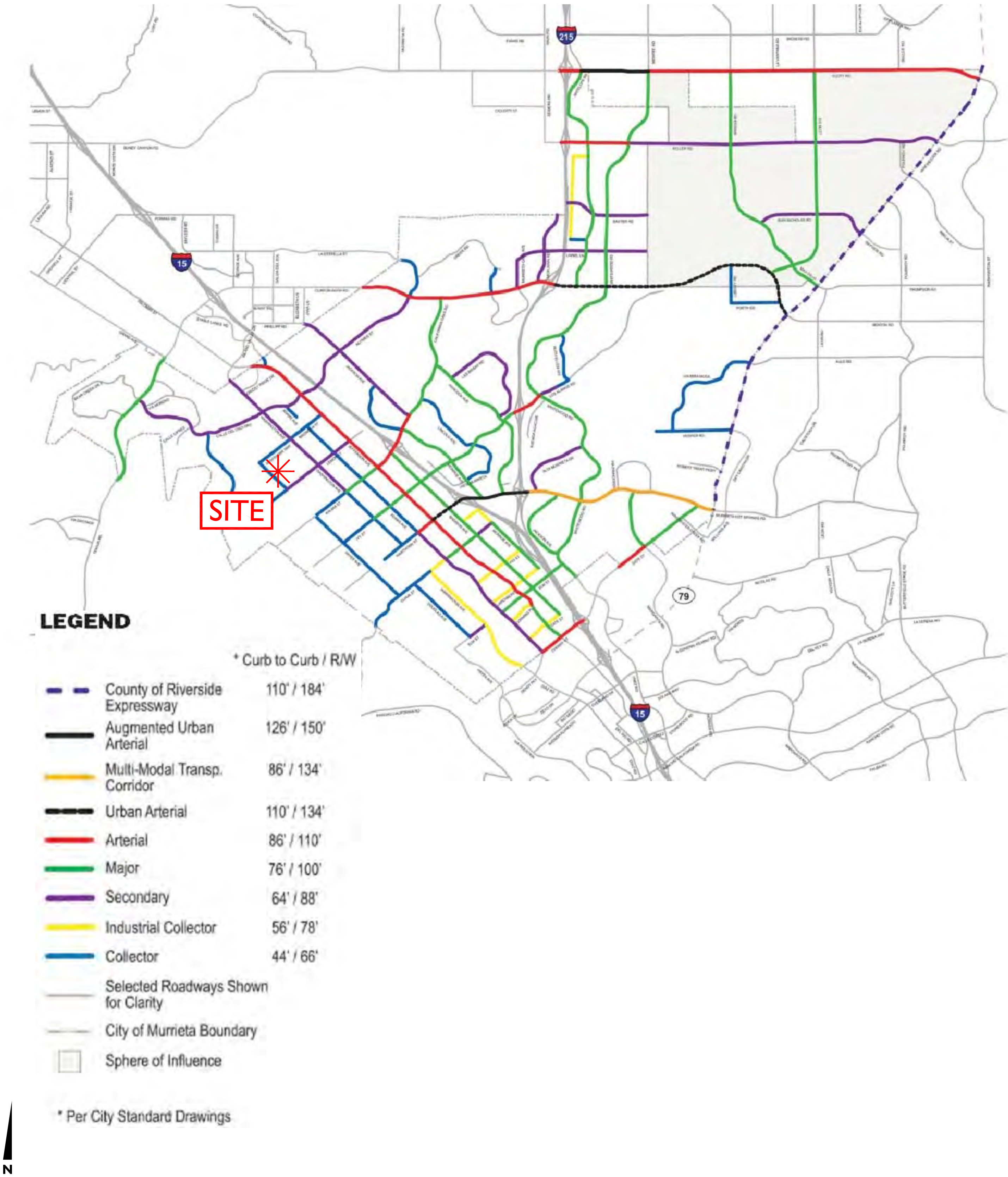


Exhibit 2-4
City of Murrieta Typical Street Cross-Sections

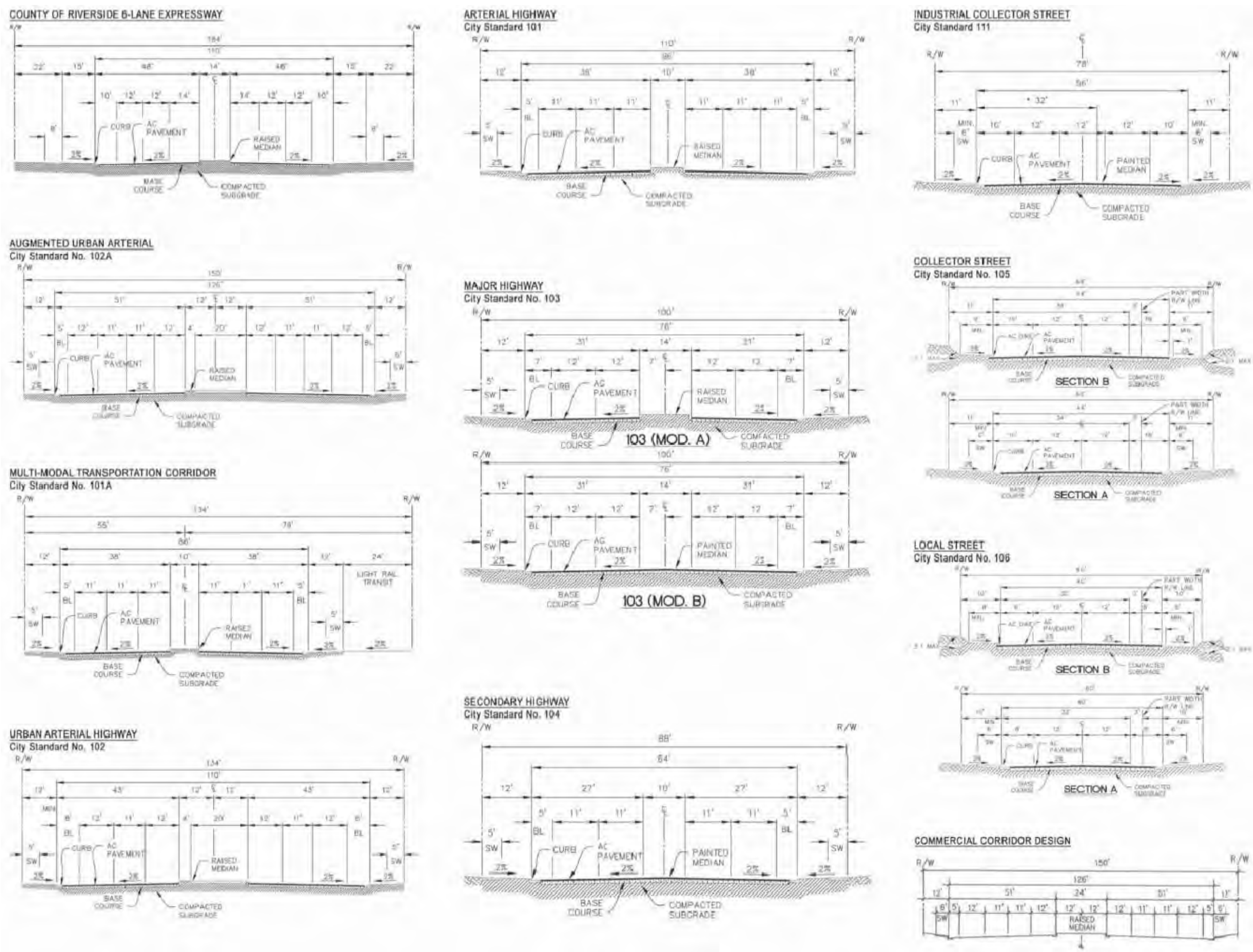
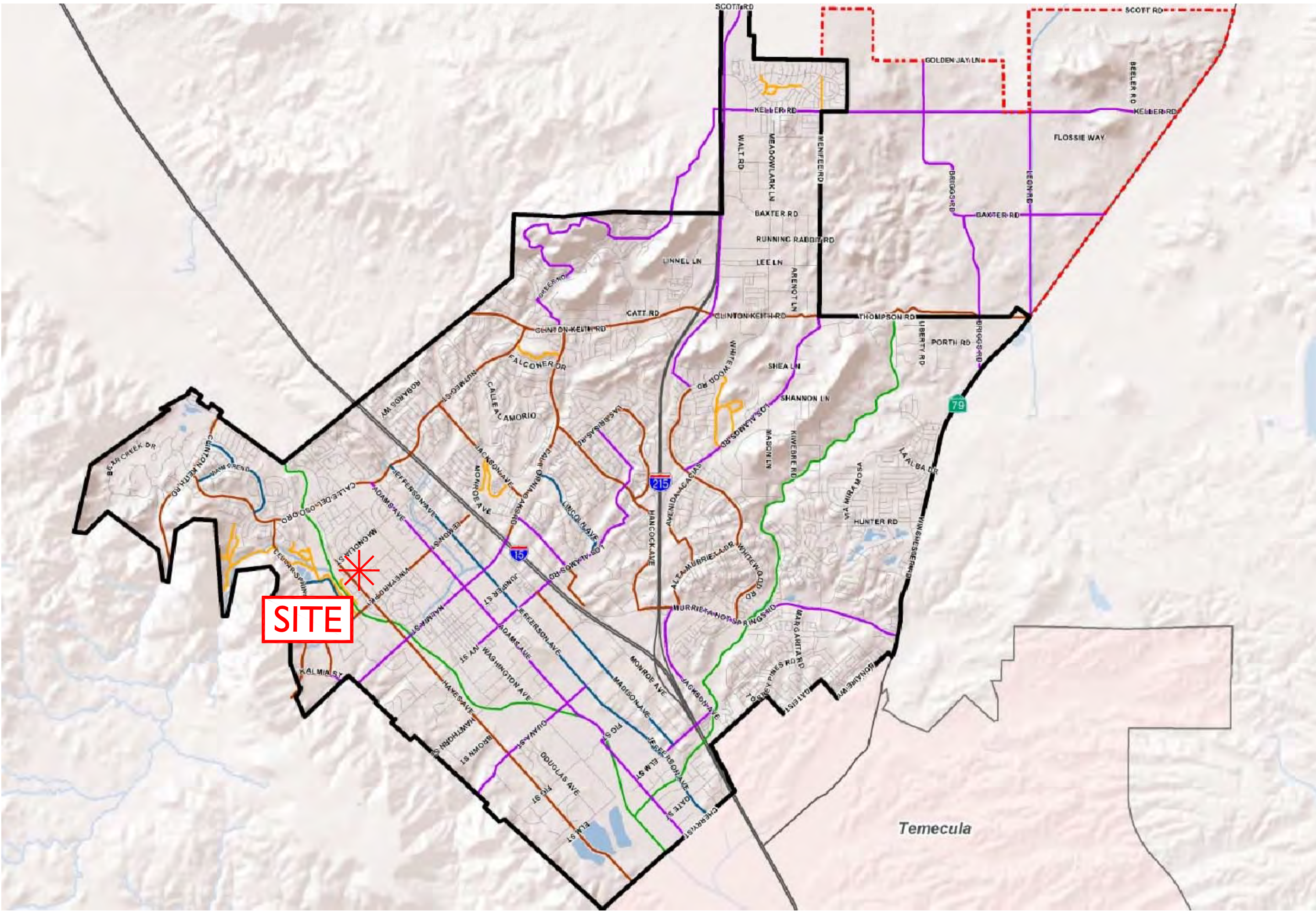


Exhibit 2-5
City of Murrieta Trails and Bikeways



LEGEND

- Class I Bike Lane
- Class II Bike Lane
- Class III Bike Lane

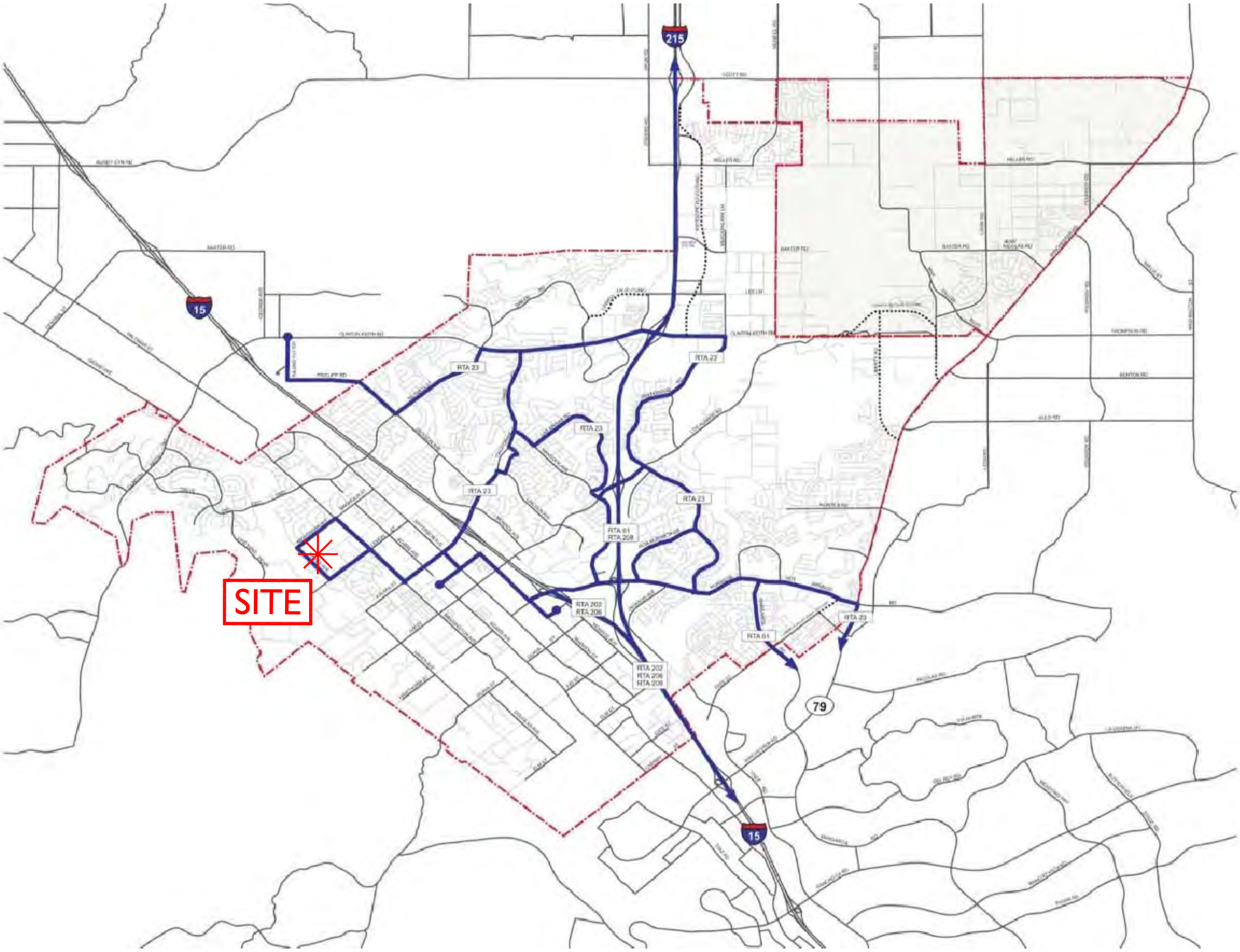
City Trail

- Horse, Bike, Walking
- Creek Segment
- Sphere of Influence
- City Boundary

N

Exhibit 2-6

City of Murrieta Transit Routes



LEGEND

- Bus Transit Line
- City of Murrieta Boundary
- Sphere of Influence
- Future Roadway Alignment

N

Table 2-1
Study Intersection LOS Analysis Summary
Existing Conditions

	Intersection	Traffic Control[3]	Intersection Approach Lane(s)[1]												Delay[2] (Secs)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
1.	Hayes Avenue (NS) / Nighthawk Way (EW)	AWS	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	11.6	7.0	B	A
2.	Hayes Avenue (NS) / Fullerton Road (EW)	CSS	0.0	0.5	0.5	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	14.9	9.2	B	A
3.	Hayes Avenue (NS) / Vineyard Parkway (EW)	AWS	0.0	0.0	0.0	0.5	0.0	0.5	1.0	1.0	0.0	0.0	1.0	1.0	15.4	7.7	C	A
4.	Washington Avenue (NS) / Nutmeg Street (EW)	TS	1.0	1.0	1.0	1.0	1.5	0.5	1.0	1.0	1>	1.0	1.0	1.0	32.7	24.8	C	C
5.	Washington Avenue (NS) / Nighthawk Way (EW)	TS	1.0	1.5	0.5	1.0	2.0	1>	1.0	0.5	0.5	1.0	1.5	0.5	31.9	13.7	C	B
6.	Washington Avenue (NS) / Fullerton Road (EW)	TS	1.0	1.0	1.0	1.0	2.0	1.0	1.0	0.5	0.5	1.0	0.5	0.5	14.8	5.3	B	A
7.	Washington Avenue (NS) / Lemon Street (EW)	TS	1.0	1.5	0.5	1.0	1.5	0.5	1.0	0.5	0.5	1.0	0.5	0.5	20.7	9.7	C	A
8.	Washington Avenue (NS) / Kalmia Street (EW)	TS	1.0	1.0	1.0	2.0	0.5	0.5	1.0	0.5	0.5	1.0	1.0	1>	27.3	26.5	C	C
9.	Hayes Avenue (NS) / Project Driveway 1 (EW)	CSS	1.0	1.0	0.0	0.0	0.5	0.5	0.5	0.0	0.5	0.5	0.5	1.0	16.5	9.2	C	A
10.	Project Driveway 2 (NS) / Fullerton Road (EW)	--	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.5	0.5	7.7	7.3	A	A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.
Where "1" is indicated for the through movement and "0"s are indicated for R/L movements, the R and/or L turns are shared with the through movement.
Deficient operation shown in **Bold.**

L = Left; T = Through; R = Right; > = Right Turn Overlap; >> = Free Right Turn; * = Defacto Right Turn Lane; ! = Indicates general purpose lane; **Bold Underline** = Improvement;

[2] Analysis Software: Synchro, Version 10.0. Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic signal or all-way stop control. For intersections with cross-street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] AWS = All Way Stop
CSS = Cross Street Stop

Table 2-2

Study Roadway Segment LOS Analysis Summary

Existing Conditions & Existing Plus Project Conditions

Study Roadway Segment	General Plan		No. of Lanes		Daily Capacity		Daily Traffic Volume			V/C Ratio		LOS	
	Classification	LOS E Capacity	Existing Conditions	Existing Plus Project Conditions	Existing Conditions	Existing Plus Project Conditions	Existing Conditions	Project ADT Assignment	Existing Plus Project Conditions	Existing Conditions	Existing Plus Project Conditions	Existing Conditions	Existing Plus Project Conditions
1. **Hayes Avenue** Nighthawk Way to Sherry Lane	Collector (2 Lanes)	13,000	2	2	13,000	13,000	2,222	335	2,557	0.17	0.20	A	A
2. **Hayes Avenue** Sherry Lane to Fullerton Road	Collector (2 Lanes)	13,000	2	2	13,000	13,000	2,344	518	2,862	0.18	0.22	A	A
3. **Hayes Avenue** Fullerton Road to Vineyard Parkway	Collector (2 Lanes)	13,000	2	2	13,000	13,000	2,683	883	3,566	0.21	0.27	A	A

3.0 Projected Traffic

A. Project Traffic Conditions

1. Trip Generation

Trip generation represents the amount of traffic that is attracted and produced by a development. The trip generation for the project is based upon the specific land uses that have been planned for this development.

Trip generation rates for the proposed development expansion are shown in Table 3-1. Due to the Murrieta Canyon Academy being an alternative high school with distinct operations that differ from those of a typical high school, the trip generation rates for this land use were calculated based on existing driveway counts at the site, which are based on the existing enrollment of 200 students.

Both daily and peak hour trip generation for the proposed development expansion are shown in Table 3-2. The proposed expansion is projected to generate approximately 1,218 daily trips, which include approximately 312 AM peak hour trips and approximately 90 PM peak hour trips.

2. Trip Distribution and Assignment

Trip distribution represents the directional orientation of traffic to and from the project site. Trip distribution is heavily influenced by the geographical location of the site, the location of residential, employment and recreational opportunities and the proximity to the regional freeway system. The directional orientation of traffic for the proposed project was determined by evaluating existing travel patterns and traffic volumes at the driveways.

Trip distribution for this study has been based upon near-term conditions, based upon those highway facilities, which are either in place or will be implemented over the next few years, which represents the buildout occupancy for the proposed development expansion.

Exhibit 3-1 shows the *inbound* trip distribution for the proposed project.

Exhibit 3-2 shows the *outbound* trip distribution for the proposed project.

The assignment of traffic from the site to the adjoining roadway system has been based upon the site's trip generation, trip distributions, existing and proposed arterial highway and local street systems, which would be in place by the time of completion of the development expansion.

3. Modal Split

Modal split denotes the proportion of traffic generated by a project that would use any of the transportation modes, namely buses, cars, bicycles, motorcycles, trains, carpools, etc. The traffic reducing potential of public transit and other modes is significant. However, the traffic projections are "conservative" in that public transit and alternative transportation may be able to reduce the traffic volumes. Thus, no modal split reduction is applied to the projections. With the implementation of transit service and provision of alternative transportation ideas and incentives, the automobile traffic demand can be reduced.

4. Project Traffic Volumes

Project peak hour traffic volumes have been calculated throughout the study area. The project traffic volumes are shown on Exhibit 3-3.

B. Existing Plus Project Conditions

1. Existing Plus Project Conditions Traffic Volumes

Existing Plus Project Conditions include existing traffic volumes and project traffic. Existing Plus Project Conditions traffic volumes are shown on Exhibit 3-4.

2. Intersection Level of Service for Existing Plus Project Conditions

Intersection levels of service for the existing network with the proposed project are shown in Table 3-3. As shown in Table 3-3, HCM calculations are based on the existing intersection geometrics. For Existing Plus Project Conditions, all study area intersections are forecast to continue to operate at Level of Service D or better during the peak hours.

HCM calculation worksheets for Existing Plus Project Conditions are provided in Appendix D.

3. Roadway Segment Level of Service for Existing Plus Project Conditions

The roadway segment level of service calculations for Existing Plus Project Conditions are shown in Table 2-2. The City of Murrieta requires Level of Service C or better for all study area roadway segments.

As shown in Table 2-2, for Existing Plus Project Conditions, the study area roadway segments are forecast to continue to operate at an acceptable level of service based on the General Plan Classification of the roadway.

C. Cumulative Projects Traffic

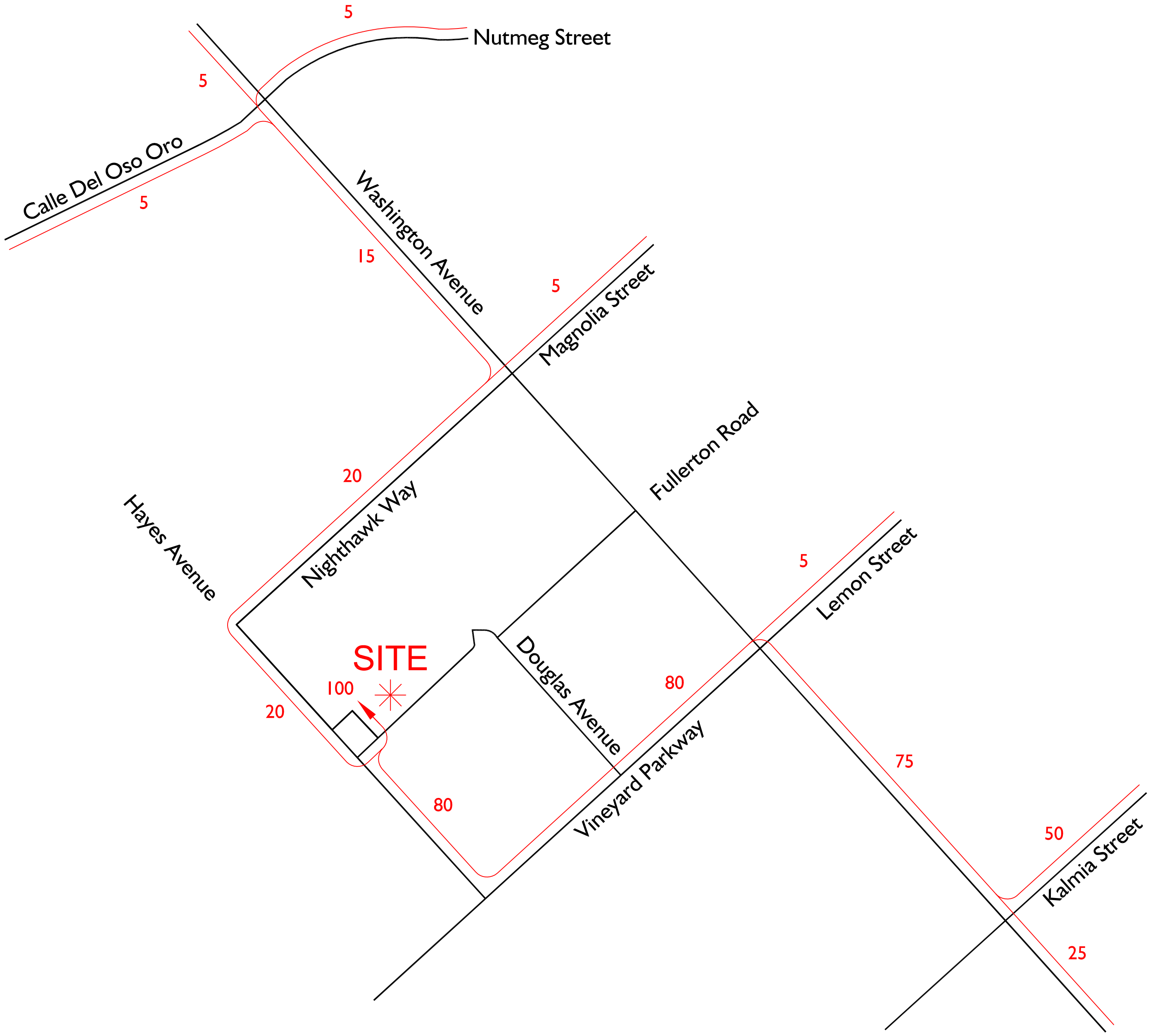
Table 3-4 lists the proposed land uses for the nearby developments for Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions known by the City of Murrieta and RK Engineering at the time this study was prepared.

Developments that have been approved or are being processed concurrently in the study area include the projects illustrated in Exhibit 3-5.

The Cumulative Projects' traffic volumes are shown on Exhibit 3-6.

Exhibit 3-1

Project Inbound Trip Distribution



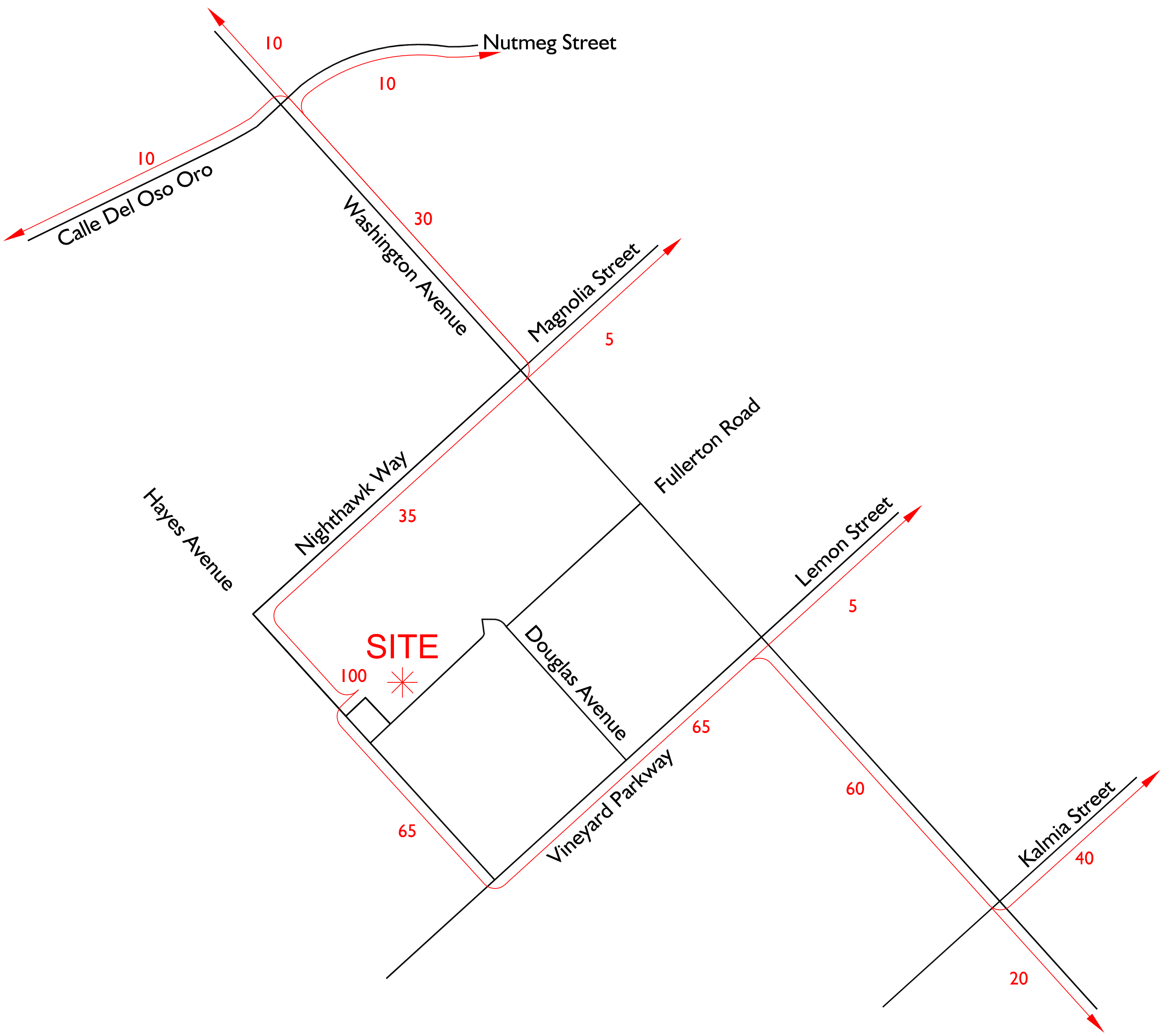
Legend:

10 = Percent to Site

N

Exhibit 3-2

Project Outbound Trip Distribution

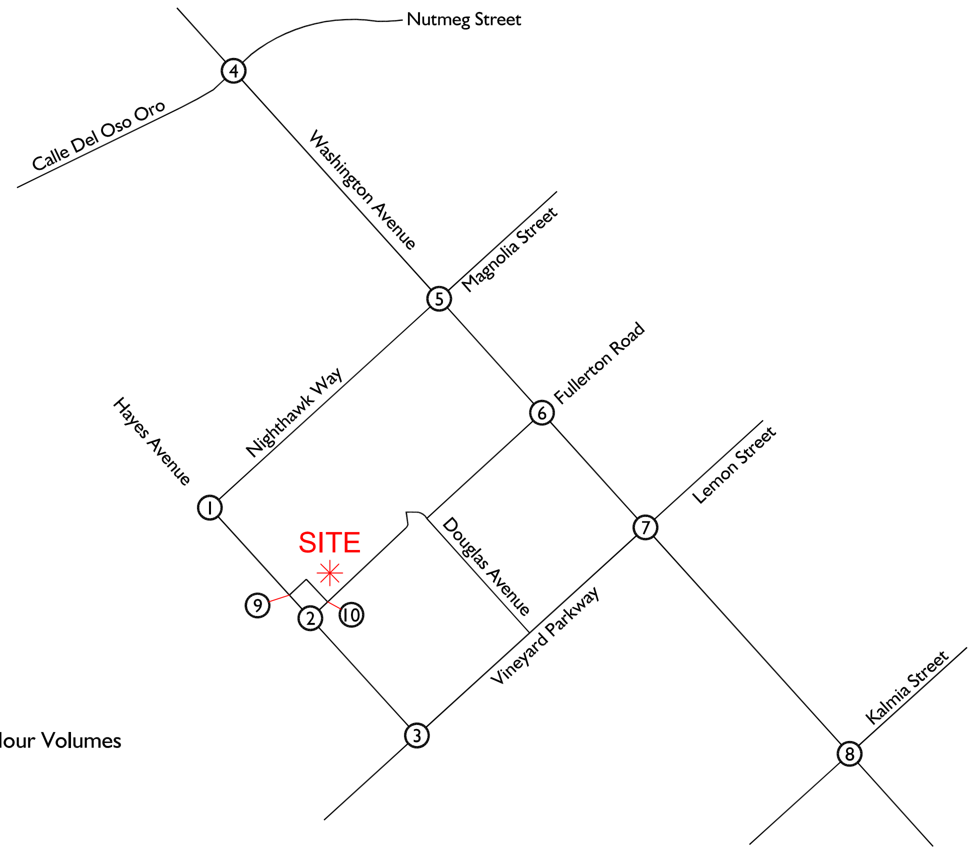


Legend:

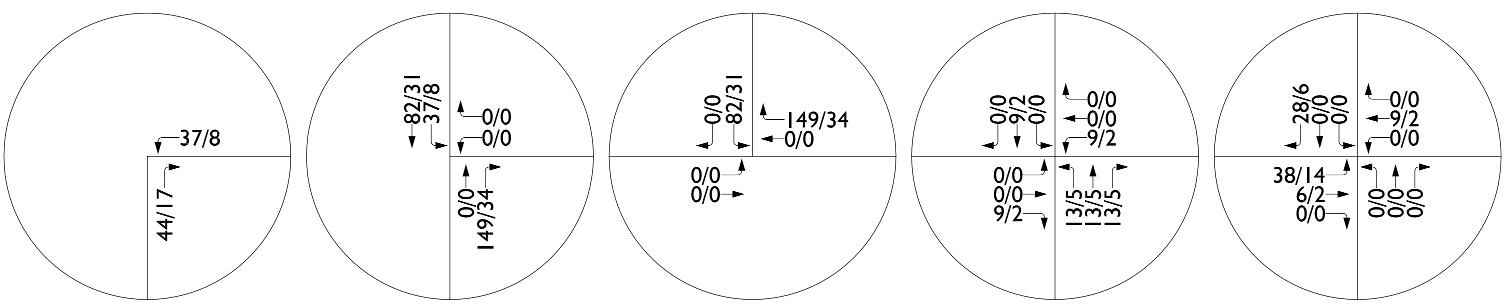
10 = Percent from Site

N

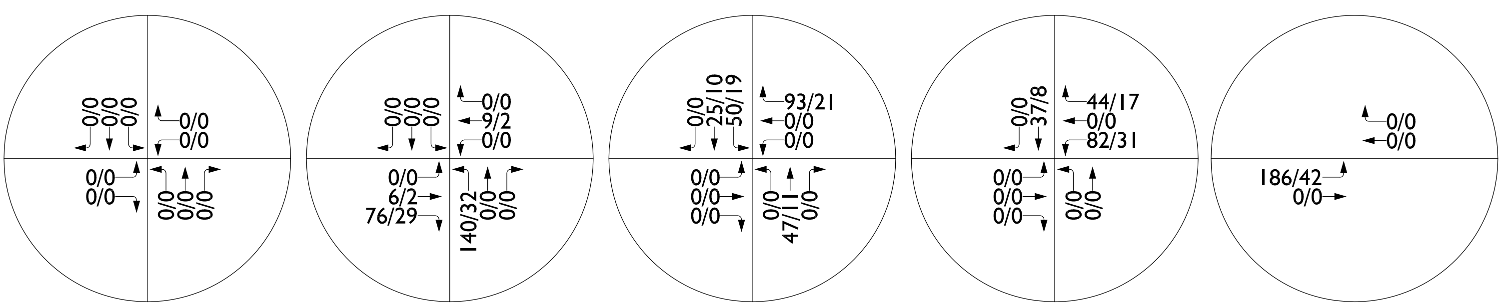
Exhibit 3-3
Project Traffic Volumes



Legend:
10/20 = AM/PM Peak Hour Volumes



1. Hayes Ave. (NS) & Nighthawk Way (EW)
2. Hayes Ave. (NS) & Fullerton Rd. (EW)
3. Hayes Ave. (NS) & Vineyard Pkwy. (EW)
4. Washington Ave. (NS) & Nutmeg St. (EW)
5. Washington Ave. (NS) & Nighthawk Way (EW)

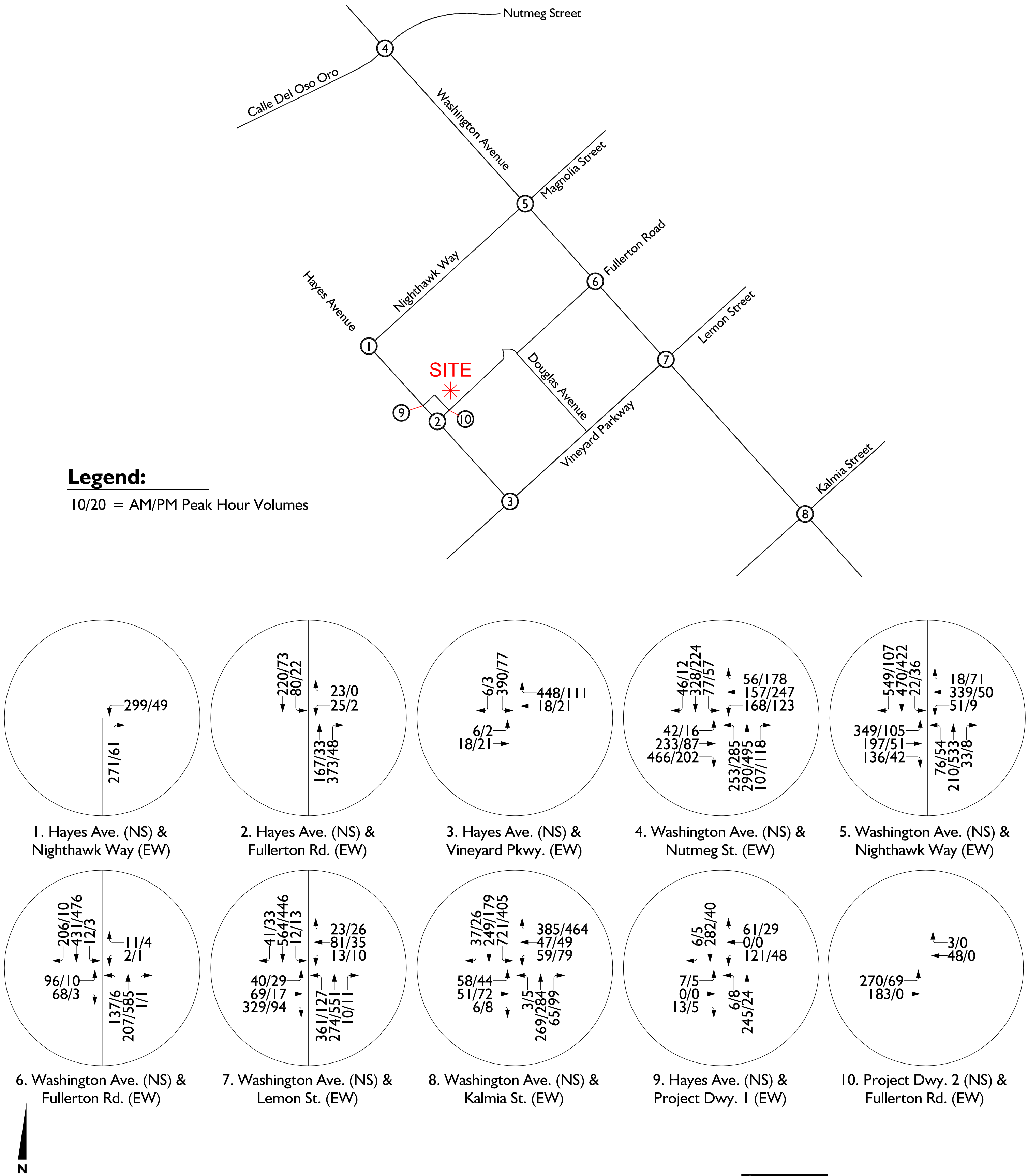


6. Washington Ave. (NS) & Fullerton Rd. (EW)
7. Washington Ave. (NS) & Lemon St. (EW)
8. Washington Ave. (NS) & Kalmia St. (EW)
9. Hayes Ave. (NS) & Project Dwy. 1 (EW)
10. Project Dwy. 2 (NS) & Fullerton Rd. (EW)

N

Exhibit 3-4

Existing Plus Project Conditions Traffic Volumes



1. Hayes Ave. (NS) & Nighthawk Way (EW)

2. Hayes Ave. (NS) & Fullerton Rd. (EW)

3. Hayes Ave. (NS) & Vineyard Pkwy. (EW)

4. Washington Ave. (NS) & Nutmeg St. (EW)

5. Washington Ave. (NS) & Nighthawk Way (EW)

6. Washington Ave. (NS) & Fullerton Rd. (EW)

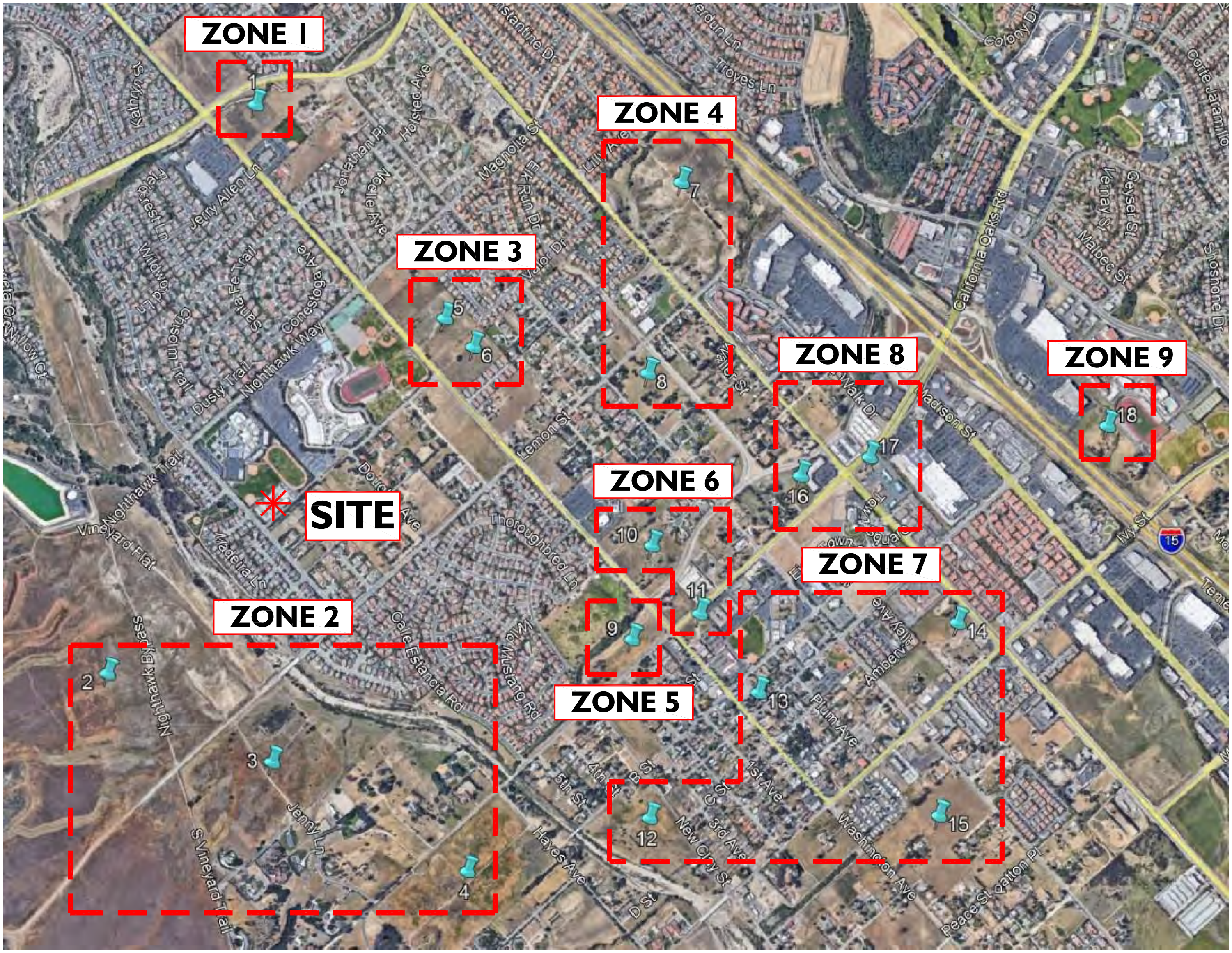
7. Washington Ave. (NS) & Lemon St. (EW)

8. Washington Ave. (NS) & Kalmia St. (EW)

9. Hayes Ave. (NS) & Project Dwy. 1 (EW)

10. Project Dwy. 2 (NS) & Fullerton Rd. (EW)

Exhibit 3-5
Cumulative Projects Location Map



Zone 1:
- 1 = DP-2016-992
- 2 = Raintree Investments GVSP

Zone 2:
- 2 = VTTM 28903
- 3 = TTM 36385
- 4 = TTM 37621

Zone 3:
- 5 = TTM 30953
- 6 = TTM 31467

Zone 4:
- 7 = TTM 36850
- 8 = TTM 37430

Zone 5:
- 9 = DP-2018-1593

Zone 6:
- 10 = DP-2017-1299
- 11 = DP-2018-1741

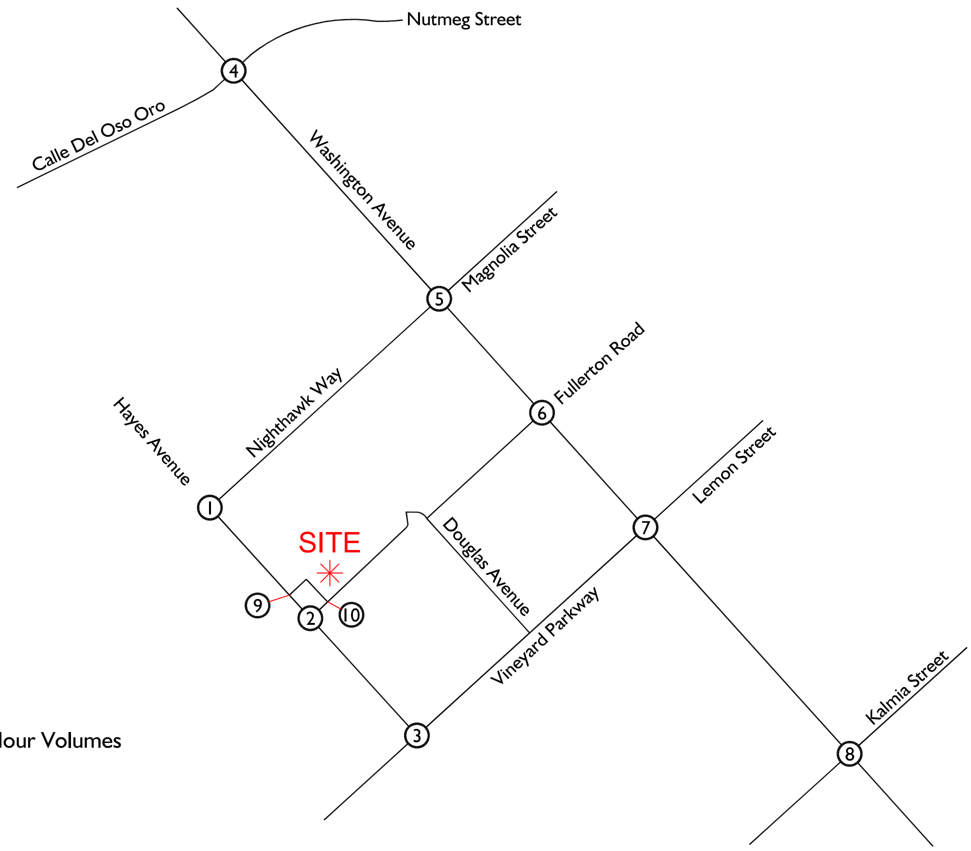
Zone 7:
- 12 = TTM 34439
- 13 = DP-2013-118
- 14 = DP-2017-1397
- 15 = TTM 36848

Zone 8:
- 16 = DP-2017-1359
- 17 = DP-2019-1856

Zone 9:
- 18 = DP-2016-1010

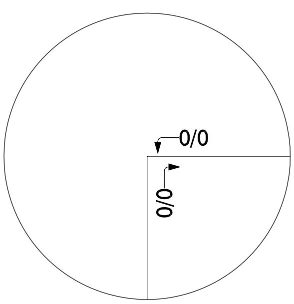
Exhibit 3-6

Cumulative Projects Traffic Volumes

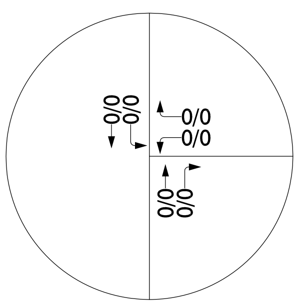


Legend:

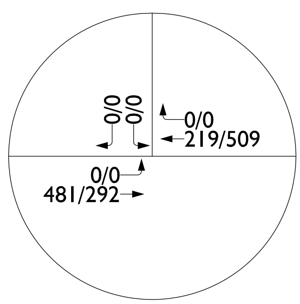
10/20 = AM/PM Peak Hour Volumes



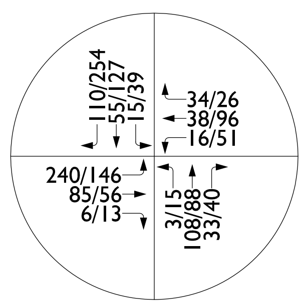
1. Hayes Ave. (NS) & Nighthawk Way (EW)



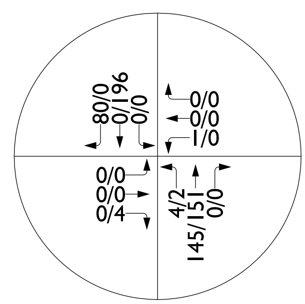
2. Hayes Ave. (NS) & Fullerton Rd. (EW)



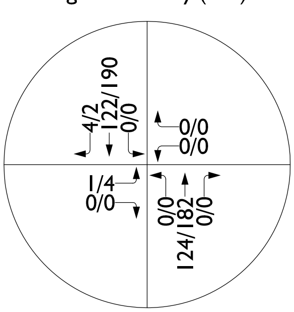
3. Hayes Ave. (NS) & Vineyard Pkwy. (EW)



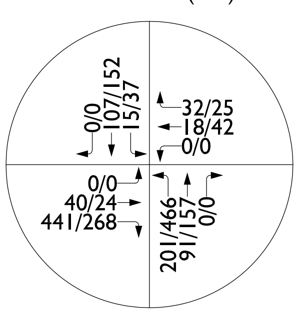
4. Washington Ave. (NS) & Nutmeg St. (EW)



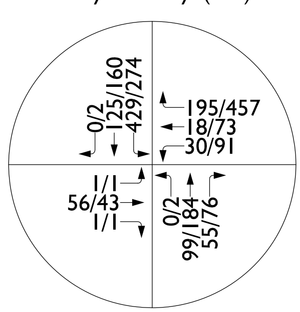
5. Washington Ave. (NS) & Nighthawk Way (EW)



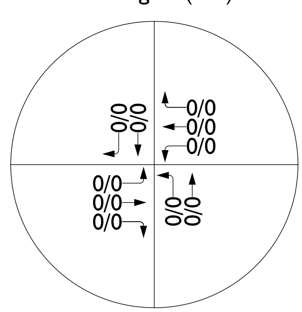
6. Washington Ave. (NS) & Fullerton Rd. (EW)



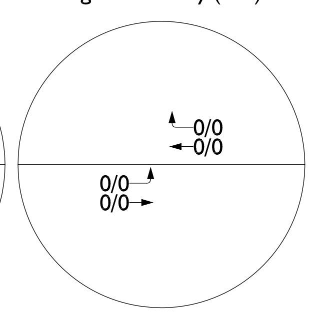
7. Washington Ave. (NS) & Lemon St. (EW)



8. Washington Ave. (NS) & Kalmia St. (EW)



9. Hayes Ave. (NS) & Project Dwy. 1 (EW)



10. Project Dwy. 2 (NS) & Fullerton Rd. (EW)

N

Table 3-1

Project Trip Generation Rates[1]

Land Use	Units[2]	AM Peak Hour			PM Peak Hour			Daily
		In	Out	Total	In	Out	Total	
Murrieta Canyon Academy	STU	0.62	0.42	1.04	0.14	0.16	0.30	4.06

[1] Source: Existing traffic counts based on existing enrollment of 200 students.

[2] STU = Students.

Table 3-2
Project Trip Generation[1]

Land Use	Quantity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Murrieta Canyon Academy	300	STU	186	126	312	42	48	90	1,218
Total Trips			**186**	**126**	**312**	**42**	**48**	**90**	**1,218**

[1] Source: Existing traffic counts based on existing enrollment of 200 students.
[2] STU = Students.

j:\rktables\RK15479TB.xlsx
JN:0280-2019-01

Table 3-3
Study Intersection LOS Analysis Summary
Existing Plus Project Conditions

	Intersection	Traffic Control[3]	Intersection Approach Lane(s)[1]												Delay[2] (Secs)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
1.	Hayes Avenue (NS) / Nighthawk Way (EW)	AWS	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	13.7	7.1	B	A
2.	Hayes Avenue (NS) / Fullerton Road (EW)	CSS	0.0	0.5	0.5	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	22.7	9.7	C	A
3.	Hayes Avenue (NS) / Vineyard Parkway (EW)	AWS	0.0	0.0	0.0	0.5	0.0	0.5	1.0	1.0	0.0	0.0	1.0	1.0	33.5	8.2	D	A
4.	Washington Avenue (NS) / Nutmeg Street (EW)	TS	1.0	1.0	1.0	1.0	1.5	0.5	1.0	1.0	1>	1.0	1.0	1.0	34.2	24.9	C	C
5.	Washington Avenue (NS) / Nighthawk Way (EW)	TS	1.0	1.5	0.5	1.0	2.0	1>	1.0	0.5	0.5	1.0	1.5	0.5	35.6	13.8	D	B
6.	Washington Avenue (NS) / Fullerton Road (EW)	TS	1.0	1.0	1.0	1.0	2.0	1.0	1.0	0.5	0.5	1.0	0.5	0.5	14.9	5.3	B	A
7.	Washington Avenue (NS) / Lemon Street (EW)	TS	1.0	1.5	0.5	1.0	1.5	0.5	1.0	0.5	0.5	1.0	0.5	0.5	34.9	10.8	C	B
8.	Washington Avenue (NS) / Kalmia Street (EW)	TS	1.0	1.0	1.0	2.0	0.5	0.5	1.0	0.5	0.5	1.0	1.0	1>	32.8	27.8	C	C
9.	Hayes Avenue (NS) / Project Driveway 1 (EW)	CSS	1.0	1.0	0.0	0.0	0.5	0.5	0.5	0.0	0.5	0.5	0.5	1.0	24.7	9.5	C	A
10.	Project Driveway 2 (NS) / Fullerton Road (EW)	--	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.5	0.5	8.9	8.3	A	A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.
Where "1" is indicated for the through movement and "0"s are indicated for R/L movements, the R and/or L turns are shared with the through movement.
Deficient operation shown in **Bold.**

L = Left; T = Through; R = Right; > = Right Turn Overlap; >> = Free Right Turn; * = Defacto Right Turn Lane; ! = Indicates general purpose lane; **Bold Underline** = Improvement;

[2] Analysis Software: Synchro, Version 10.0. Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic signal or all-way stop control. For intersections with cross-street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] AWS = All Way Stop
CSS = Cross Street Stop

j:\rktables\RK15479TB.xlsx
JN:0280-2019-01

Table 3-4
Cumulative Projects Trip Generation[1]

ID No.	Jurisdiction	Project Name / Case Number	Land Use	ITE Trip Code	Quantity	Units[2]	Peak Hour						Daily
							AM			PM			
							In	Out	Total	In	Out	Total	
TAZ 1													
1	Murrieta	DP-2016-992	Assisted Living	254	108	Beds	13	8	21	11	17	28	281
TAZ 2													
2	Murrieta	VTTM 28903[3]	Single Family Housing	210	1,306	DU	216	637	853	739	410	1,149	10,890
			Elementary School	520	600	STU	102	72	174	6	6	12	612
			Day Care Center	565	50	STU	22	19	41	20	23	43	226
3	Murrieta	TTM 36385[3]	Single Family Housing	210	105	DU	20	59	79	67	39	106	1,005
4	Murrieta	TTM 37621	Single Family Housing	210	25	DU	5	14	19	16	9	25	236
						TAZ 2 Total	**365**	**801**	**1,166**	**848**	**487**	**1,335**	**12,969**
TAZ 3													
5	Murrieta	TTM 30953[3]	Multifamily Housing (Low-Rise)	220	141	DU	11	61	72	59	28	87	935
6	Murrieta	TTM 31467[3]	Multifamily Housing (Low-Rise)	220	64	DU	4	24	28	23	12	35	375
						TAZ 3 Total	**15**	**85**	**100**	**82**	**40**	**122**	**1,310**
TAZ 4													
7	Murrieta	TTM 36850[3]	Single Family Housing	210	270	DU	51	151	202	170	100	270	2,570
8	Murrieta	TTM 37430	Single Family Housing	210	12	DU	2	7	9	7	4	11	113
						TAZ 4 Total	**53**	**158**	**211**	**177**	**104**	**281**	**2,683**
TAZ 5													
9	Murrieta	DP-2018-1593[3]	Timeshare	265	161	DU	19	58	77	76	45	121	1,615
TAZ 6													
10	Murrieta	DP-2017-1299	Mini Warehouse	151	191.900	TSF	12	8	20	15	17	32	290
11	Murrieta	DP-2018-1741	Shopping Center	820	51.455	TSF	30	18	48	94	102	196	1,942
						TAZ 6 Total	**42**	**26**	**68**	**109**	**119**	**228**	**2,232**
TAZ 7													
12	Murrieta	TTM 34439	Single Family Housing	210	62	DU	11	34	45	39	23	62	585
13	Murrieta	DP-2013-118	Multifamily Housing (Low-Rise)	220	2	DU	0	1	1	1	0	1	15
			Shopping Center	820	6.212	TSF	4	2	6	11	12	23	235
14	Murrieta	DP-2017-1397[3]	Multifamily Housing (Low-Rise)	220	333	DU	33	137	170	133	73	206	2,214
15	Murrieta	TTM 36848[3]	Single Family Housing	210	86	DU	16	48	64	54	32	86	819
						TAZ 7 Total	**64**	**222**	**286**	**238**	**140**	**378**	**3,868**
TAZ 8													
16	Murrieta	DP-2017-1359	Medical/Dental Office Building	720	13.100	TSF	28	8	36	13	33	46	456
17	Murrieta	DP-2019-1856	Automated Car Wash	948	4.975	TSF	NA	NA	NA	35	35	70	NA
						TAZ 8 Total	**28**	**8**	**36**	**48**	**68**	**116**	**456**
TAZ 9													
18	Murrieta	DP-2016-1010[3]	Hotel	310	104	Rooms	166	146	311	150	127	277	4,062
			Shopping Center	820	8.500	TSF							
			Quality Restaurant	931	12.100	TSF							
			Fast Food with Drive-Thru	934	4.000	TSF							
			Coffee/Donut Shop with Drive-Thru	937	2.000	TSF							
						Total Cumulative Projects Trip Generation	***765***	***1,512***	***2,276***	***1,739***	***1,147***	***2,886***	***29,476***

[1] Cumulative Projects information provided by the City of Murrieta.

j:\rktables\RK15479TB.xlsx
JN:0280-2019-01

4.0 MUTCD Traffic Signal Warrant Analysis

For all analysis scenarios, the following study intersection has been evaluated for signalization based on the peak hour volume warrant and procedures contained in the *California Manual on Uniform Traffic Control Devices (CA MUTCD), 2014 Edition*:

- Int 3 – Hayes Avenue / Vineyard Parkway

Table 4-1 summarizes the results of the *MUTCD* signal warrant analysis. Detailed *MUTCD* signal warrant analysis sheets are contained in Appendix E.

As shown in Table 4-1, the Hayes Avenue / Vineyard Parkway intersection does not meet the peak hour volume criteria to satisfy the signal warrant for Existing or Existing Plus Project Conditions. However, the intersection is forecast to continue to perform at an acceptable LOS for Existing Plus Project Conditions.

As shown in Table 4-1, the Hayes Avenue / Vineyard Parkway intersection meets the peak hour volume criteria to satisfy the signal warrant for the following analysis scenarios:

- Project Buildout Year Plus Project (AM Peak Hour);

- Project Buildout Year With Cumulative Projects (AM Peak Hour); and

- Project Buildout Year With Cumulative Projects Plus Project (AM Peak Hour).

Table 4-1

Unsignalized Study Intersections Traffic Signal Warrant Analysis Summary

Intersection		**Signal Warrant Met?**									
		Existing Conditions		Existing Plus Project Conditions		Project Buildout Year With Ambient Growth Plus Project Conditions		Project Buildout Year With Ambient Growth With Cumulative Projects Conditions		Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
3.	Hayes Avenue (NS) / Vineyard Parkway (EW)	NO	NO	NO	NO	**YES**	NO	**YES**	NO	**YES**	NO

j:\rktables\RK15479TB.xlsx
JN:2757-2019-02

5.0 Project Buildout Year Conditions

A. Background Traffic

The development expansion is proposed for completion by Year 2023. To be conservative, this traffic impact study has analyzed the project in one (1) complete phase. To assess Project Buildout Year With Ambient Growth traffic conditions, project traffic is combined with existing traffic, and area-wide growth.

Project Buildout Year With Ambient Growth volumes were derived by applying a two percent (2%) annual growth rate over a four-year period to existing volumes. The background traffic growth rate is consistent with typical ambient growth rates used for traffic impact studies in the City of Murrieta.

B. Project Buildout Year With Ambient Growth Plus Project Conditions Traffic Volumes

Project Buildout Year With Ambient Growth Plus Project Conditions include existing traffic volumes on surrounding roadways, area-wide growth, and project traffic. The AM and PM peak hour intersection turning movement volumes and average daily traffic are shown on Exhibit 5-1 for Project Buildout Year With Ambient Growth Plus Project Conditions.

C. Intersection Level of Service for Project Buildout Year With Ambient Growth Plus Project Conditions

Intersection levels of service for the existing network with background growth, and the proposed project are shown in Table 5-1. As shown in Table 5-1, HCM calculations are based on the existing intersection geometrics. For Project Buildout Year With Ambient Growth Plus Project Conditions, all study area intersections are forecast to continue to operate at Level of Service D or better during the peak hours, with the exception of the following intersection that is forecast to operate at an unacceptable Level of Service during peak hours:

- Int 3 – Hayes Avenue / Vineyard Parkway (AM Peak Hour)

HCM calculation worksheets for Project Buildout Year With Ambient Growth Plus Project Conditions are provided in Appendix F.

D. Project Buildout Year With Ambient Growth With Cumulative Projects Conditions Traffic Volumes

Project Buildout Year With Ambient Growth With Cumulative Projects Conditions include existing traffic volumes on surrounding roadways, area-wide growth, and cumulative projects traffic. Project Buildout Year With Ambient Growth With Cumulative Projects Conditions traffic volumes are shown on Exhibit 5-2.

E. Intersection Level of Service for Project Buildout Year With Ambient Growth With Cumulative Projects Conditions

Intersection levels of service for the existing network with background growth, and the cumulative projects are shown in Table 5-2. As shown in Table 5-2, HCM calculations are based on the existing intersection geometrics. For Project Buildout Year With Ambient Growth With Cumulative Projects Conditions, all study area intersections are forecast to continue to operate at Level of Service D or better during the peak hours, with the exception of the following intersections that are forecast to operate at an unacceptable Level of Service during peak hours:

- Int 3 – Hayes Avenue / Vineyard Parkway (AM and PM Peak Hours); and
- Int 7 – Washington Avenue / Lemon Street (AM Peak Hour); and
- Int 8 – Washington Avenue / Kalmia Street (PM Peak Hour).

HCM calculation worksheets for Project Buildout Year With Ambient Growth With Cumulative Projects Conditions are provided in Appendix G.

F. Roadway Segment Level of Service for Project Buildout Year With Ambient Growth With Cumulative Projects Conditions

The roadway segment level of service calculations for Project Buildout Year With Ambient Growth With Cumulative Projects Conditions are shown in Table 5-4. The City of Murrieta requires Level of Service C or better for all study area roadway segments.

For Project Buildout Year With Ambient Growth With Cumulative Projects Conditions, the study area roadway segments are forecast to operate at an acceptable level of service based on the General Plan Classification of the roadway.

G. Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions Traffic Volumes

Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions include existing traffic volumes on surrounding roadways, area-wide growth, cumulative projects traffic, and project traffic. Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions traffic volumes are shown on Exhibit 5-3.

H. Intersection Level of Service for Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions

Intersection levels of service for the existing network with background growth, cumulative projects, and the proposed project are shown in Table 5-3. As shown in Table 5-3, HCM calculations are based on the existing intersection geometrics. For Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions, all study area intersections are forecast to continue to operate at Level of Service D or better during the peak hours, with the exception of the following intersections that are forecast to operate at an unacceptable Level of Service during peak hours:

- Int 3 – Hayes Avenue / Vineyard Parkway (AM and PM Peak Hours); and
- Int 7 – Washington Avenue / Lemon Street (AM and PM Peak Hours); and
- Int 8 – Washington Avenue / Kalmia Street (AM and PM Peak Hours).

HCM calculation worksheets for Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions are provided in Appendix H.

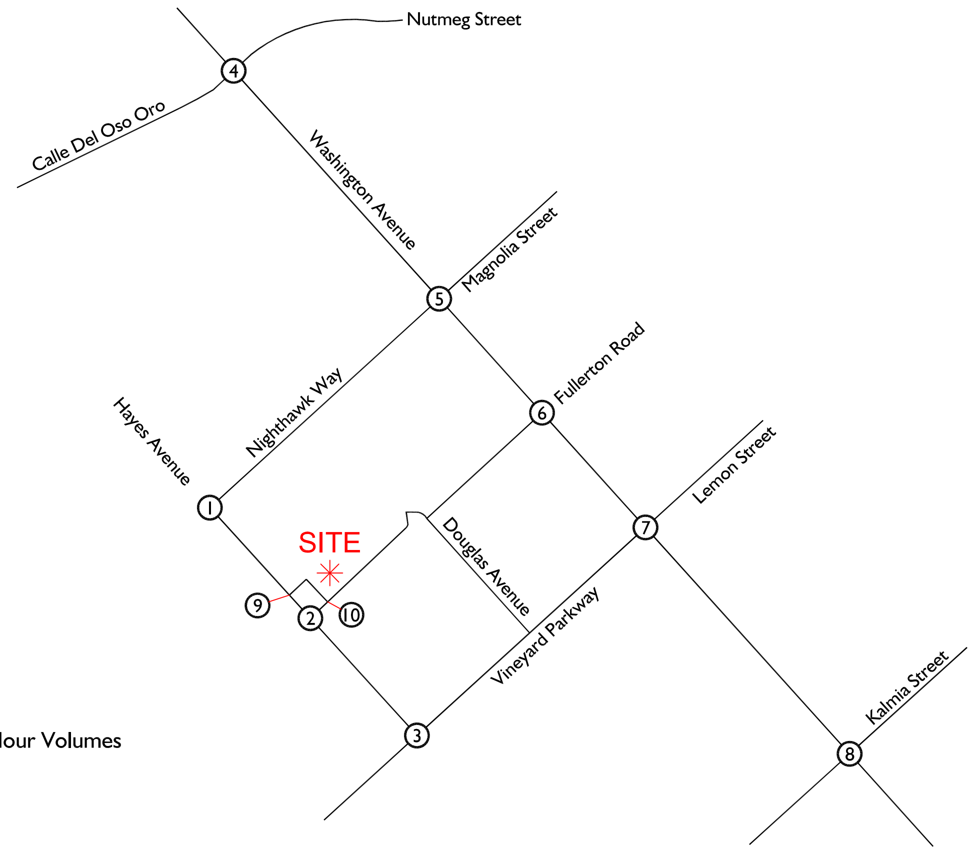
I. Roadway Segment Level of Service for Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions

The roadway segment level of service calculations for Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions are shown in Table 5-4. The City of Murrieta requires Level of Service C or better for all study area roadway segments.

As shown in Table 5-4, for Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions, the study area roadway segments are forecast to operate at an acceptable level of service based on the General Plan Classification of the roadway.

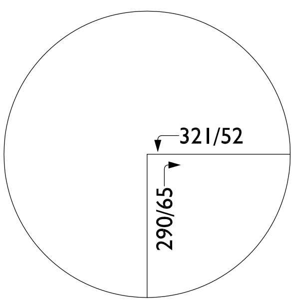
Exhibit 5-1

Project Buildout Year With Ambient Growth Plus Project Conditions Traffic Volumes

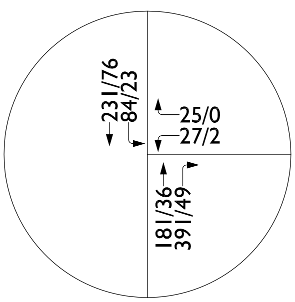


Legend:

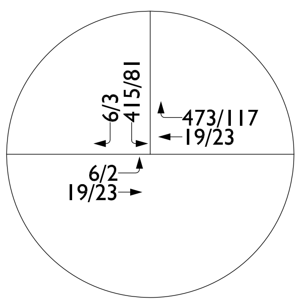
10/20 = AM/PM Peak Hour Volumes



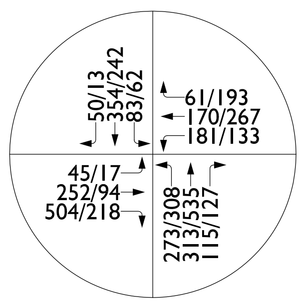
1. Hayes Ave. (NS) & Nighthawk Way (EW)



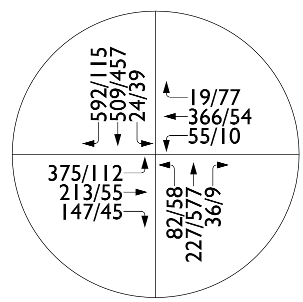
2. Hayes Ave. (NS) & Fullerton Rd. (EW)



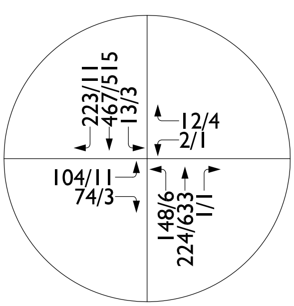
3. Hayes Ave. (NS) & Vineyard Pkwy. (EW)



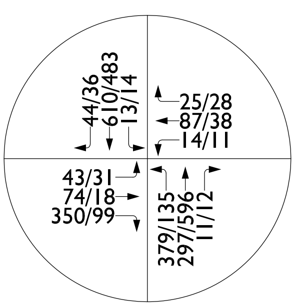
4. Washington Ave. (NS) & Nutmeg St. (EW)



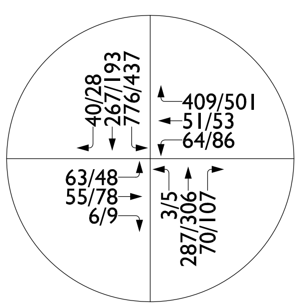
5. Washington Ave. (NS) & Nighthawk Way (EW)



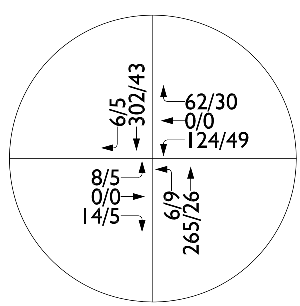
6. Washington Ave. (NS) & Fullerton Rd. (EW)



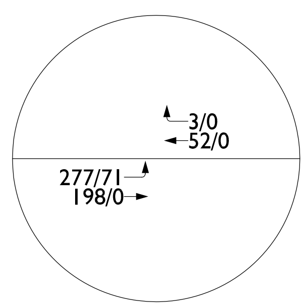
7. Washington Ave. (NS) & Lemon St. (EW)



8. Washington Ave. (NS) & Kalmia St. (EW)



9. Hayes Ave. (NS) & Project Dwy. 1 (EW)

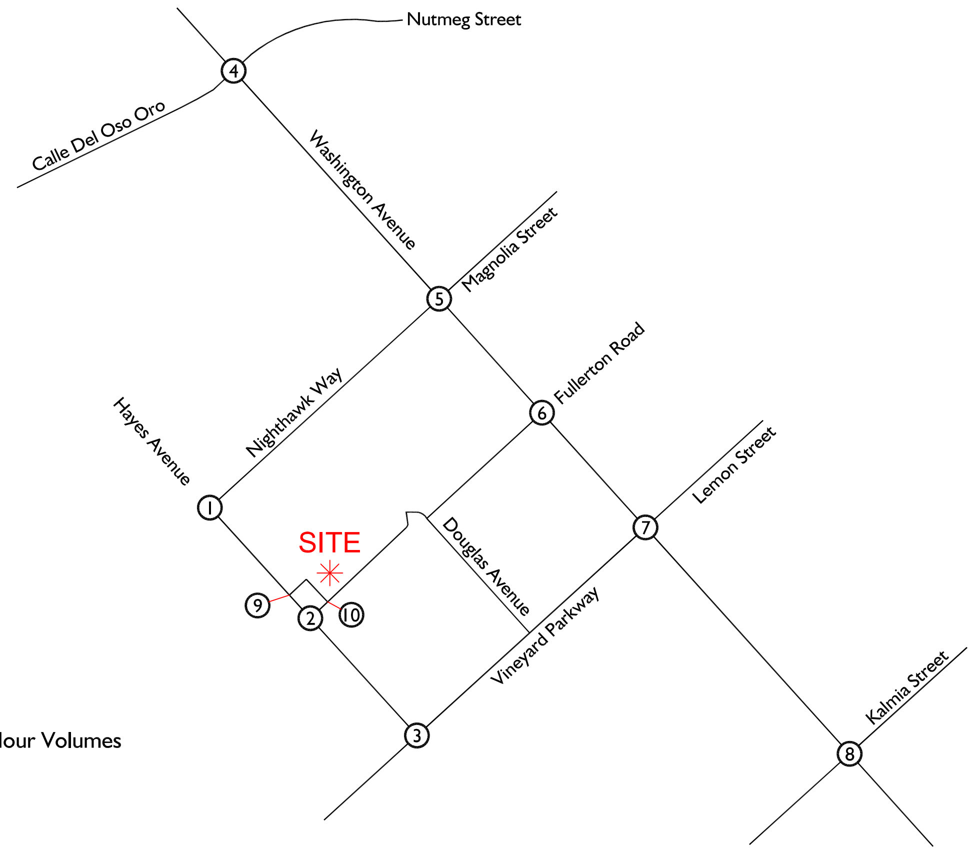


10. Project Dwy. 2 (NS) & Fullerton Rd. (EW)

N

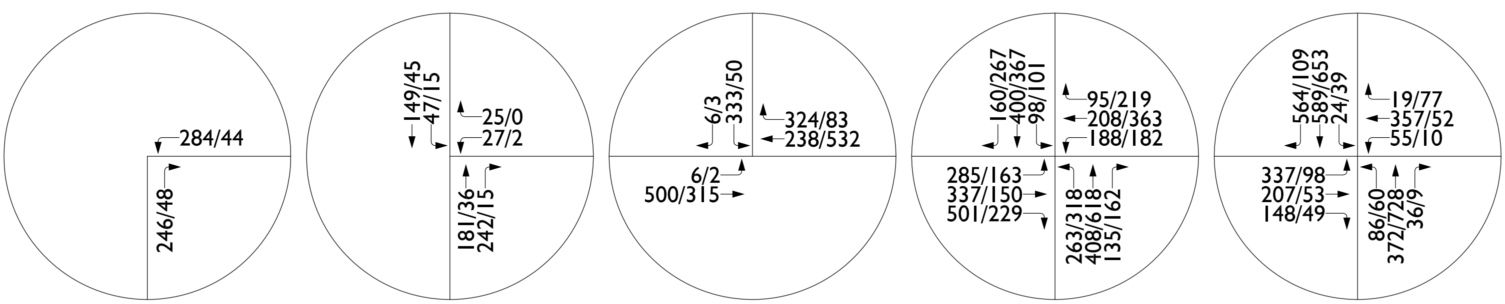
Exhibit 5-2

Project Buildout Year With Ambient Growth With Cumulative Projects Conditions Traffic Volumes



Legend:

10/20 = AM/PM Peak Hour Volumes



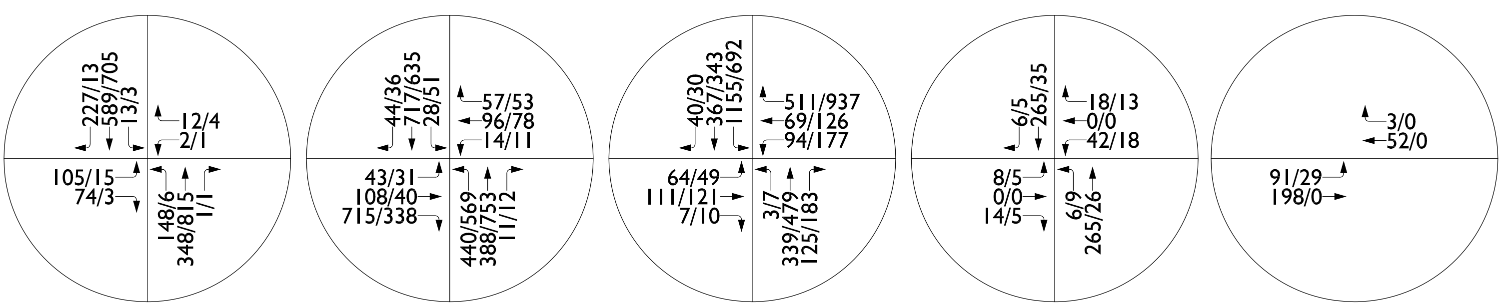
1. Hayes Ave. (NS) & Nighthawk Way (EW)

2. Hayes Ave. (NS) & Fullerton Rd. (EW)

3. Hayes Ave. (NS) & Vineyard Pkwy. (EW)

4. Washington Ave. (NS) & Nutmeg St. (EW)

5. Washington Ave. (NS) & Nighthawk Way (EW)



6. Washington Ave. (NS) & Fullerton Rd. (EW)

7. Washington Ave. (NS) & Lemon St. (EW)

8. Washington Ave. (NS) & Kalmia St. (EW)

9. Hayes Ave. (NS) & Project Dwy. 1 (EW)

10. Project Dwy. 2 (NS) & Fullerton Rd. (EW)

N

Exhibit 5-3

Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions Traffic Volumes

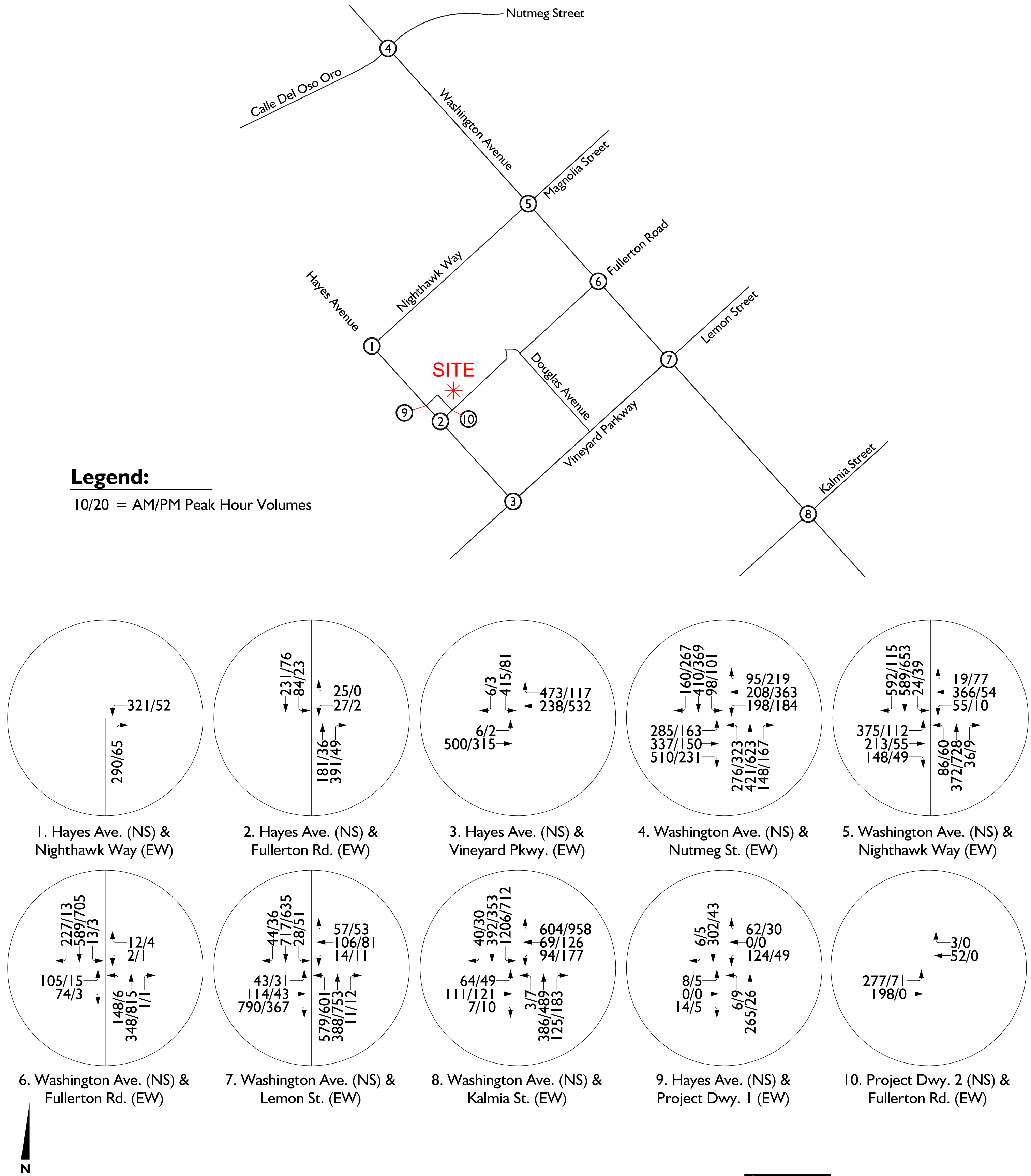


Table 5-1
Study Intersection LOS Analysis Summary
Project Buildout Year With Ambient Growth Plus Project Conditions

	Intersection	Traffic Control[3]	Intersection Approach Lane(s)[1]												Delay[2] (Secs)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
1.	Hayes Avenue (NS) / Nighthawk Way (EW)	AWS	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	15.3	7.2	C	A
2.	Hayes Avenue (NS) / Fullerton Road (EW)	CSS	0.0	0.5	0.5	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	25.7	9.8	D	A
3.	Hayes Avenue (NS) / Vineyard Parkway (EW)	AWS	0.0	0.0	0.0	0.5	0.0	0.5	1.0	1.0	0.0	0.0	1.0	1.0	**44.3**	8.3	**E**	A
	With Mitigation	*TS*	*0.0*	*0.0*	*0.0*	*1.0*	*0.0*	*1.0*	*1.0*	*1.0*	*0.0*	*0.0*	*1.0*	*1.0*	*14.6*	*6.4*	*B*	*A*
4.	Washington Avenue (NS) / Nutmeg Street (EW)	TS	1.0	1.0	1.0	1.0	1.5	0.5	1.0	1.0	1>	1.0	1.0	1.0	37.0	27.1	D	C
5.	Washington Avenue (NS) / Nighthawk Way (EW)	TS	1.0	1.5	0.5	1.0	2.0	1>	1.0	0.5	0.5	1.0	1.5	0.5	45.1	14.2	D	B
6.	Washington Avenue (NS) / Fullerton Road (EW)	TS	1.0	1.0	1.0	1.0	2.0	1.0	1.0	0.5	0.5	1.0	0.5	0.5	16.4	5.6	B	A
7.	Washington Avenue (NS) / Lemon Street (EW)	TS	1.0	1.5	0.5	1.0	1.5	0.5	1.0	0.5	0.5	1.0	0.5	0.5	39.7	11.1	D	B
	With Mitigation	*TS*	*1.0*	*1.5*	*0.5*	*1.0*	*1.5*	*0.5*	*1.0*	*1.0*	*1>*	*1.0*	*0.5*	*0.5*	*20.9*	*10.3*	*C*	*B*
8.	Washington Avenue (NS) / Kalmia Street (EW)	TS	1.0	1.0	1.0	2.0	0.5	0.5	1.0	0.5	0.5	1.0	1.0	1>	33.4	28.0	C	C
	With Mitigation	*TS*	*1.0*	*1.0*	*1.0*	*2.0*	*0.5*	*0.5*	*1.0*	*0.5*	*0.5*	*1.0*	*1.0*	*2>*	*28.5*	*22.9*	*C*	*C*
9.	Hayes Avenue (NS) / Project Driveway 1 (EW)	CSS	1.0	1.0	0.0	0.0	0.5	0.5	0.5	0.0	0.5	0.5	0.5	1.0	28.7	9.6	D	A
10.	Project Driveway 2 (NS) / Fullerton Road (EW)	--	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.5	0.5	9.0	7.3	A	A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.
Where "1" is indicated for the through movement and "0"s are indicated for R/L movements, the R and/or L turns are shared with the through movement.
Deficient operation shown in **Bold.**

L = Left; T = Through; R = Right; > = Right Turn Overlap; >> = Free Right Turn; * = Defacto Right Turn Lane; ! = Indicates general purpose lane; **Bold Underline** = Improvement;

[2] Analysis Software: Synchro, Version 10.0. Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic signal or all-way stop control. For intersections with cross-street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] AWS = All Way Stop
CSS = Cross Street Stop

j:\rktables\RK15479TB.xlsx
JN:0280-2019-01

Table 5-2

Study Intersection LOS Analysis Summary

Project Buildout Year With Ambient Growth With Cumulative Projects Conditions

	Intersection	Traffic Control[3]	Intersection Approach Lane(s)[1]												Delay[2] (Secs)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
1.	Hayes Avenue (NS) / Nighthawk Way (EW)	AWS	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	12.6	7.1	B	A
2.	Hayes Avenue (NS) / Fullerton Road (EW)	CSS	0.0	0.5	0.5	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	16.1	9.3	C	A
3.	Hayes Avenue (NS) / Vineyard Parkway (EW)	AWS	0.0	0.0	0.0	0.5	0.0	0.5	1.0	1.0	0.0	0.0	1.0	1.0	**75.8**	**35.8**	**F**	**E**
4.	Washington Avenue (NS) / Nutmeg Street (EW)	TS	1.0	1.0	1.0	1.0	1.5	0.5	1.0	1.0	1>	1.0	1.0	1.0	45.6	45.2	D	D
5.	Washington Avenue (NS) / Nighthawk Way (EW)	TS	1.0	1.5	0.5	1.0	2.0	1>	1.0	0.5	0.5	1.0	1.5	0.5	40.8	14.6	D	B
6.	Washington Avenue (NS) / Fullerton Road (EW)	TS	1.0	1.0	1.0	1.0	2.0	1.0	1.0	0.5	0.5	1.0	0.5	0.5	17.5	5.3	B	A
7.	Washington Avenue (NS) / Lemon Street (EW)	TS	1.0	1.5	0.5	1.0	1.5	0.5	1.0	0.5	0.5	1.0	0.5	0.5	**148.9**	43.2	**F**	D
8.	Washington Avenue (NS) / Kalmia Street (EW)	TS	1.0	1.0	1.0	2.0	0.5	0.5	1.0	0.5	0.5	1.0	1.0	1>	47.9	**84.9**	D	**F**
9.	Hayes Avenue (NS) / Project Driveway 1 (EW)	CSS	1.0	1.0	0.0	0.0	0.5	0.5	0.5	0.0	0.5	0.5	0.5	1.0	17.9	9.3	C	A
10.	Project Driveway 2 (NS) / Fullerton Road (EW)	--	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.5	0.5	7.8	7.3	A	A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes. Where "1" is indicated for the through movement and "0"s are indicated for R/L movements, the R and/or L turns are shared with the through movement.
Deficient operation shown in **Bold.**

L = Left; T = Through; R = Right; > = Right Turn Overlap; >> = Free Right Turn; * = Defacto Right Turn Lane; ! = Indicates general purpose lane; **Bold Underline** = Improvement;

[2] Analysis Software: Synchro, Version 10.0. Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic signal or all-way stop control. For intersections with cross-street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] AWS = All Way Stop
CSS = Cross Street Stop

Table 5-3

Study Intersection LOS Analysis Summary

Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions

	Intersection	Traffic Control[3]	Intersection Approach Lane(s)[1]												Delay[2] (Secs)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
1.	Hayes Avenue (NS) / Nighthawk Way (EW)	AWS	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	15.3	7.2	C	A
2.	Hayes Avenue (NS) / Fullerton Road (EW)	CSS	0.0	0.5	0.5	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	25.7	9.8	D	A
3.	Hayes Avenue (NS) / Vineyard Parkway (EW)	AWS	0.0	0.0	0.0	0.5	0.0	0.5	1.0	1.0	0.0	0.0	1.0	1.0	**115.3**	**43.4**	**F**	**E**
	With Mitigation	*TS*	*0.0*	*0.0*	*0.0*	*1.0*	*0.0*	*1.0*	*1.0*	*1.0*	*0.0*	*0.0*	*1.0*	*1.0*	*12.3*	*5.8*	*B*	*A*
4.	Washington Avenue (NS) / Nutmeg Street (EW)	TS	1.0	1.0	1.0	1.0	1.5	0.5	1.0	1.0	1>	1.0	1.0	1.0	46.9	46.2	D	D
5.	Washington Avenue (NS) / Nighthawk Way (EW)	TS	1.0	1.5	0.5	1.0	2.0	1>	1.0	0.5	0.5	1.0	1.5	0.5	46.2	14.8	D	B
6.	Washington Avenue (NS) / Fullerton Road (EW)	TS	1.0	1.0	1.0	1.0	2.0	1.0	1.0	0.5	0.5	1.0	0.5	0.5	17.5	5.3	B	A
7.	Washington Avenue (NS) / Lemon Street (EW)	TS	1.0	1.5	0.5	1.0	1.5	0.5	1.0	0.5	0.5	1.0	0.5	0.5	**202.4**	**55.8**	**F**	**E**
	With Mitigation	*TS*	*1.0*	*1.5*	*0.5*	*1.0*	*1.5*	*0.5*	*1.0*	*1.0*	*1>*	*1.0*	*0.5*	*0.5*	*37.1*	*25.9*	*D*	*C*
8.	Washington Avenue (NS) / Kalmia Street (EW)	TS	1.0	1.0	1.0	2.0	0.5	0.5	1.0	0.5	0.5	1.0	1.0	1>	**57.1**	**94.4**	**E**	**F**
	With Mitigation	*TS*	*1.0*	*1.0*	*1.0*	*2.0*	*0.5*	*0.5*	*1.0*	*0.5*	*0.5*	*1.0*	*1.0*	*2>*	*53.7*	*37.6*	*D*	*D*
9.	Hayes Avenue (NS) / Project Driveway 1 (EW)	CSS	1.0	1.0	0.0	0.0	0.5	0.5	0.5	0.0	0.5	0.5	0.5	1.0	28.7	9.6	D	A
10.	Project Driveway 2 (NS) / Fullerton Road (EW)	--	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.5	0.5	9.0	7.3	A	A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes. Where "1" is indicated for the through movement and "0"s are indicated for R/L movements, the R and/or L turns are shared with the through movement. Deficient operation shown in **Bold.**

L = Left; T = Through; R = Right; > = Right Turn Overlap; >> = Free Right Turn; * = Defacto Right Turn Lane; ! = Indicates general purpose lane; **Bold Underline** = Improvement;

[2] Analysis Software: Synchro, Version 10.0. Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic signal or all-way stop control. For intersections with cross-street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] AWS = All Way Stop

CSS = Cross Street Stop

Table 5-4

Study Roadway Segment LOS Analysis Summary

Project Buildout Year With Ambient Growth With Cumulative Projects Without & With Project Conditions

Study Roadway Segment	General Plan		No. of Lanes		Daily Capacity		Daily Traffic Volume					V/C Ratio		LOS	
	Classification	LOS E Capacity	Project Buildout Year With Ambient Growth With Cumulative Projects Without Project Conditions	Project Buildout Year With Ambient Growth With Cumulative Projects With Project Conditions	Project Buildout Year With Ambient Growth With Cumulative Projects Without Project Conditions	Project Buildout Year With Ambient Growth With Cumulative Projects With Project Conditions	Existing Conditions	Cumulative Project ADT Assignment	Project ADT Assignment	Project Buildout Year With Ambient Growth With Cumulative Projects Without Project Conditions	Project Buildout Year With Ambient Growth With Cumulative Projects With Project Conditions	Project Buildout Year With Ambient Growth With Cumulative Projects Without Project Conditions	Project Buildout Year With Ambient Growth With Cumulative Projects With Project Conditions	Project Buildout Year With Ambient Growth With Cumulative Projects Without Project Conditions	Project Buildout Year With Ambient Growth With Cumulative Projects With Project Conditions
1. **Hayes Avenue** Nighthawk Way to Sherry Lane	Collector (2 Lanes)	13,000	2	2	13,000	13,000	2,222	0	335	2,405	2,740	0.19	0.21	A	A
2. **Hayes Avenue** Sherry Lane to Fullerton Road	Collector (2 Lanes)	13,000	2	2	13,000	13,000	2,344	0	518	2,537	3,055	0.20	0.24	A	A
3. **Hayes Avenue** Fullerton Road to Vineyard Parkway	Collector (2 Lanes)	13,000	2	2	13,000	13,000	2,683	0	883	2,904	3,787	0.22	0.29	A	A

j:\rktables\RK15479TB.xlsx
JN:0280-2019-01

6.0 Findings and Recommendations

A. Site Overview

The findings of this study are based on the land use plan for the proposed Murrieta Canyon Academy expansion project. The development expansion will increase the facility capacity by 300 students.

B. LOS & Impact Analysis Summary & Required Mitigation Measures

All study area intersections are currently operating at an acceptable LOS (LOS D or better) and are expected to continue to operate at an acceptable LOS for the analysis scenarios, with the exception of the following intersections, which are forecast to operate at an unacceptable LOS during peak hours:

- Project Buildout Year With Ambient Growth Plus Project
  - Int 3 – Hayes Avenue / Vineyard Parkway (AM Peak Hour)
- Project Buildout Year With Ambient Growth With Cumulative Projects
  - Int 3 – Hayes Avenue / Vineyard Parkway (AM and PM Peak Hours)
  - Int 7 – Washington Avenue / Lemon Street (AM Peak Hour)
  - Int 8 – Washington Avenue / Kalmia Street (PM Peak Hour)
- Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project
  - Int 3 – Hayes Avenue / Vineyard Parkway (AM and PM Peak Hours)
  - Int 7 – Washington Avenue / Lemon Street (AM and PM Peak Hours)
  - Int 8 – Washington Avenue / Kalmia Street (AM and PM Peak Hours)

All study roadway segments are currently operating at an acceptable LOS (LOS C or better) and are forecast to continue to operate at an acceptable LOS for all the analysis scenarios.

In accordance with the City of Murrieta General Plan Circulation Element, its LOS operation goals established for the study area, and adopted thresholds, the proposed development expansion results in LOS deficiencies at the study intersections listed above, which would be considered impacts and would require improvements.

The following mitigation measures are recommended for the impacted intersections:

- Int 3 – Hayes Avenue / Vineyard Parkway
    - Install traffic signals to replace the existing all-way stop condition.
- Int 7 – Washington Avenue / Lemon Street
    - Restripe/widen the northeastbound Lemon Street approach from one left-turn lane and one shared through/right-turn lane to one left-turn lane, one through lane, and one right-turn lane; and
    - Install a right-turn-overlap signal head on the northeastbound Lemon Street approach.
- Int 8 – Washington Avenue / Kalmia Street
    - Restripe/widen the southwestbound Kalmia Street approach from one left-turn lane, one through lane, and one right-turn lane to one left-turn lane, one through lane, and two right-turn lanes.

The recommended intersection improvements are summarized in Table 6-1.

HCM calculation worksheets for Mitigated Project Buildout Year With Ambient Growth Plus Project Conditions are provided in Appendix I.

HCM calculation worksheets for Mitigated Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions are provided in Appendix J.

C. Project Fair-Share Calculations

The significant traffic impact at the Hayes Avenue / Vineyard Parkway intersection is forecast to occur for the Project Buildout Year With Ambient Growth Plus Project Conditions. Therefore, the impact at this location is considered to be a project direct impact and the full responsibility of the proposed project to mitigate.

The Washington Avenue / Lemon Street and Washington Avenue / Kalmia Street study intersections is forecast to occur for the Project Buildout Year With Ambient Growth With Cumulative Project Plus Project Conditions. Therefore, the impact at these two locations are considered to be a cumulative impacts and the project would need to contribute to the mitigations on a fair-share basis. Project fair-share calculations for these mitigation measures are summarized in Table 6-2.

D. Circulation Recommendations

I. Construct an on-site circulation system per the detailed site plan.

II. Install stop signs, stop bars, and stop legends at all project access points.

E. Safety and Operational Improvements

Sight distance at each project access should be reviewed at the time of construction per City of Murrieta standards, provided in Appendix K.

I. A limited use area shall be maintained where a clear line of sight can be established.

II. The limited use area shall be used for the purpose of prohibiting or clearing obstructions to maintain adequate sight distance at intersections.

III. Limited use area to be kept clear of all obstructions over 30 inches high, including vegetation.

IV. No trees, walls, or any obstructions shall be allowed in the limited use area.

V. The toe of the slope shall not encroach into the limited use area.

As is the case for any roadway design, the City of Murrieta should periodically review traffic operations in the vicinity of the project once the project is constructed to assure that the traffic operations are satisfactory.

F. Regional Funding Mechanisms

Participate in any approved transportation or development impact fees, such as TUMF fees, required by the City of Murrieta and County of Riverside.

Table 6-1

Recommended Intersection Improvements[1]

Intersection	Project Buildout Year With Ambient Growth Plus Project Conditions	Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions
3. Hayes Ave (NS) / Vineyard Pkwy (EW)	- Install traffic signals to replace the existing all-way stop condition.	Same as Project Buildout Year With Ambient Growth Plus Project Conditions.
7. Washington Ave (NS) / Lemon St (EW)	No mitigations recommended.	- Restripe/widen the northeastbound Lemon Street approach from one left-turn lane and one shared through/right-turn lane to one left-turn lane, one through lane, and one right-turn lane. - Install a right-turn-overlap signal head on the northeastbound Lemon Street approach.
8. Washington Ave (NS) / Kalmia St (EW)	No mitigations recommended.	- Restripe/widen the southwestbound Kalmia Street approach from one left-turn lane, one through lane, and one right-turn lane to one left-turn lane, one through lane, and two right-turn lanes.

[1] Recommended improvements generally consist of the minimum necessary improvements to improve operations to acceptable Level of Service.

Table 6-2

Project Fair-Share Calculations Summary

Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions

Intersection	Existing Conditions		Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions		Total Growth in Traffic		Project Traffic		Project % of Trips	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Washington Avenue / Lemon Street	1,586	1,327	2,892	2,674	1,306	1,347	231	65	17.69%	4.83%
Washington Avenue / Kalmia Street	1,735	1,653	3,103	3,214	1,368	1,561	215	61	15.72%	3.91%

[1] Project Fair-Share Traffic Contribution represents the project's traffic contribution at each study area intersection as a percentage of the overall growth in traffic for Project Buildout Year With Ambient Growth Plus Project Conditions, and Project Buildout Year With Ambient Growth With Cumulative Projects Plus Project Conditions.

j:\rktables\RK15479TB.xlsx
JN:2780-2018-01

Appendix A

Highway Capacity Manual
Level of Service Definition

Highway Capacity Manual Level of Service Definition

The current technical guide to the evaluation of traffic operations is the *Highway Capacity Manual* (HCM2010). The HCM defines level of service as a qualitative measure which describes operational conditions within a traffic stream, generally in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. The criteria used to evaluate LOS (Level of Service) conditions vary based on the type of roadway and whether the traffic flow is considered interrupted or uninterrupted.

The definitions of level of service for uninterrupted flow (flow unrestrained by the existence of traffic control devices) are:

- LOS A represents free flow. Individual users are vertically unaffected by the presence of others in the traffic stream.

- LOS B is in the range of stable flow, but the presence of others users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver.

- LOS C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream.

- LOS D represents high-density but stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience.

- LOS E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Small increases in flow will cause breakdowns in traffic movement.

- LOS F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations.

The definitions of level of service for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control.

The level of service is typically dependent on the quality of traffic flow at the intersections along a roadway. The HCM methodology expresses the level of service at an intersection in terms of delay time for the various intersection approaches. The HCM uses different procedures depending on the type of intersection control. The levels of service determined in this study are determined using the HCM methodology.

For signalized intersections, average control delay per vehicle is used to determine level of service. Levels of service at signalized study intersections have been evaluated using the HCM intersection analysis program.

Study area intersections which are stop sign controlled with stop control on the minor street only have been analyzed using the unsignalized intersection methodology of the HCM. For these intersections, the calculation of level of service is dependent on the occurrence of gaps occurring in the traffic flow of the main street. Using data collected describing the intersection configuration and traffic volumes at these locations; the level of service has been calculated. The level of service is determined based on worst individual movement or movements sharing a single lane. The relationship between level of service and delay is different than for signalized intersections.

The level of services are defined for the various analysis methodologies as follows:

	Average Control Delay Per Vehicle (Seconds)	
LOS	Signalized	Unsignalized
A	0.00 - 10.00	0.00 - 10.00
B	10.01 - 20.00	10.01 - 15.00
C	20.01 - 35.00	15.01 - 25.00
D	35.01 - 55.00	25.01 - 35.00
E	55.01 - 80.00	35.01 - 50.00
F	>80.01	>50.01

The LOS analysis for signalized intersections has been performed using optimized signal timing. This analysis has included an assumed lost time of four seconds per phase in accordance with the City of Murrieta Guidelines for the preparation of Traffic Impact Analyses. Signal timing optimization has considered pedestrian safety and signal coordination requirements. Appropriate time for pedestrian crossings have also been considered in the signalized intersection analysis. Saturation flow rates of 1,900 vehicles per hour of green (vphg) have been assumed for all capacity analysis.

Appendix B

Traffic Count Worksheets

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Nighthawk Way
Weather: Clear

File Name : 01_MUR_Hayes_Nighthawk AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

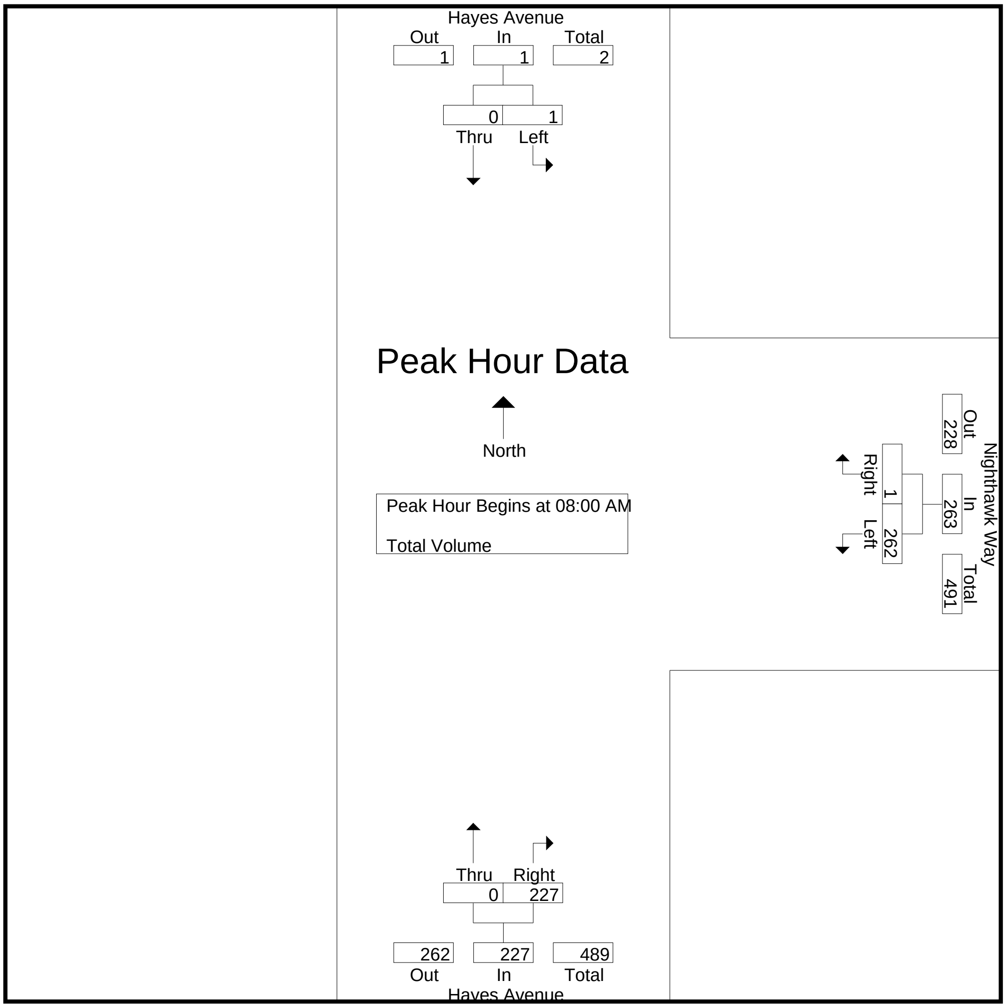
	Hayes Avenue Southbound			Nighthawk Way Westbound			Hayes Avenue Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	0	0	0	10	0	10	0	25	25	35
07:15 AM	0	0	0	15	0	15	0	53	53	68
07:30 AM	0	0	0	55	0	55	0	57	57	112
07:45 AM	0	0	0	63	0	63	0	64	64	127
Total	0	0	0	143	0	143	0	199	199	342
08:00 AM	1	0	1	38	1	39	0	33	33	73
08:15 AM	0	0	0	49	0	49	0	48	48	97
08:30 AM	0	0	0	85	0	85	0	59	59	144
08:45 AM	0	0	0	90	0	90	0	87	87	177
Total	1	0	1	262	1	263	0	227	227	491
Grand Total	1	0	1	405	1	406	0	426	426	833
Apprch %	100	0		99.8	0.2		0	100		
Total %	0.1	0	0.1	48.6	0.1	48.7	0	51.1	51.1	

	Hayes Avenue Southbound			Nighthawk Way Westbound			Hayes Avenue Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	**1**	0	**1**	38	**1**	39	0	33	33	73
08:15 AM	0	0	0	49	0	49	0	48	48	97
08:30 AM	0	0	0	85	0	85	0	59	59	144
08:45 AM	0	0	0	**90**	0	**90**	0	**87**	**87**	**177**
Total Volume	1	0	1	262	1	263	0	227	227	491
% App. Total	100	0		99.6	0.4		0	100		
PHF	.250	.000	.250	.728	.250	.731	.000	.652	.652	.694

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Nighthawk Way
Weather: Clear

File Name : 01_MUR_Hayes_Nighthawk AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM			08:00 AM			08:00 AM		
+0 mins.	0	0	0	38	**1**	39	0	33	33
+15 mins.	0	0	0	49	0	49	0	48	48
+30 mins.	0	0	0	85	0	85	0	59	59
+45 mins.	**1**	0	**1**	**90**	0	**90**	0	**87**	**87**
Total Volume	1	0	1	262	1	263	0	227	227
% App. Total	100	0		99.6	0.4		0	100	
PHF	.250	.000	.250	.728	.250	.731	.000	.652	.652

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Nighthawk Way
Weather: Clear

File Name : 01_MUR_Hayes_Nighthawk PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

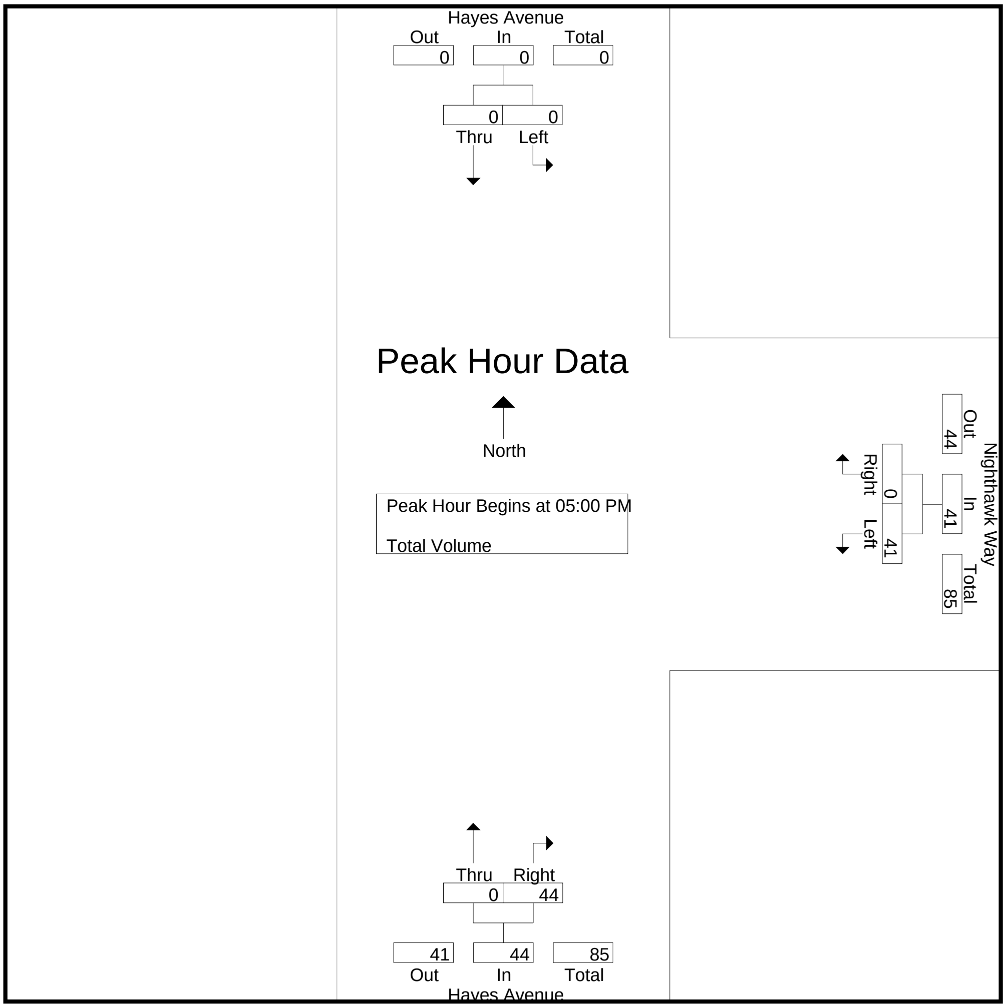
	Hayes Avenue Southbound			Nighthawk Way Westbound			Hayes Avenue Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	6	0	6	0	11	11	17
04:15 PM	0	0	0	10	0	10	0	9	9	19
04:30 PM	0	0	0	8	0	8	0	6	6	14
04:45 PM	0	0	0	11	0	11	0	10	10	21
Total	0	0	0	35	0	35	0	36	36	71
05:00 PM	0	0	0	9	0	9	0	13	13	22
05:15 PM	0	0	0	10	0	10	0	14	14	24
05:30 PM	0	0	0	7	0	7	0	6	6	13
05:45 PM	0	0	0	15	0	15	0	11	11	26
Total	0	0	0	41	0	41	0	44	44	85
Grand Total	0	0	0	76	0	76	0	80	80	156
Apprch %	0	0		100	0		0	100		
Total %	0	0	0	48.7	0	48.7	0	51.3	51.3	

	Hayes Avenue Southbound			Nighthawk Way Westbound			Hayes Avenue Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	0	0	0	9	0	9	0	13	13	22
05:15 PM	0	0	0	10	0	10	0	**14**	**14**	24
05:30 PM	0	0	0	7	0	7	0	6	6	13
05:45 PM	0	0	0	**15**	0	**15**	0	11	11	**26**
Total Volume	0	0	0	41	0	41	0	44	44	85
% App. Total	0	0		100	0		0	100		
PHF	.000	.000	.000	.683	.000	.683	.000	.786	.786	.817

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Nighthawk Way
Weather: Clear

File Name : 01_MUR_Hayes_Nighthawk PM
Site Code : 10519351
Start Date : 5/15/2019



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM			05:00 PM			05:00 PM		
+0 mins.	0	0	0	9	0	9	0	13	13
+15 mins.	0	0	0	10	0	10	0	**14**	**14**
+30 mins.	0	0	0	7	0	7	0	6	6
+45 mins.	0	0	0	**15**	0	**15**	0	11	11
Total Volume	0	0	0	41	0	41	0	44	44
% App. Total	0	0		100	0		0	100	
PHF	.000	.000	.000	.683	.000	.683	.000	.786	.786

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Fullerton Road
Weather: Clear

File Name : 02_MUR_Hayes_Fullerton AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

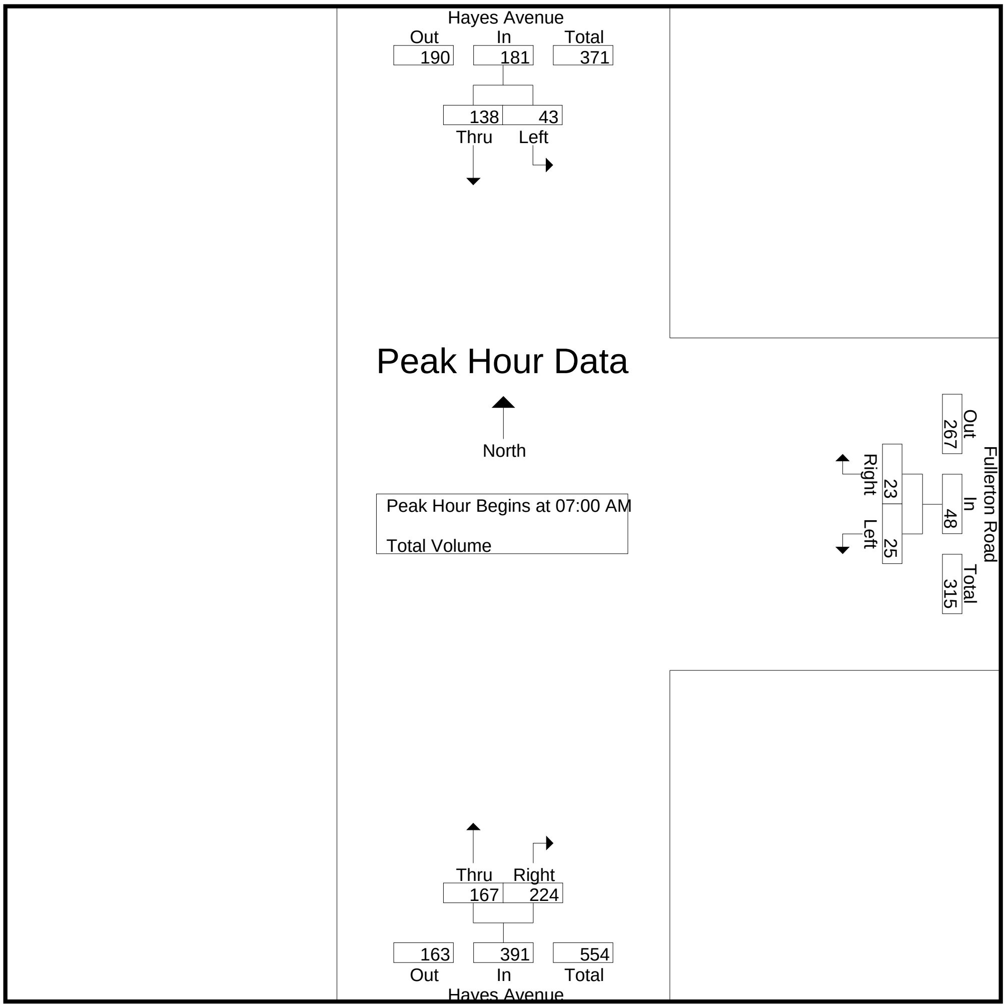
	Hayes Avenue Southbound			Fullerton Road Westbound			Hayes Avenue Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	5	6	11	5	4	9	29	55	84	104
07:15 AM	10	19	29	16	14	30	63	118	181	240
07:30 AM	6	41	47	4	5	9	35	12	47	103
07:45 AM	22	72	94	0	0	0	40	39	79	173
Total	43	138	181	25	23	48	167	224	391	620
08:00 AM	9	45	54	0	0	0	30	20	50	104
08:15 AM	7	52	59	0	1	1	72	14	86	146
08:30 AM	2	94	96	0	0	0	89	3	92	188
08:45 AM	3	86	89	2	0	2	62	10	72	163
Total	21	277	298	2	1	3	253	47	300	601
Grand Total	64	415	479	27	24	51	420	271	691	1221
Apprch %	13.4	86.6		52.9	47.1		60.8	39.2		
Total %	5.2	34	39.2	2.2	2	4.2	34.4	22.2	56.6	

	Hayes Avenue Southbound			Fullerton Road Westbound			Hayes Avenue Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	5	6	11	5	4	9	29	55	84	104
07:15 AM	10	19	29	**16**	**14**	**30**	**63**	**118**	**181**	**240**
07:30 AM	6	41	47	4	5	9	35	12	47	103
07:45 AM	**22**	**72**	**94**	0	0	0	40	39	79	173
Total Volume	43	138	181	25	23	48	167	224	391	620
% App. Total	23.8	76.2		52.1	47.9		42.7	57.3		
PHF	.489	.479	.481	.391	.411	.400	.663	.475	.540	.646

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Fullerton Road
Weather: Clear

File Name : 02_MUR_Hayes_Fullerton AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM			07:00 AM			07:00 AM		
+0 mins.	**22**	72	94	5	4	9	29	55	84
+15 mins.	9	45	54	**16**	**14**	**30**	**63**	**118**	**181**
+30 mins.	7	52	59	4	5	9	35	12	47
+45 mins.	2	**94**	**96**	0	0	0	40	39	79
Total Volume	40	263	303	25	23	48	167	224	391
% App. Total	13.2	86.8		52.1	47.9		42.7	57.3	
PHF	.455	.699	.789	.391	.411	.400	.663	.475	.540

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Fullerton Road
Weather: Clear

File Name : 02_MUR_Hayes_Fullerton PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

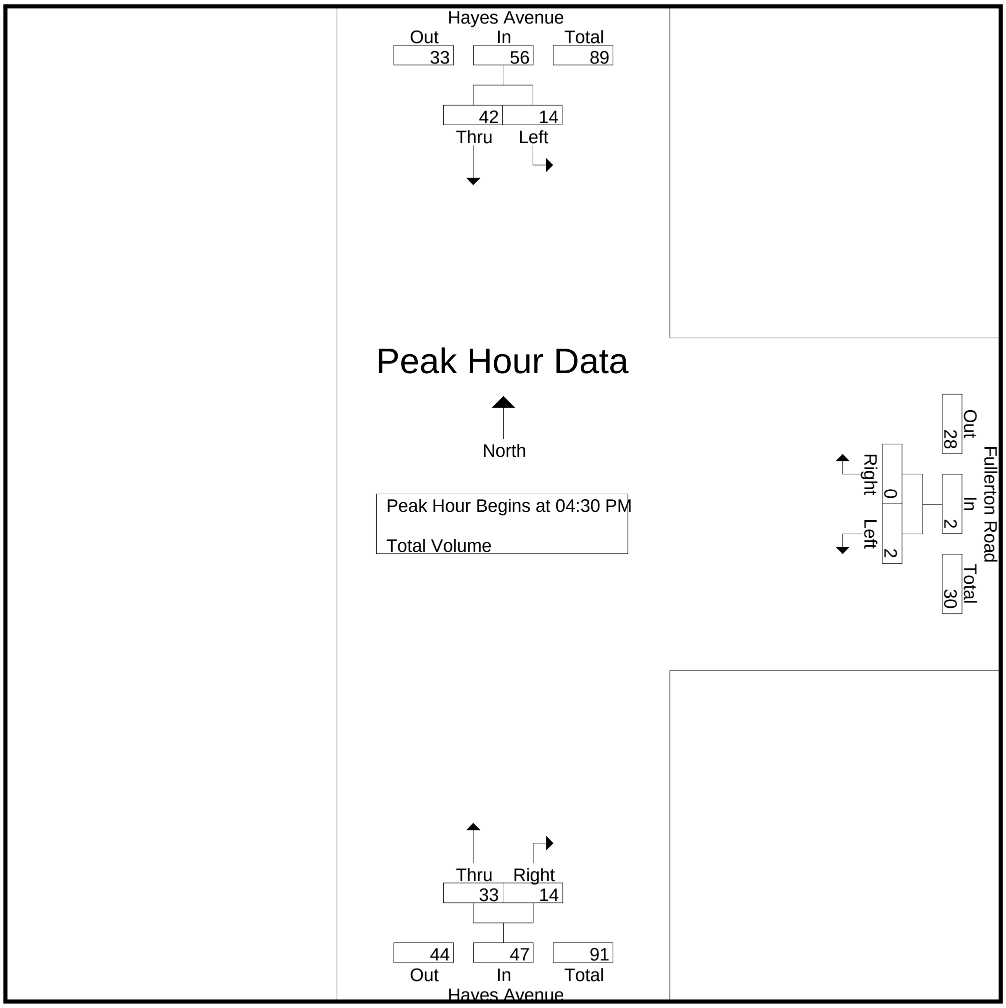
	Hayes Avenue Southbound			Fullerton Road Westbound			Hayes Avenue Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	0	11	11	0	0	0	7	2	9	20
04:15 PM	2	12	14	0	0	0	7	3	10	24
04:30 PM	3	10	13	0	0	0	4	3	7	20
04:45 PM	6	11	17	0	0	0	7	3	10	27
Total	11	44	55	0	0	0	25	11	36	91
05:00 PM	2	13	15	1	0	1	10	6	16	32
05:15 PM	3	8	11	1	0	1	12	2	14	26
05:30 PM	0	4	4	0	0	0	10	3	13	17
05:45 PM	0	6	6	0	0	0	6	2	8	14
Total	5	31	36	2	0	2	38	13	51	89
Grand Total	16	75	91	2	0	2	63	24	87	180
Apprch %	17.6	82.4		100	0		72.4	27.6		
Total %	8.9	41.7	50.6	1.1	0	1.1	35	13.3	48.3	

	Hayes Avenue Southbound			Fullerton Road Westbound			Hayes Avenue Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	3	10	13	0	0	0	4	3	7	20
04:45 PM	**6**	11	**17**	0	0	0	7	3	10	27
05:00 PM	2	**13**	15	**1**	0	**1**	10	**6**	**16**	**32**
05:15 PM	3	8	11	1	0	1	**12**	2	14	26
Total Volume	14	42	56	2	0	2	33	14	47	105
% App. Total	25	75		100	0		70.2	29.8		
PHF	.583	.808	.824	.500	.000	.500	.688	.583	.734	.820

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Fullerton Road
Weather: Clear

File Name : 02_MUR_Hayes_Fullerton PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:15 PM			04:30 PM			04:45 PM		
+0 mins.	2	12	14	0	0	0	7	3	10
+15 mins.	3	10	13	0	0	0	10	**6**	**16**
+30 mins.	**6**	11	**17**	**1**	0	**1**	**12**	2	14
+45 mins.	2	**13**	15	1	0	1	10	3	13
Total Volume	13	46	59	2	0	2	39	14	53
% App. Total	22	78		100	0		73.6	26.4	
PHF	.542	.885	.868	.500	.000	.500	.813	.583	.828

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Vineyard Parkway
Weather: Clear

File Name : 03_MUR_Hayes_Vineyard AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

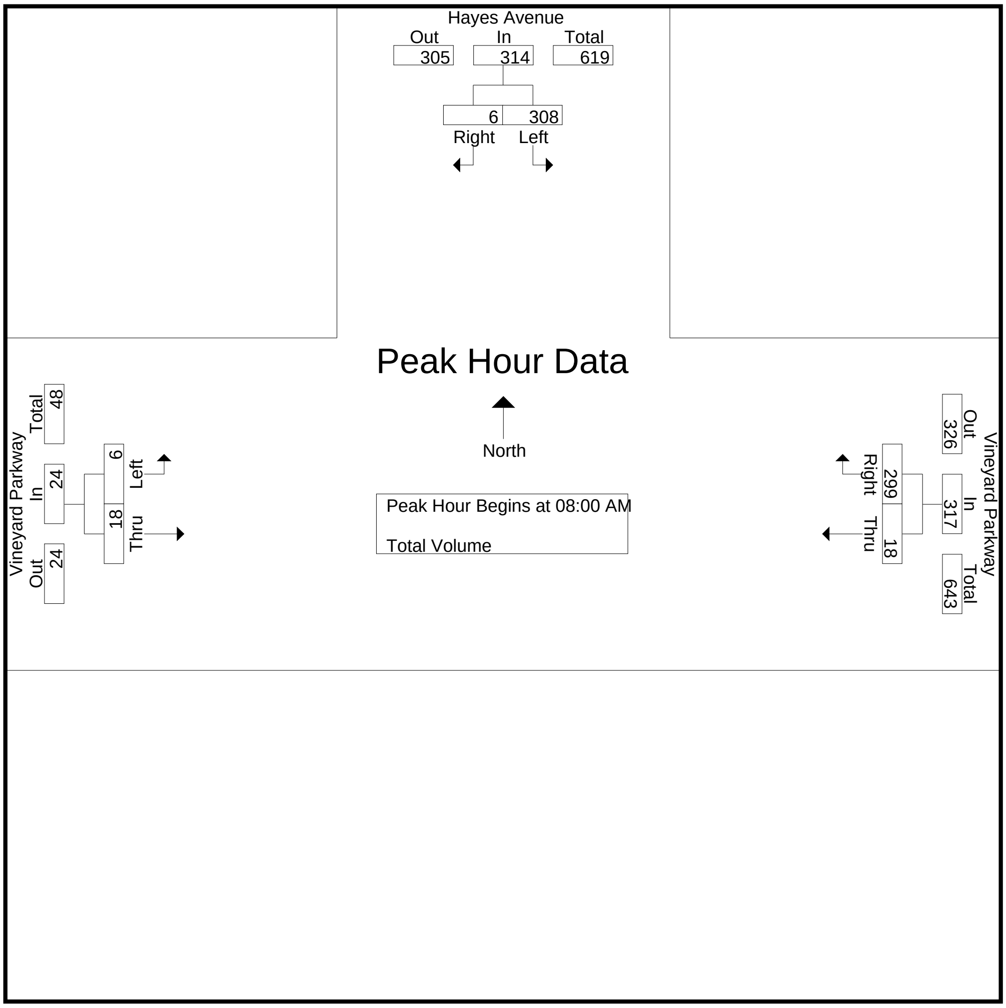
	Hayes Avenue Southbound			Vineyard Parkway Westbound			Vineyard Parkway Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
07:00 AM	14	1	15	2	85	87	1	3	4	106
07:15 AM	37	1	38	8	169	177	5	7	12	227
07:30 AM	43	3	46	4	46	50	0	6	6	102
07:45 AM	76	0	76	1	75	76	3	3	6	158
Total	170	5	175	15	375	390	9	19	28	593
08:00 AM	53	2	55	3	49	52	1	5	6	113
08:15 AM	64	1	65	4	90	94	1	5	6	165
08:30 AM	97	1	98	5	92	97	3	0	3	198
08:45 AM	94	2	96	6	68	74	1	8	9	179
Total	308	6	314	18	299	317	6	18	24	655
Grand Total	478	11	489	33	674	707	15	37	52	1248
Apprch %	97.8	2.2		4.7	95.3		28.8	71.2		
Total %	38.3	0.9	39.2	2.6	54	56.7	1.2	3	4.2	

	Hayes Avenue Southbound			Vineyard Parkway Westbound			Vineyard Parkway Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	53	**2**	55	3	49	52	1	5	6	113
08:15 AM	64	1	65	4	90	94	1	5	6	165
08:30 AM	**97**	1	**98**	5	**92**	**97**	**3**	0	3	**198**
08:45 AM	94	2	96	**6**	68	74	1	**8**	**9**	179
Total Volume	308	6	314	18	299	317	6	18	24	655
% App. Total	98.1	1.9		5.7	94.3		25	75		
PHF	.794	.750	.801	.750	.813	.817	.500	.563	.667	.827

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Vineyard Parkway
Weather: Clear

File Name : 03_MUR_Hayes_Vineyard AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM			07:00 AM			07:15 AM		
+0 mins.	53	**2**	55	2	85	87	**5**	**7**	**12**
+15 mins.	64	1	65	**8**	**169**	**177**	0	6	6
+30 mins.	**97**	1	**98**	4	46	50	3	3	6
+45 mins.	94	2	96	1	75	76	1	5	6
Total Volume	308	6	314	15	375	390	9	21	30
% App. Total	98.1	1.9		3.8	96.2		30	70	
PHF	.794	.750	.801	.469	.555	.551	.450	.750	.625

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Vineyard Parkway
Weather: Clear

File Name : 03_MUR_Hayes_Vineyard PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

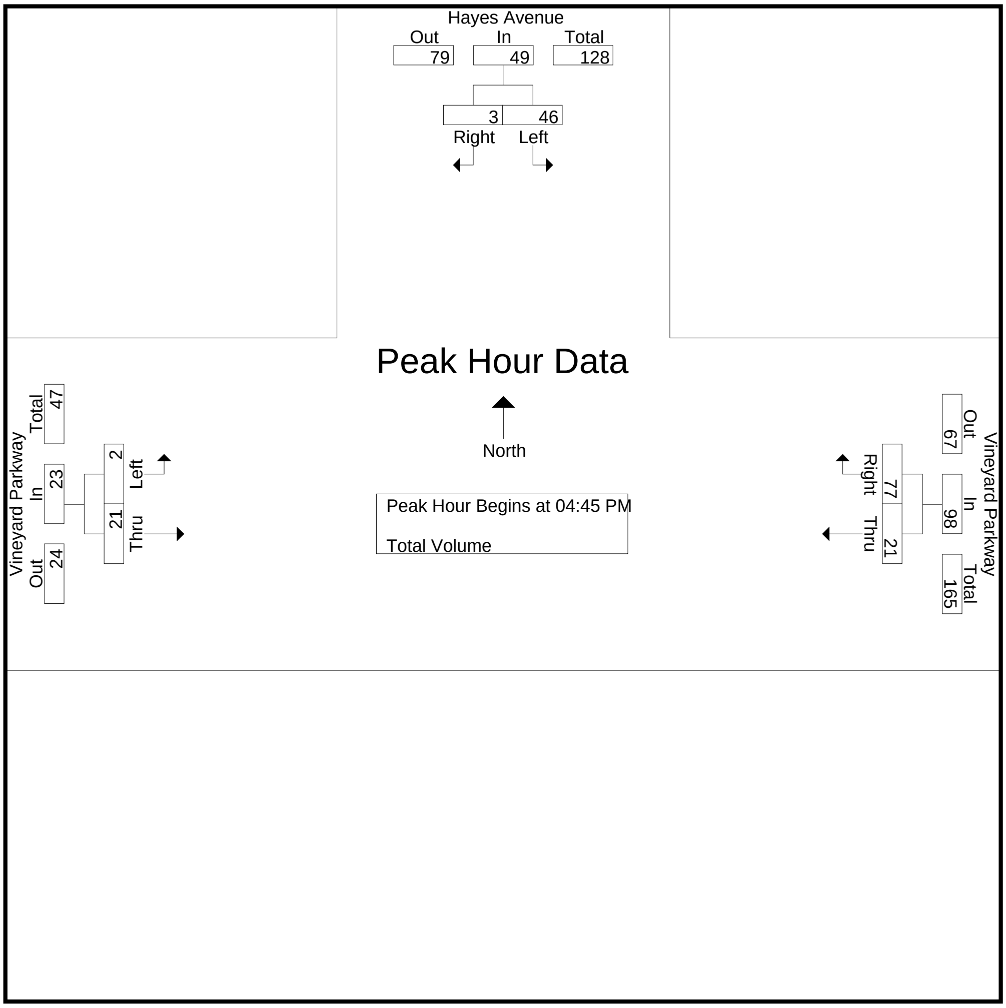
	Hayes Avenue Southbound			Vineyard Parkway Westbound			Vineyard Parkway Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
04:00 PM	14	0	14	5	17	22	0	8	8	44
04:15 PM	10	1	11	4	11	15	0	2	2	28
04:30 PM	15	1	16	3	11	14	1	4	5	35
04:45 PM	13	0	13	3	17	20	0	7	7	40
Total	52	2	54	15	56	71	1	21	22	147
05:00 PM	14	1	15	9	25	34	0	6	6	55
05:15 PM	10	1	11	5	18	23	1	1	2	36
05:30 PM	9	1	10	4	17	21	1	7	8	39
05:45 PM	8	1	9	5	14	19	1	2	3	31
Total	41	4	45	23	74	97	3	16	19	161
Grand Total	93	6	99	38	130	168	4	37	41	308
Apprch %	93.9	6.1		22.6	77.4		9.8	90.2		
Total %	30.2	1.9	32.1	12.3	42.2	54.5	1.3	12	13.3	

	Hayes Avenue Southbound			Vineyard Parkway Westbound			Vineyard Parkway Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	13	0	13	3	17	20	0	**7**	7	40
05:00 PM	**14**	**1**	**15**	**9**	**25**	**34**	0	6	6	**55**
05:15 PM	10	1	11	5	18	23	**1**	1	2	36
05:30 PM	9	1	10	4	17	21	1	7	**8**	39
Total Volume	46	3	49	21	77	98	2	21	23	170
% App. Total	93.9	6.1		21.4	78.6		8.7	91.3		
PHF	.821	.750	.817	.583	.770	.721	.500	.750	.719	.773

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Vineyard Parkway
Weather: Clear

File Name : 03_MUR_Hayes_Vineyard PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:15 PM			04:45 PM			04:45 PM		
+0 mins.	10	**1**	11	3	17	20	0	**7**	7
+15 mins.	**15**	1	**16**	**9**	**25**	**34**	0	6	6
+30 mins.	13	0	13	5	18	23	**1**	1	2
+45 mins.	14	1	15	4	17	21	1	7	**8**
Total Volume	52	3	55	21	77	98	2	21	23
% App. Total	94.5	5.5		21.4	78.6		8.7	91.3	
PHF	.867	.750	.859	.583	.770	.721	.500	.750	.719

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Nutmeg Street
Weather: Clear

File Name : 04_MUR_Washington_Nutmeg AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

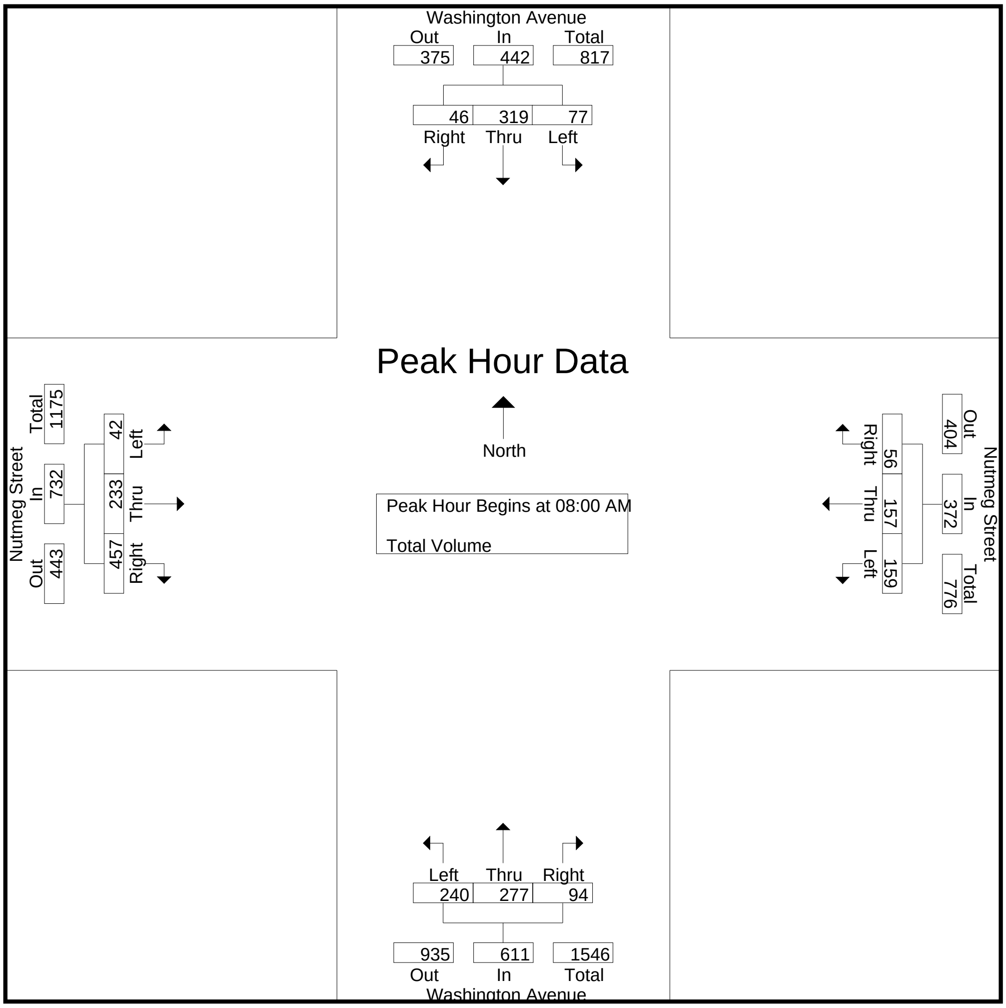
	Washington Avenue Southbound				Nutmeg Street Westbound				Washington Avenue Northbound				Nutmeg Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	20	143	1	164	30	21	14	65	32	56	31	119	1	50	150	201	549
07:15 AM	15	103	1	119	28	25	22	75	55	93	45	193	0	61	121	182	569
07:30 AM	14	77	0	91	51	9	9	69	49	68	25	142	4	44	62	110	412
07:45 AM	24	94	5	123	43	13	19	75	56	53	21	130	3	48	72	123	451
Total	73	417	7	497	152	68	64	284	192	270	122	584	8	203	405	616	1981
08:00 AM	23	84	28	135	29	52	18	99	65	47	14	126	6	50	86	142	502
08:15 AM	17	81	13	111	41	53	9	103	57	54	19	130	21	82	131	234	578
08:30 AM	23	96	4	123	47	27	14	88	51	82	30	163	9	67	157	233	607
08:45 AM	14	58	1	73	42	25	15	82	67	94	31	192	6	34	83	123	470
Total	77	319	46	442	159	157	56	372	240	277	94	611	42	233	457	732	2157
Grand Total	150	736	53	939	311	225	120	656	432	547	216	1195	50	436	862	1348	4138
Apprch %	16	78.4	5.6		47.4	34.3	18.3		36.2	45.8	18.1		3.7	32.3	63.9		
Total %	3.6	17.8	1.3	22.7	7.5	5.4	2.9	15.9	10.4	13.2	5.2	28.9	1.2	10.5	20.8	32.6	

	Washington Avenue Southbound				Nutmeg Street Westbound				Washington Avenue Northbound				Nutmeg Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	**23**	84	**28**	**135**	29	52	**18**	99	65	47	14	126	6	50	86	142	502
08:15 AM	17	81	13	111	41	**53**	9	**103**	57	54	19	130	**21**	**82**	131	**234**	578
08:30 AM	23	**96**	4	123	**47**	27	14	88	51	82	30	163	9	67	**157**	233	**607**
08:45 AM	14	58	1	73	42	25	15	82	**67**	**94**	**31**	**192**	6	34	83	123	470
Total Volume	77	319	46	442	159	157	56	372	240	277	94	611	42	233	457	732	2157
% App. Total	17.4	72.2	10.4		42.7	42.2	15.1		39.3	45.3	15.4		5.7	31.8	62.4		
PHF	.837	.831	.411	.819	.846	.741	.778	.903	.896	.737	.758	.796	.500	.710	.728	.782	.888

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Nutmeg Street
Weather: Clear

File Name : 04_MUR_Washington_Nutmeg AM
Site Code : 10519351
Start Date : 5/15/2019



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				08:00 AM				08:00 AM				07:45 AM			
+0 mins.	20	**143**	1	**164**	29	52	**18**	99	65	47	14	126	3	48	72	123
+15 mins.	15	103	1	119	41	**53**	9	**103**	57	54	19	130	6	50	86	142
+30 mins.	14	77	0	91	**47**	27	14	88	51	82	30	163	**21**	**82**	131	**234**
+45 mins.	**24**	94	**5**	123	42	25	15	82	**67**	**94**	**31**	**192**	9	67	**157**	233
Total Volume	73	417	7	497	159	157	56	372	240	277	94	611	39	247	446	732
% App. Total	14.7	83.9	1.4		42.7	42.2	15.1		39.3	45.3	15.4		5.3	33.7	60.9	
PHF	.760	.729	.350	.758	.846	.741	.778	.903	.896	.737	.758	.796	.464	.753	.710	.782

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Nutmeg Street
Weather: Clear

File Name : 04_MUR_Washington_Nutmeg PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

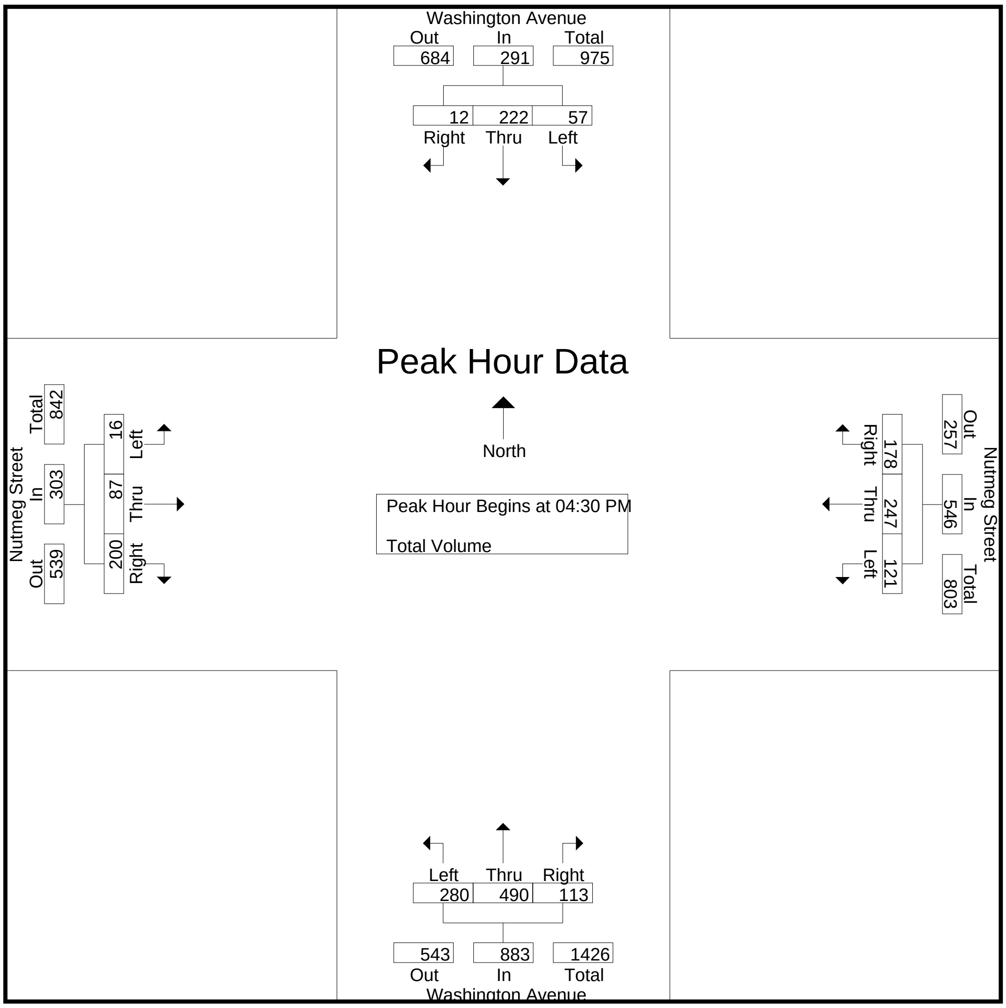
	Washington Avenue Southbound				Nutmeg Street Westbound				Washington Avenue Northbound				Nutmeg Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	17	63	2	82	27	57	36	120	62	104	36	202	2	27	54	83	487
04:15 PM	12	74	5	91	27	49	45	121	67	109	24	200	4	26	48	78	490
04:30 PM	20	54	4	78	32	65	40	137	61	124	24	209	6	16	50	72	496
04:45 PM	15	58	2	75	39	65	55	159	63	97	24	184	5	30	60	95	513
Total	64	249	13	326	125	236	176	537	253	434	108	795	17	99	212	328	1986
05:00 PM	8	57	3	68	28	60	37	125	58	138	38	234	2	24	31	57	484
05:15 PM	14	53	3	70	22	57	46	125	98	131	27	256	3	17	59	79	530
05:30 PM	29	69	2	100	21	46	38	105	73	70	22	165	4	33	39	76	446
05:45 PM	21	69	1	91	39	49	30	118	70	67	23	160	4	22	51	77	446
Total	72	248	9	329	110	212	151	473	299	406	110	815	13	96	180	289	1906
Grand Total	136	497	22	655	235	448	327	1010	552	840	218	1610	30	195	392	617	3892
Apprch %	20.8	75.9	3.4		23.3	44.4	32.4		34.3	52.2	13.5		4.9	31.6	63.5		
Total %	3.5	12.8	0.6	16.8	6	11.5	8.4	26	14.2	21.6	5.6	41.4	0.8	5	10.1	15.9	

	Washington Avenue Southbound				Nutmeg Street Westbound				Washington Avenue Northbound				Nutmeg Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	**20**	54	**4**	**78**	32	**65**	40	137	61	124	24	209	**6**	16	50	72	496
04:45 PM	15	**58**	2	75	**39**	65	**55**	**159**	63	97	24	184	5	**30**	**60**	**95**	513
05:00 PM	8	57	3	68	28	60	37	125	58	**138**	**38**	234	2	24	31	57	484
05:15 PM	14	53	3	70	22	57	46	125	**98**	131	27	**256**	3	17	59	79	**530**
Total Volume	57	222	12	291	121	247	178	546	280	490	113	883	16	87	200	303	2023
% App. Total	19.6	76.3	4.1		22.2	45.2	32.6		31.7	55.5	12.8		5.3	28.7	66		
PHF	.713	.957	.750	.933	.776	.950	.809	.858	.714	.888	.743	.862	.667	.725	.833	.797	.954

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Nutmeg Street
Weather: Clear

File Name : 04_MUR_Washington_Nutmeg PM
Site Code : 10519351
Start Date : 5/15/2019



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				04:30 PM				04:30 PM				04:00 PM			
+0 mins.	8	57	**3**	68	32	**65**	40	137	61	124	24	209	2	27	54	83
+15 mins.	14	53	3	70	**39**	65	**55**	**159**	63	97	24	184	4	26	48	78
+30 mins.	**29**	**69**	2	**100**	28	60	37	125	58	**138**	**38**	234	**6**	16	50	72
+45 mins.	21	69	1	91	22	57	46	125	**98**	131	27	**256**	5	**30**	**60**	**95**
Total Volume	72	248	9	329	121	247	178	546	280	490	113	883	17	99	212	328
% App. Total	21.9	75.4	2.7		22.2	45.2	32.6		31.7	55.5	12.8		5.2	30.2	64.6	
PHF	.621	.899	.750	.823	.776	.950	.809	.858	.714	.888	.743	.862	.708	.825	.883	.863

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Nighthawk Way/Magnolia Street
Weather: Clear

File Name : 05_MUR_Washington_Nighthawk_Magnolia AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

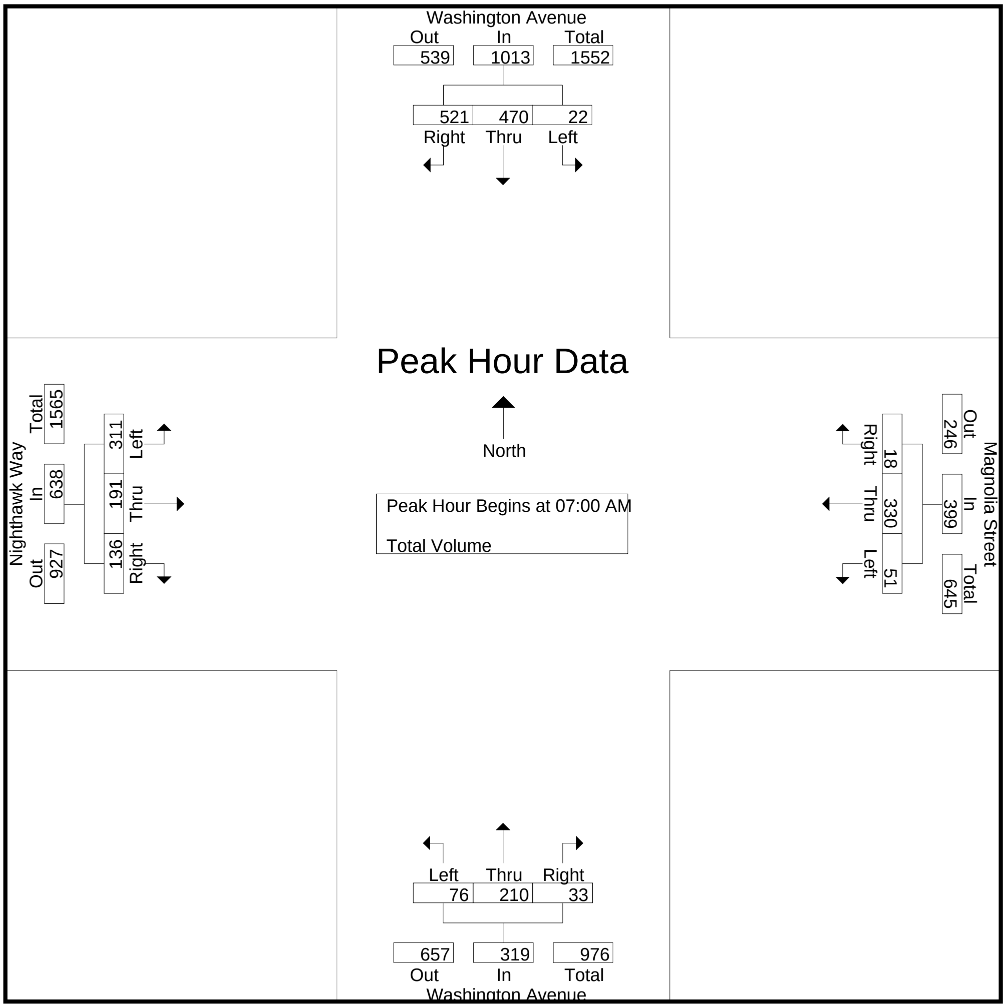
	Washington Avenue Southbound				Magnolia Street Westbound				Washington Avenue Northbound				Nighthawk Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	9	144	192	345	16	112	4	132	31	46	8	85	62	24	21	107	669
07:15 AM	8	162	174	344	30	140	4	174	22	73	16	111	108	70	71	249	878
07:30 AM	3	73	75	151	2	41	6	49	14	50	9	73	76	53	32	161	434
07:45 AM	2	91	80	173	3	37	4	44	9	41	0	50	65	44	12	121	388
Total	22	470	521	1013	51	330	18	399	76	210	33	319	311	191	136	638	2369
08:00 AM	6	128	65	199	7	24	6	37	16	56	5	77	38	13	12	63	376
08:15 AM	4	121	132	257	2	48	17	67	15	72	6	93	74	34	27	135	552
08:30 AM	9	125	167	301	2	49	11	62	11	63	5	79	94	53	26	173	615
08:45 AM	7	116	117	240	4	47	11	62	7	61	2	70	98	64	49	211	583
Total	26	490	481	997	15	168	45	228	49	252	18	319	304	164	114	582	2126
Grand Total	48	960	1002	2010	66	498	63	627	125	462	51	638	615	355	250	1220	4495
Apprch %	2.4	47.8	49.9		10.5	79.4	10		19.6	72.4	8		50.4	29.1	20.5		
Total %	1.1	21.4	22.3	44.7	1.5	11.1	1.4	13.9	2.8	10.3	1.1	14.2	13.7	7.9	5.6	27.1	

	Washington Avenue Southbound				Magnolia Street Westbound				Washington Avenue Northbound				Nighthawk Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	**9**	144	**192**	**345**	16	112	4	132	**31**	46	8	85	62	24	21	107	669
07:15 AM	8	**162**	174	344	**30**	**140**	4	**174**	22	**73**	**16**	**111**	**108**	**70**	**71**	**249**	**878**
07:30 AM	3	73	75	151	2	41	**6**	49	14	50	9	73	76	53	32	161	434
07:45 AM	2	91	80	173	3	37	4	44	9	41	0	50	65	44	12	121	388
Total Volume	22	470	521	1013	51	330	18	399	76	210	33	319	311	191	136	638	2369
% App. Total	2.2	46.4	51.4		12.8	82.7	4.5		23.8	65.8	10.3		48.7	29.9	21.3		
PHF	.611	.725	.678	.734	.425	.589	.750	.573	.613	.719	.516	.718	.720	.682	.479	.641	.675

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Nighthawk Way/Magnolia Street
Weather: Clear

File Name : 05_MUR_Washington_Nighthawk_Magnolia AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:00 AM				07:00 AM				07:00 AM			
+0 mins.	**9**	144	**192**	**345**	16	112	4	132	**31**	46	8	85	62	24	21	107
+15 mins.	8	**162**	174	344	**30**	**140**	4	**174**	22	**73**	**16**	**111**	**108**	**70**	**71**	**249**
+30 mins.	3	73	75	151	2	41	**6**	49	14	50	9	73	76	53	32	161
+45 mins.	2	91	80	173	3	37	4	44	9	41	0	50	65	44	12	121
Total Volume	22	470	521	1013	51	330	18	399	76	210	33	319	311	191	136	638
% App. Total	2.2	46.4	51.4		12.8	82.7	4.5		23.8	65.8	10.3		48.7	29.9	21.3	
PHF	.611	.725	.678	.734	.425	.589	.750	.573	.613	.719	.516	.718	.720	.682	.479	.641

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Nighthawk Way/Magnolia Street
Weather: Clear

File Name : 05_MUR_Washington_Nighthawk_Magnolia PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

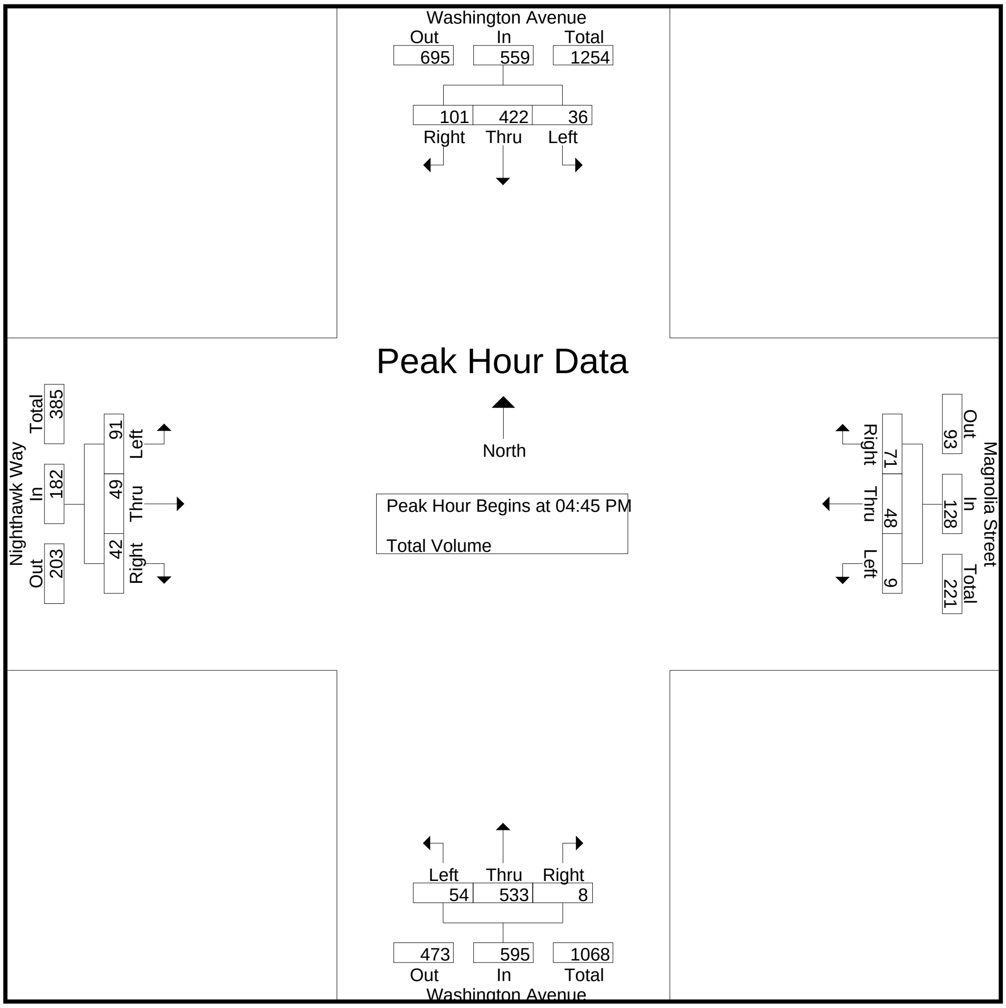
	Washington Avenue Southbound				Magnolia Street Westbound				Washington Avenue Northbound				Nighthawk Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	7	123	12	142	2	4	11	17	7	121	2	130	17	19	9	45	334
04:15 PM	11	114	12	137	4	7	13	24	5	155	1	161	12	5	7	24	346
04:30 PM	14	103	11	128	0	5	17	22	12	130	3	145	5	3	4	12	307
04:45 PM	12	110	19	141	4	10	18	32	16	133	2	151	12	4	12	28	352
Total	44	450	54	548	10	26	59	95	40	539	8	587	46	31	32	109	1339
05:00 PM	6	108	41	155	1	12	18	31	14	128	0	142	27	19	11	57	385
05:15 PM	10	117	26	153	2	15	18	35	12	120	1	133	26	13	8	47	368
05:30 PM	8	87	15	110	2	11	17	30	12	152	5	169	26	13	11	50	359
05:45 PM	9	97	18	124	0	5	23	28	14	110	0	124	12	2	12	26	302
Total	33	409	100	542	5	43	76	124	52	510	6	568	91	47	42	180	1414
Grand Total	77	859	154	1090	15	69	135	219	92	1049	14	1155	137	78	74	289	2753
Apprch %	7.1	78.8	14.1		6.8	31.5	61.6		8	90.8	1.2		47.4	27	25.6		
Total %	2.8	31.2	5.6	39.6	0.5	2.5	4.9	8	3.3	38.1	0.5	42	5	2.8	2.7	10.5	

	Washington Avenue Southbound				Magnolia Street Westbound				Washington Avenue Northbound				Nighthawk Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	**12**	110	19	141	**4**	10	**18**	32	**16**	133	2	151	12	4	**12**	28	352
05:00 PM	6	108	**41**	**155**	1	12	18	31	14	128	0	142	**27**	**19**	11	**57**	**385**
05:15 PM	10	**117**	26	153	2	**15**	18	**35**	12	120	1	133	26	13	8	47	368
05:30 PM	8	87	15	110	2	11	17	30	12	**152**	**5**	**169**	26	13	11	50	359
Total Volume	36	422	101	559	9	48	71	128	54	533	8	595	91	49	42	182	1464
% App. Total	6.4	75.5	18.1		7	37.5	55.5		9.1	89.6	1.3		50	26.9	23.1		
PHF	.750	.902	.616	.902	.563	.800	.986	.914	.844	.877	.400	.880	.843	.645	.875	.798	.951

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Nighthawk Way/Magnolia Street
Weather: Clear

File Name : 05_MUR_Washington_Nighthawk_Magnolia PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				04:45 PM				04:15 PM				04:45 PM			
+0 mins.	**14**	103	11	128	**4**	10	**18**	32	5	**155**	1	**161**	12	4	**12**	28
+15 mins.	12	110	19	141	1	12	18	31	12	130	**3**	145	**27**	**19**	11	**57**
+30 mins.	6	108	**41**	**155**	2	**15**	18	**35**	**16**	133	2	151	26	13	8	47
+45 mins.	10	**117**	26	153	2	11	17	30	14	128	0	142	26	13	11	50
Total Volume	42	438	97	577	9	48	71	128	47	546	6	599	91	49	42	182
% App. Total	7.3	75.9	16.8		7	37.5	55.5		7.8	91.2	1		50	26.9	23.1	
PHF	.750	.936	.591	.931	.563	.800	.986	.914	.734	.881	.500	.930	.843	.645	.875	.798

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Fullerton Road
Weather: Clear

File Name : 06_MUR_Washington_Fullerton AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

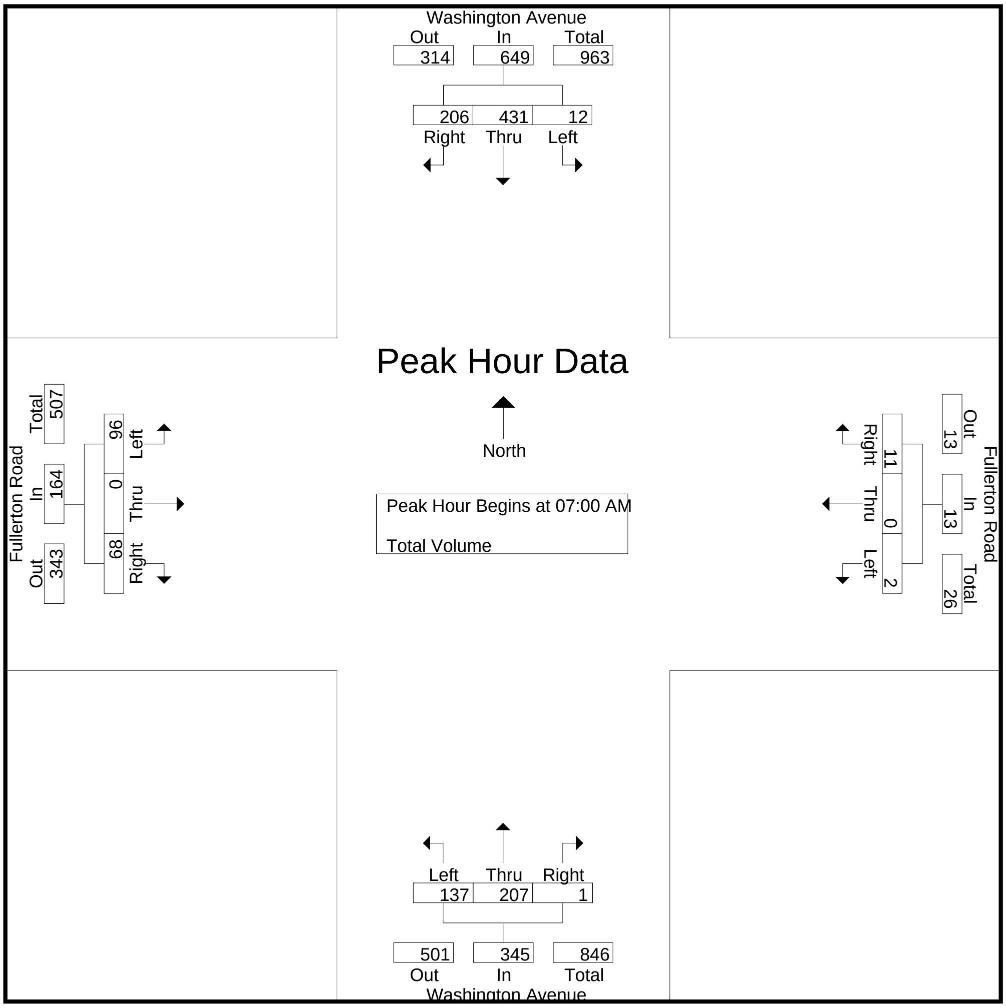
	Washington Avenue Southbound				Fullerton Road Westbound				Washington Avenue Northbound				Fullerton Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	1	98	75	174	0	0	1	1	59	64	1	124	23	0	13	36	335
07:15 AM	10	127	121	258	0	0	9	9	71	55	0	126	50	0	38	88	481
07:30 AM	1	107	9	117	2	0	1	3	7	41	0	48	22	0	16	38	206
07:45 AM	0	99	1	100	0	0	0	0	0	47	0	47	1	0	1	2	149
Total	12	431	206	649	2	0	11	13	137	207	1	345	96	0	68	164	1171
08:00 AM	0	143	3	146	2	0	1	3	1	79	1	81	1	0	0	1	231
08:15 AM	0	147	4	151	1	0	0	1	2	97	0	99	5	0	1	6	257
08:30 AM	0	146	3	149	0	0	0	0	1	77	0	78	1	0	0	1	228
08:45 AM	0	163	1	164	0	0	0	0	0	56	1	57	1	0	1	2	223
Total	0	599	11	610	3	0	1	4	4	309	2	315	8	0	2	10	939
Grand Total	12	1030	217	1259	5	0	12	17	141	516	3	660	104	0	70	174	2110
Apprch %	1	81.8	17.2		29.4	0	70.6		21.4	78.2	0.5		59.8	0	40.2		
Total %	0.6	48.8	10.3	59.7	0.2	0	0.6	0.8	6.7	24.5	0.1	31.3	4.9	0	3.3	8.2	

	Washington Avenue Southbound				Fullerton Road Westbound				Washington Avenue Northbound				Fullerton Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	1	98	75	174	0	0	1	1	59	**64**	**1**	124	23	0	13	36	335
07:15 AM	**10**	**127**	**121**	**258**	0	0	**9**	**9**	**71**	55	0	**126**	**50**	0	**38**	**88**	**481**
07:30 AM	1	107	9	117	**2**	0	1	3	7	41	0	48	22	0	16	38	206
07:45 AM	0	99	1	100	0	0	0	0	0	47	0	47	1	0	1	2	149
Total Volume	12	431	206	649	2	0	11	13	137	207	1	345	96	0	68	164	1171
% App. Total	1.8	66.4	31.7		15.4	0	84.6		39.7	60	0.3		58.5	0	41.5		
PHF	.300	.848	.426	.629	.250	.000	.306	.361	.482	.809	.250	.685	.480	.000	.447	.466	.609

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Fullerton Road
Weather: Clear

File Name : 06_MUR_Washington_Fullerton AM
Site Code : 10519351
Start Date : 5/15/2019



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:15 AM				07:00 AM				07:00 AM			
+0 mins.	1	98	75	174	0	0	**9**	**9**	59	**64**	**1**	124	23	0	13	36
+15 mins.	**10**	**127**	**121**	**258**	**2**	0	1	3	**71**	55	0	**126**	**50**	0	**38**	**88**
+30 mins.	1	107	9	117	0	0	0	0	7	41	0	48	22	0	16	38
+45 mins.	0	99	1	100	2	0	1	3	0	47	0	47	1	0	1	2
Total Volume	12	431	206	649	4	0	11	15	137	207	1	345	96	0	68	164
% App. Total	1.8	66.4	31.7		26.7	0	73.3		39.7	60	0.3		58.5	0	41.5	
PHF	.300	.848	.426	.629	.500	.000	.306	.417	.482	.809	.250	.685	.480	.000	.447	.466

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Fullerton Road
Weather: Clear

File Name : 06_MUR_Washington_Fullerton PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

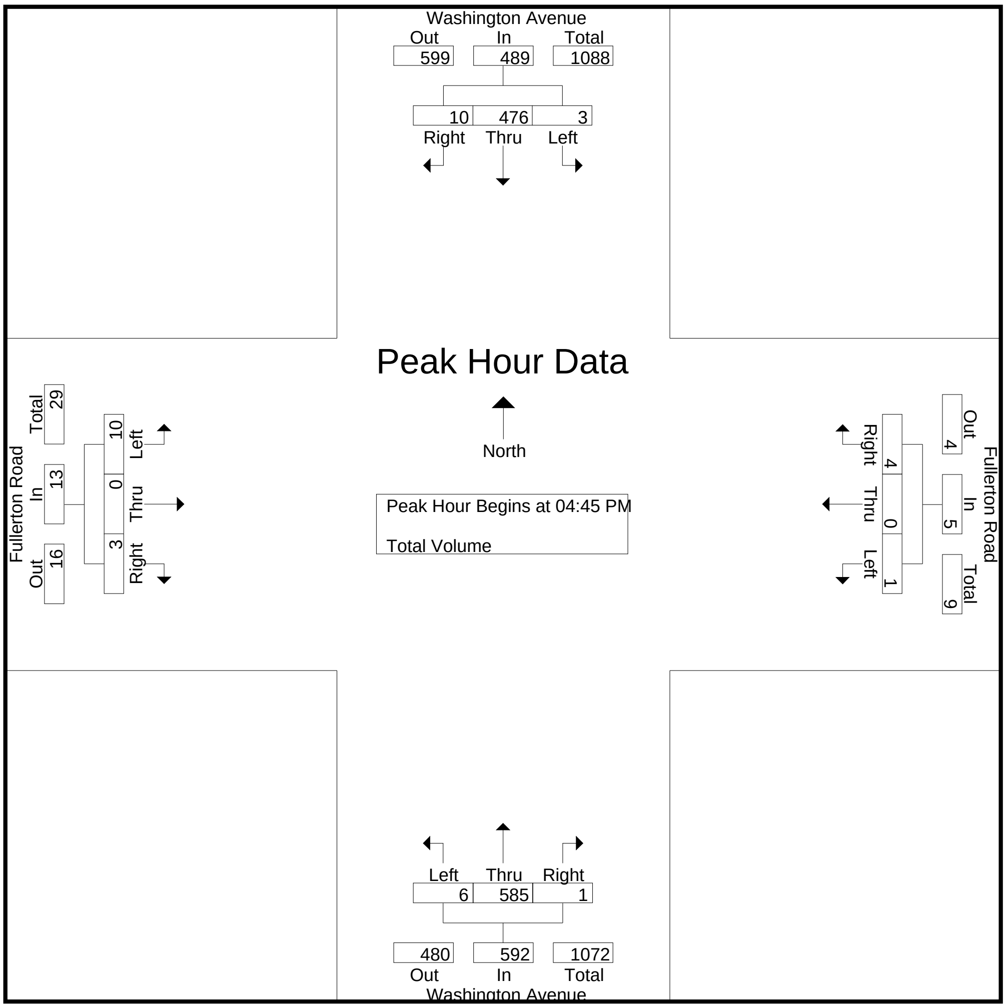
	Washington Avenue Southbound				Fullerton Road Westbound				Washington Avenue Northbound				Fullerton Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	129	7	136	1	0	0	1	3	126	0	129	5	0	3	8	274
04:15 PM	0	118	5	123	0	0	0	0	2	159	0	161	2	0	3	5	289
04:30 PM	0	97	1	98	1	0	0	1	2	138	0	140	7	0	3	10	249
04:45 PM	0	131	4	135	0	0	0	0	2	147	0	149	2	0	0	2	286
Total	0	475	17	492	2	0	0	2	9	570	0	579	16	0	9	25	1098
05:00 PM	0	117	1	118	0	0	0	0	3	143	0	146	1	0	1	2	266
05:15 PM	1	124	2	127	1	0	1	2	1	132	1	134	3	0	0	3	266
05:30 PM	2	104	3	109	0	0	3	3	0	163	0	163	4	0	2	6	281
05:45 PM	0	101	3	104	0	0	0	0	3	117	0	120	0	0	0	0	224
Total	3	446	9	458	1	0	4	5	7	555	1	563	8	0	3	11	1037
Grand Total	3	921	26	950	3	0	4	7	16	1125	1	1142	24	0	12	36	2135
Apprch %	0.3	96.9	2.7		42.9	0	57.1		1.4	98.5	0.1		66.7	0	33.3		
Total %	0.1	43.1	1.2	44.5	0.1	0	0.2	0.3	0.7	52.7	0	53.5	1.1	0	0.6	1.7	

	Washington Avenue Southbound				Fullerton Road Westbound				Washington Avenue Northbound				Fullerton Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	**131**	**4**	**135**	0	0	0	0	2	147	0	149	2	0	0	2	**286**
05:00 PM	0	117	1	118	0	0	0	0	**3**	143	0	146	1	0	1	2	266
05:15 PM	1	124	2	127	**1**	0	1	2	1	132	**1**	134	3	0	0	3	266
05:30 PM	**2**	104	3	109	0	0	**3**	**3**	0	**163**	0	**163**	**4**	0	**2**	**6**	281
Total Volume	3	476	10	489	1	0	4	5	6	585	1	592	10	0	3	13	1099
% App. Total	0.6	97.3	2		20	0	80		1	98.8	0.2		76.9	0	23.1		
PHF	.375	.908	.625	.906	.250	.000	.333	.417	.500	.897	.250	.908	.625	.000	.375	.542	.961

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Fullerton Road
Weather: Clear

File Name : 06_MUR_Washington_Fullerton PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:45 PM				04:15 PM				04:00 PM			
+0 mins.	0	129	**7**	**136**	0	0	0	0	2	**159**	0	**161**	5	0	**3**	8
+15 mins.	0	118	5	123	0	0	0	0	2	138	0	140	2	0	3	5
+30 mins.	0	97	1	98	**1**	0	1	2	2	147	0	149	**7**	0	3	**10**
+45 mins.	0	**131**	4	135	0	0	**3**	**3**	**3**	143	0	146	2	0	0	2
Total Volume	0	475	17	492	1	0	4	5	9	587	0	596	16	0	9	25
% App. Total	0	96.5	3.5		20	0	80		1.5	98.5	0		64	0	36	
PHF	.000	.906	.607	.904	.250	.000	.333	.417	.750	.923	.000	.925	.571	.000	.750	.625

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Vineyard Parkway/Lemon Street
Weather: Clear

File Name : 07_MUR_Washington_Vineyard_Lemon AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

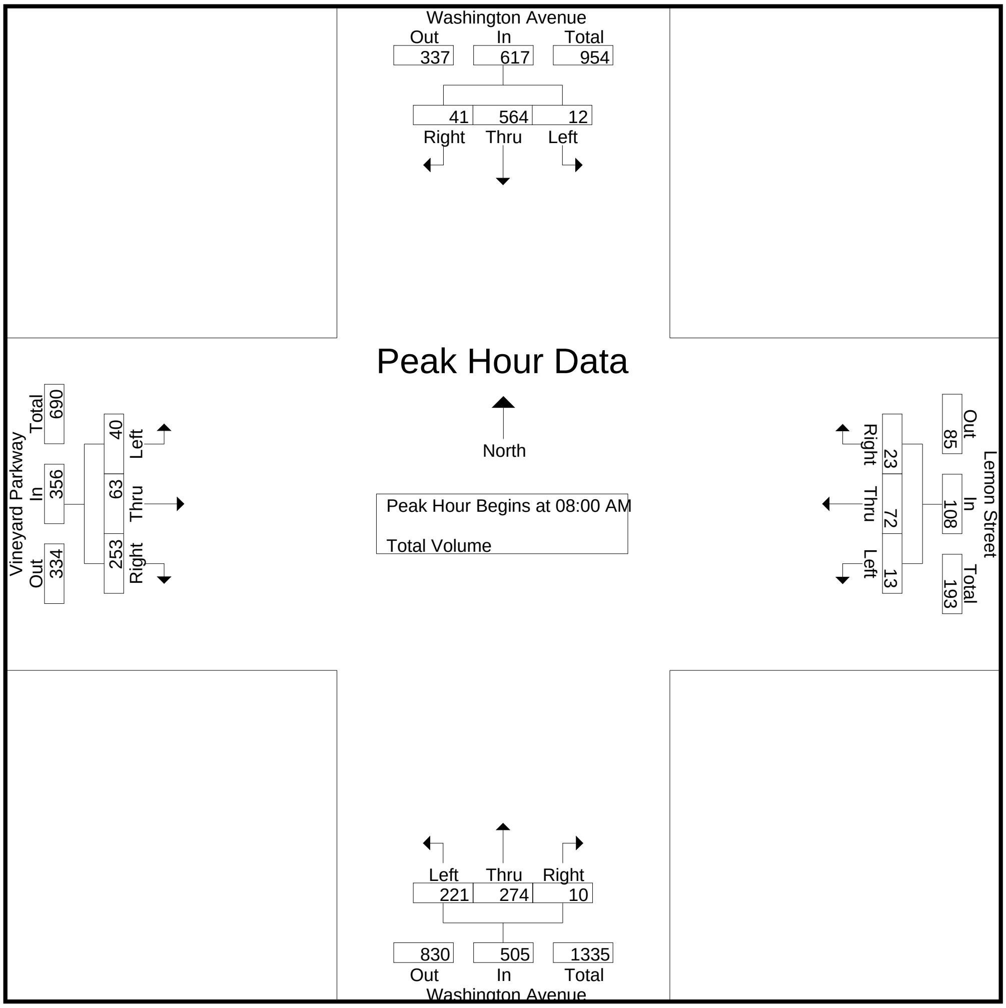
	Washington Avenue Southbound				Lemon Street Westbound				Washington Avenue Northbound				Vineyard Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	5	84	21	110	0	32	18	50	53	101	0	154	4	5	28	37	351
07:15 AM	5	138	23	166	0	64	21	85	88	87	0	175	18	23	45	86	512
07:30 AM	5	128	7	140	1	8	5	14	31	39	1	71	6	14	49	69	294
07:45 AM	3	94	5	102	0	20	2	22	59	41	1	101	7	17	59	83	308
Total	18	444	56	518	1	124	46	171	231	268	2	501	35	59	181	275	1465
08:00 AM	1	142	3	146	1	16	3	20	32	71	1	104	13	15	53	81	351
08:15 AM	4	145	6	155	3	31	10	44	62	92	8	162	5	8	55	68	429
08:30 AM	2	137	12	151	1	20	2	23	75	65	1	141	12	22	72	106	421
08:45 AM	5	140	20	165	8	5	8	21	52	46	0	98	10	18	73	101	385
Total	12	564	41	617	13	72	23	108	221	274	10	505	40	63	253	356	1586
Grand Total	30	1008	97	1135	14	196	69	279	452	542	12	1006	75	122	434	631	3051
Apprch %	2.6	88.8	8.5		5	70.3	24.7		44.9	53.9	1.2		11.9	19.3	68.8		
Total %	1	33	3.2	37.2	0.5	6.4	2.3	9.1	14.8	17.8	0.4	33	2.5	4	14.2	20.7	

	Washington Avenue Southbound				Lemon Street Westbound				Washington Avenue Northbound				Vineyard Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	1	142	3	146	1	16	3	20	32	71	1	104	**13**	15	53	81	351
08:15 AM	4	**145**	6	155	3	**31**	**10**	**44**	62	**92**	**8**	**162**	5	8	55	68	**429**
08:30 AM	2	137	12	151	1	20	2	23	**75**	65	1	141	12	**22**	72	**106**	421
08:45 AM	**5**	140	**20**	**165**	**8**	5	8	21	52	46	0	98	10	18	**73**	101	385
Total Volume	12	564	41	617	13	72	23	108	221	274	10	505	40	63	253	356	1586
% App. Total	1.9	91.4	6.6		12	66.7	21.3		43.8	54.3	2		11.2	17.7	71.1		
PHF	.600	.972	.513	.935	.406	.581	.575	.614	.737	.745	.313	.779	.769	.716	.866	.840	.924

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Vineyard Parkway/Lemon Street
Weather: Clear

File Name : 07_MUR_Washington_Vineyard_Lemon AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				07:00 AM				07:45 AM				08:00 AM			
+0 mins.	1	142	3	146	0	32	18	50	59	41	1	101	**13**	15	53	81
+15 mins.	4	**145**	6	155	0	**64**	**21**	**85**	32	71	1	104	5	8	55	68
+30 mins.	2	137	12	151	**1**	8	5	14	62	**92**	**8**	**162**	12	**22**	72	**106**
+45 mins.	**5**	140	**20**	**165**	0	20	2	22	**75**	65	1	141	10	18	**73**	101
Total Volume	12	564	41	617	1	124	46	171	228	269	11	508	40	63	253	356
% App. Total	1.9	91.4	6.6		0.6	72.5	26.9		44.9	53	2.2		11.2	17.7	71.1	
PHF	.600	.972	.513	.935	.250	.484	.548	.503	.760	.731	.344	.784	.769	.716	.866	.840

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Vineyard Parkway/Lemon Street
Weather: Clear

File Name : 07_MUR_Washington_Vineyard_Lemon PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

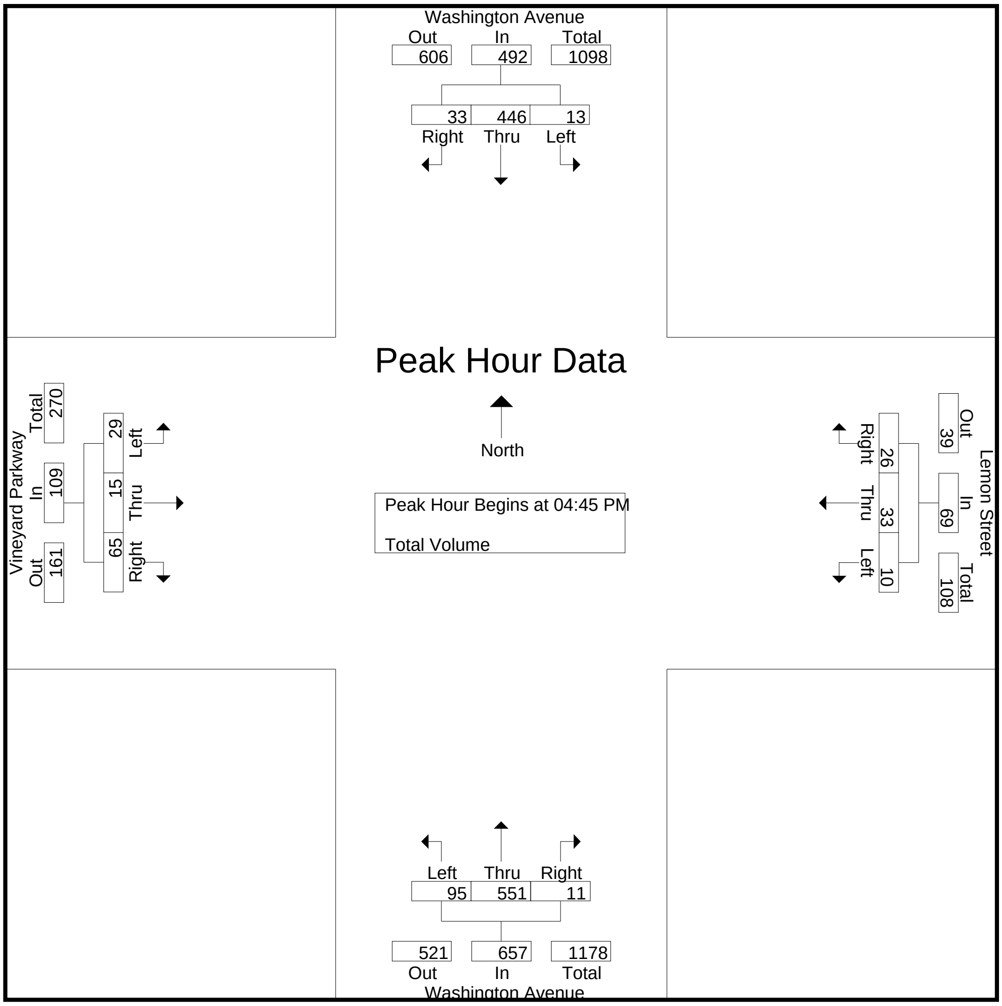
	Washington Avenue Southbound				Lemon Street Westbound				Washington Avenue Northbound				Vineyard Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	3	124	11	138	1	5	5	11	21	121	2	144	4	2	30	36	329
04:15 PM	7	101	5	113	2	3	3	8	20	151	3	174	9	3	15	27	322
04:30 PM	2	109	2	113	2	4	8	14	15	131	4	150	4	3	26	33	310
04:45 PM	2	122	7	131	2	10	7	19	19	139	5	163	12	6	21	39	352
Total	14	456	25	495	7	22	23	52	75	542	14	631	29	14	92	135	1313
05:00 PM	3	106	15	124	3	6	7	16	30	136	4	170	5	5	17	27	337
05:15 PM	5	115	8	128	3	11	6	20	22	126	1	149	4	0	14	18	315
05:30 PM	3	103	3	109	2	6	6	14	24	150	1	175	8	4	13	25	323
05:45 PM	5	94	6	105	2	6	6	14	31	108	3	142	4	1	13	18	279
Total	16	418	32	466	10	29	25	64	107	520	9	636	21	10	57	88	1254
Grand Total	30	874	57	961	17	51	48	116	182	1062	23	1267	50	24	149	223	2567
Apprch %	3.1	90.9	5.9		14.7	44	41.4		14.4	83.8	1.8		22.4	10.8	66.8		
Total %	1.2	34	2.2	37.4	0.7	2	1.9	4.5	7.1	41.4	0.9	49.4	1.9	0.9	5.8	8.7	

	Washington Avenue Southbound				Lemon Street Westbound				Washington Avenue Northbound				Vineyard Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	2	**122**	7	**131**	2	10	**7**	19	19	139	**5**	163	**12**	**6**	**21**	**39**	**352**
05:00 PM	3	106	**15**	124	**3**	6	7	16	**30**	136	4	170	5	5	17	27	337
05:15 PM	**5**	115	8	128	3	**11**	6	**20**	22	126	1	149	4	0	14	18	315
05:30 PM	3	103	3	109	2	6	6	14	24	**150**	1	**175**	8	4	13	25	323
Total Volume	13	446	33	492	10	33	26	69	95	551	11	657	29	15	65	109	1327
% App. Total	2.6	90.7	6.7		14.5	47.8	37.7		14.5	83.9	1.7		26.6	13.8	59.6		
PHF	.650	.914	.550	.939	.833	.750	.929	.863	.792	.918	.550	.939	.604	.625	.774	.699	.942

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Vineyard Parkway/Lemon Street
Weather: Clear

File Name : 07_MUR_Washington_Vineyard_Lemon PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				04:30 PM				04:15 PM				04:00 PM			
+0 mins.	2	109	2	113	2	4	**8**	14	20	**151**	3	**174**	4	2	**30**	36
+15 mins.	2	**122**	7	**131**	2	10	7	19	15	131	4	150	9	3	15	27
+30 mins.	3	106	**15**	124	**3**	6	7	16	19	139	**5**	163	4	3	26	33
+45 mins.	**5**	115	8	128	3	**11**	6	**20**	**30**	136	4	170	**12**	**6**	21	**39**
Total Volume	12	452	32	496	10	31	28	69	84	557	16	657	29	14	92	135
% App. Total	2.4	91.1	6.5		14.5	44.9	40.6		12.8	84.8	2.4		21.5	10.4	68.1	
PHF	.600	.926	.533	.947	.833	.705	.875	.863	.700	.922	.800	.944	.604	.583	.767	.865

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Kalmia Street
Weather: Clear

File Name : 08_MUR_Washington_Kalmia AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

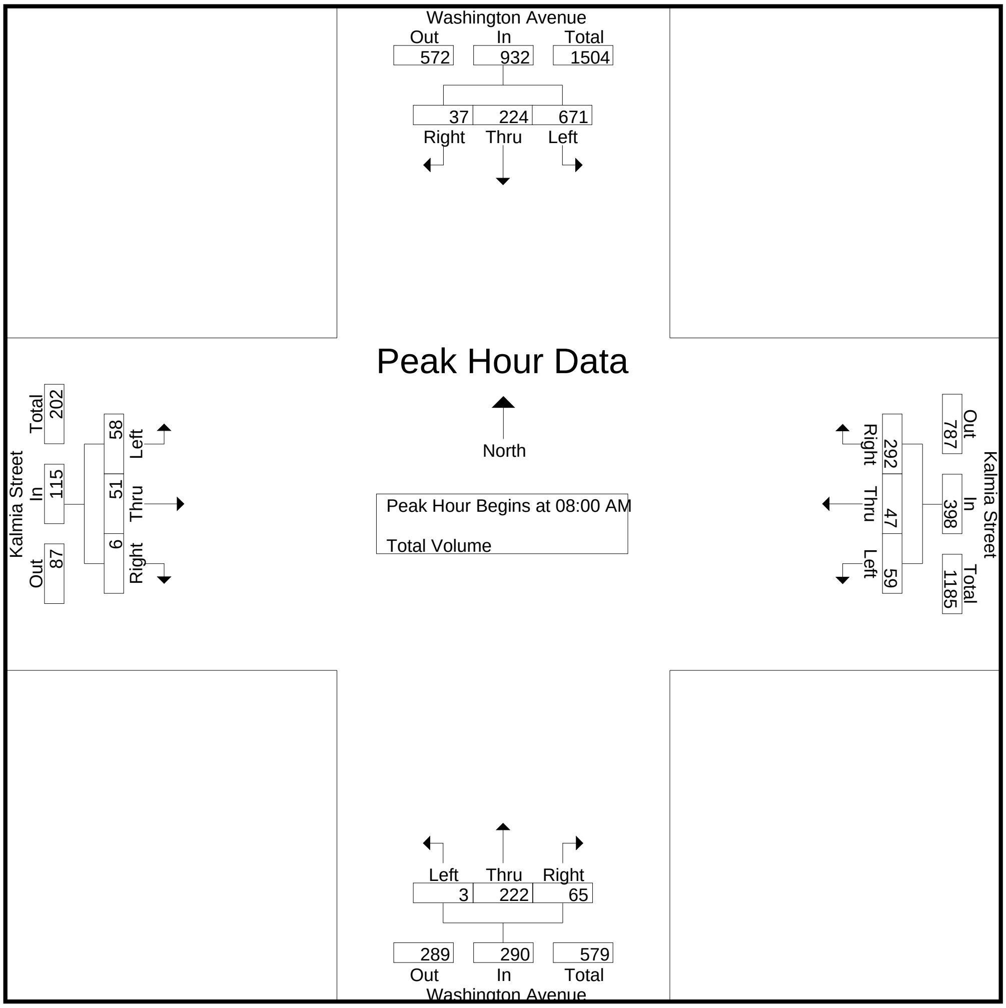
	Washington Avenue Southbound				Kalmia Street Westbound				Washington Avenue Northbound				Kalmia Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	89	33	3	125	4	4	107	115	1	26	4	31	31	5	0	36	307
07:15 AM	145	54	9	208	9	12	120	141	0	39	8	47	14	6	1	21	417
07:30 AM	142	49	7	198	6	13	43	62	2	18	2	22	9	9	0	18	300
07:45 AM	116	63	4	183	12	11	84	107	2	23	6	31	7	10	1	18	339
Total	492	199	23	714	31	40	354	425	5	106	20	131	61	30	2	93	1363
08:00 AM	178	51	5	234	14	9	66	89	1	31	9	41	15	10	3	28	392
08:15 AM	182	62	5	249	14	14	79	107	1	92	27	120	11	23	0	34	510
08:30 AM	150	50	16	216	10	13	72	95	0	69	13	82	16	10	1	27	420
08:45 AM	161	61	11	233	21	11	75	107	1	30	16	47	16	8	2	26	413
Total	671	224	37	932	59	47	292	398	3	222	65	290	58	51	6	115	1735
Grand Total	1163	423	60	1646	90	87	646	823	8	328	85	421	119	81	8	208	3098
Apprch %	70.7	25.7	3.6		10.9	10.6	78.5		1.9	77.9	20.2		57.2	38.9	3.8		
Total %	37.5	13.7	1.9	53.1	2.9	2.8	20.9	26.6	0.3	10.6	2.7	13.6	3.8	2.6	0.3	6.7	

	Washington Avenue Southbound				Kalmia Street Westbound				Washington Avenue Northbound				Kalmia Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	178	51	5	234	14	9	66	89	**1**	31	9	41	15	10	**3**	28	392
08:15 AM	**182**	**62**	5	**249**	14	**14**	**79**	**107**	1	**92**	**27**	**120**	11	**23**	0	**34**	**510**
08:30 AM	150	50	**16**	216	10	13	72	95	0	69	13	82	**16**	10	1	27	420
08:45 AM	161	61	11	233	**21**	11	75	107	1	30	16	47	16	8	2	26	413
Total Volume	671	224	37	932	59	47	292	398	3	222	65	290	58	51	6	115	1735
% App. Total	72	24	4		14.8	11.8	73.4		1	76.6	22.4		50.4	44.3	5.2		
PHF	.922	.903	.578	.936	.702	.839	.924	.930	.750	.603	.602	.604	.906	.554	.500	.846	.850

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Kalmia Street
Weather: Clear

File Name : 08_MUR_Washington_Kalmia AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				07:00 AM				08:00 AM				08:00 AM			
+0 mins.	178	51	5	234	4	4	107	115	**1**	31	9	41	15	10	**3**	28
+15 mins.	**182**	**62**	5	**249**	9	12	**120**	**141**	1	**92**	**27**	**120**	11	**23**	0	**34**
+30 mins.	150	50	**16**	216	6	**13**	43	62	0	69	13	82	**16**	10	1	27
+45 mins.	161	61	11	233	**12**	11	84	107	1	30	16	47	16	8	2	26
Total Volume	671	224	37	932	31	40	354	425	3	222	65	290	58	51	6	115
% App. Total	72	24	4		7.3	9.4	83.3		1	76.6	22.4		50.4	44.3	5.2	
PHF	.922	.903	.578	.936	.646	.769	.738	.754	.750	.603	.602	.604	.906	.554	.500	.846

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Kalmia Street
Weather: Clear

File Name : 08_MUR_Washington_Kalmia PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

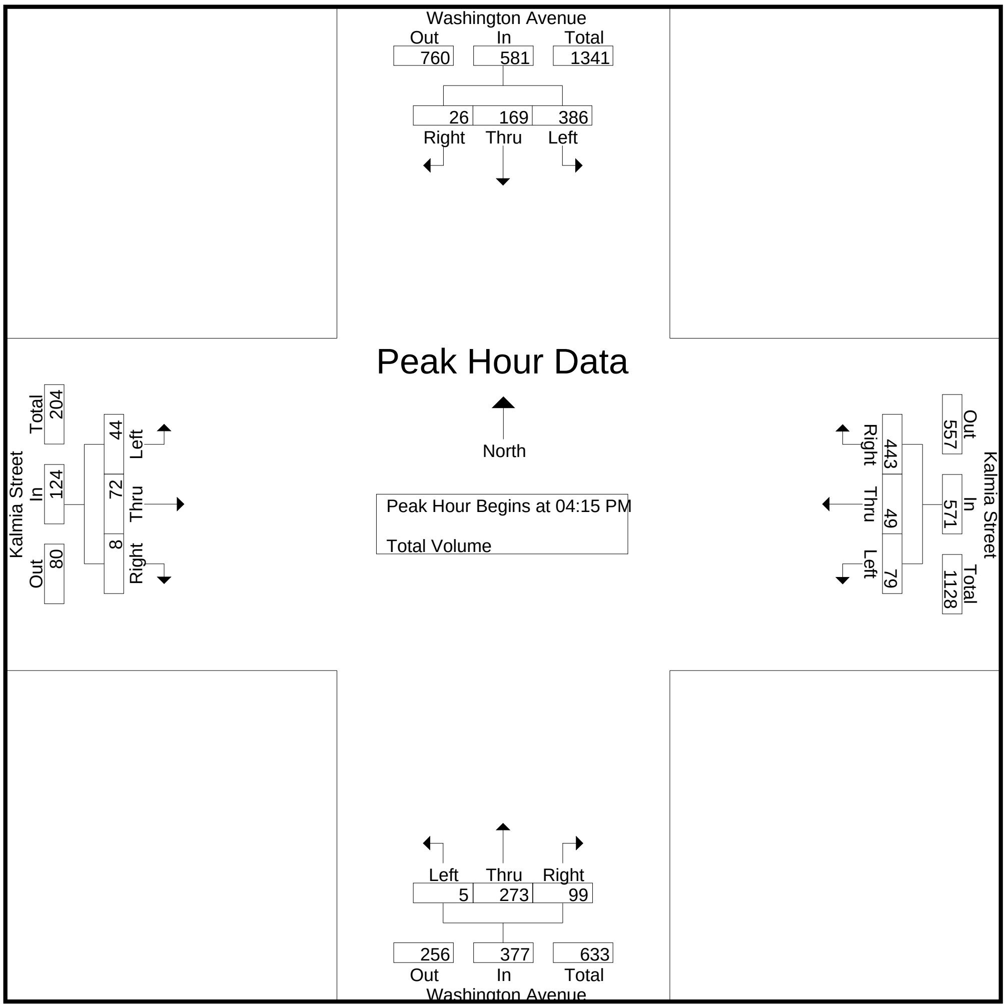
	Washington Avenue Southbound				Kalmia Street Westbound				Washington Avenue Northbound				Kalmia Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	116	45	8	169	10	7	110	127	1	62	24	87	6	13	1	20	403
04:15 PM	97	32	4	133	20	14	121	155	1	69	26	96	15	22	2	39	423
04:30 PM	104	35	8	147	21	12	94	127	0	69	18	87	9	21	1	31	392
04:45 PM	86	61	7	154	18	13	106	137	2	65	31	98	11	13	2	26	415
Total	403	173	27	603	69	46	431	546	4	265	99	368	41	69	6	116	1633
05:00 PM	99	41	7	147	20	10	122	152	2	70	24	96	9	16	3	28	423
05:15 PM	81	40	8	129	18	16	97	131	4	66	22	92	14	26	3	43	395
05:30 PM	91	48	11	150	11	24	119	154	2	68	8	78	17	14	2	33	415
05:45 PM	74	34	11	119	15	10	106	131	1	54	17	72	10	19	1	30	352
Total	345	163	37	545	64	60	444	568	9	258	71	338	50	75	9	134	1585
Grand Total	748	336	64	1148	133	106	875	1114	13	523	170	706	91	144	15	250	3218
Apprch %	65.2	29.3	5.6		11.9	9.5	78.5		1.8	74.1	24.1		36.4	57.6	6		
Total %	23.2	10.4	2	35.7	4.1	3.3	27.2	34.6	0.4	16.3	5.3	21.9	2.8	4.5	0.5	7.8	

	Washington Avenue Southbound				Kalmia Street Westbound				Washington Avenue Northbound				Kalmia Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	97	32	4	133	20	**14**	121	**155**	1	69	26	96	**15**	**22**	2	**39**	**423**
04:30 PM	**104**	35	**8**	147	**21**	12	94	127	0	69	18	87	9	21	1	31	392
04:45 PM	86	**61**	7	**154**	18	13	106	137	**2**	65	**31**	**98**	11	13	2	26	415
05:00 PM	99	41	7	147	20	10	**122**	152	2	**70**	24	96	9	16	**3**	28	423
Total Volume	386	169	26	581	79	49	443	571	5	273	99	377	44	72	8	124	1653
% App. Total	66.4	29.1	4.5		13.8	8.6	77.6		1.3	72.4	26.3		35.5	58.1	6.5		
PHF	.928	.693	.813	.943	.940	.875	.908	.921	.625	.975	.798	.962	.733	.818	.667	.795	.977

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Washington Avenue
E/W: Kalmia Street
Weather: Clear

File Name : 08_MUR_Washington_Kalmia PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:45 PM				04:15 PM				05:00 PM			
+0 mins.	**116**	45	**8**	**169**	18	13	106	137	1	69	26	96	9	16	**3**	28
+15 mins.	97	32	4	133	**20**	10	**122**	152	0	69	18	87	14	**26**	3	**43**
+30 mins.	104	35	8	147	18	16	97	131	**2**	65	**31**	**98**	**17**	14	2	33
+45 mins.	86	**61**	7	154	11	**24**	119	**154**	2	**70**	24	96	10	19	1	30
Total Volume	403	173	27	603	67	63	444	574	5	273	99	377	50	75	9	134
% App. Total	66.8	28.7	4.5		11.7	11	77.4		1.3	72.4	26.3		37.3	56	6.7	
PHF	.869	.709	.844	.892	.838	.656	.910	.932	.625	.975	.798	.962	.735	.721	.750	.779

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Sherry Lane/High School Access
Weather: Clear

File Name : 09_MUR_Hayes_HS Access AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

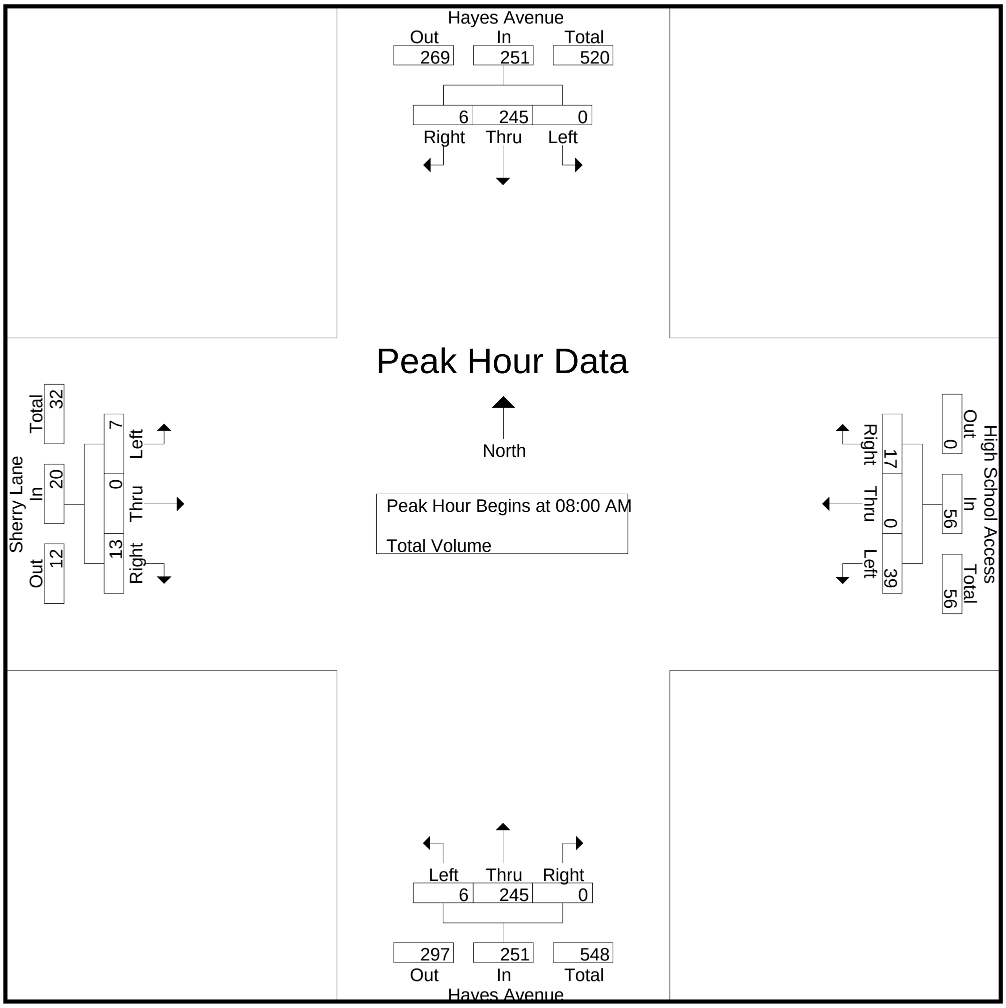
	Hayes Avenue Southbound				High School Access Westbound				Hayes Avenue Northbound				Sherry Lane Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	8	1	9	1	0	0	1	1	27	0	28	2	0	2	4	42
07:15 AM	0	23	1	24	2	0	0	2	3	71	0	74	2	0	3	5	105
07:30 AM	0	41	0	41	3	0	4	7	1	40	0	41	2	0	0	2	91
07:45 AM	0	67	1	68	25	0	13	38	0	37	0	37	5	0	0	5	148
Total	0	139	3	142	31	0	17	48	5	175	0	180	11	0	5	16	386
08:00 AM	0	30	0	30	21	0	7	28	0	30	0	30	3	0	4	7	95
08:15 AM	0	50	3	53	5	0	5	10	3	67	0	70	2	0	3	5	138
08:30 AM	0	84	0	84	7	0	2	9	2	86	0	88	1	0	5	6	187
08:45 AM	0	81	3	84	6	0	3	9	1	62	0	63	1	0	1	2	158
Total	0	245	6	251	39	0	17	56	6	245	0	251	7	0	13	20	578
Grand Total	0	384	9	393	70	0	34	104	11	420	0	431	18	0	18	36	964
Apprch %	0	97.7	2.3		67.3	0	32.7		2.6	97.4	0		50	0	50		
Total %	0	39.8	0.9	40.8	7.3	0	3.5	10.8	1.1	43.6	0	44.7	1.9	0	1.9	3.7	

	Hayes Avenue Southbound				High School Access Westbound				Hayes Avenue Northbound				Sherry Lane Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	30	0	30	**21**	0	**7**	**28**	0	30	0	30	**3**	0	4	**7**	95
08:15 AM	0	50	**3**	53	5	0	5	10	**3**	67	0	70	2	0	3	5	138
08:30 AM	0	**84**	0	**84**	7	0	2	9	2	**86**	0	**88**	1	0	**5**	6	**187**
08:45 AM	0	81	3	84	6	0	3	9	1	62	0	63	1	0	1	2	158
Total Volume	0	245	6	251	39	0	17	56	6	245	0	251	7	0	13	20	578
% App. Total	0	97.6	2.4		69.6	0	30.4		2.4	97.6	0		35	0	65		
PHF	.000	.729	.500	.747	.464	.000	.607	.500	.500	.712	.000	.713	.583	.000	.650	.714	.773

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Sherry Lane/High School Access
Weather: Clear

File Name : 09_MUR_Hayes_HS Access AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				07:45 AM				08:00 AM				07:45 AM			
+0 mins.	0	30	0	30	**25**	0	**13**	**38**	0	30	0	30	**5**	0	0	5
+15 mins.	0	50	**3**	53	21	0	7	28	**3**	67	0	70	3	0	4	**7**
+30 mins.	0	**84**	0	**84**	5	0	5	10	2	**86**	0	**88**	2	0	3	5
+45 mins.	0	81	3	84	7	0	2	9	1	62	0	63	1	0	**5**	6
Total Volume	0	245	6	251	58	0	27	85	6	245	0	251	11	0	12	23
% App. Total	0	97.6	2.4		68.2	0	31.8		2.4	97.6	0		47.8	0	52.2	
PHF	.000	.729	.500	.747	.580	.000	.519	.559	.500	.712	.000	.713	.550	.000	.600	.821

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Sherry Lane/High School Access
Weather: Clear

File Name : 09_MUR_Hayes_HS Access PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

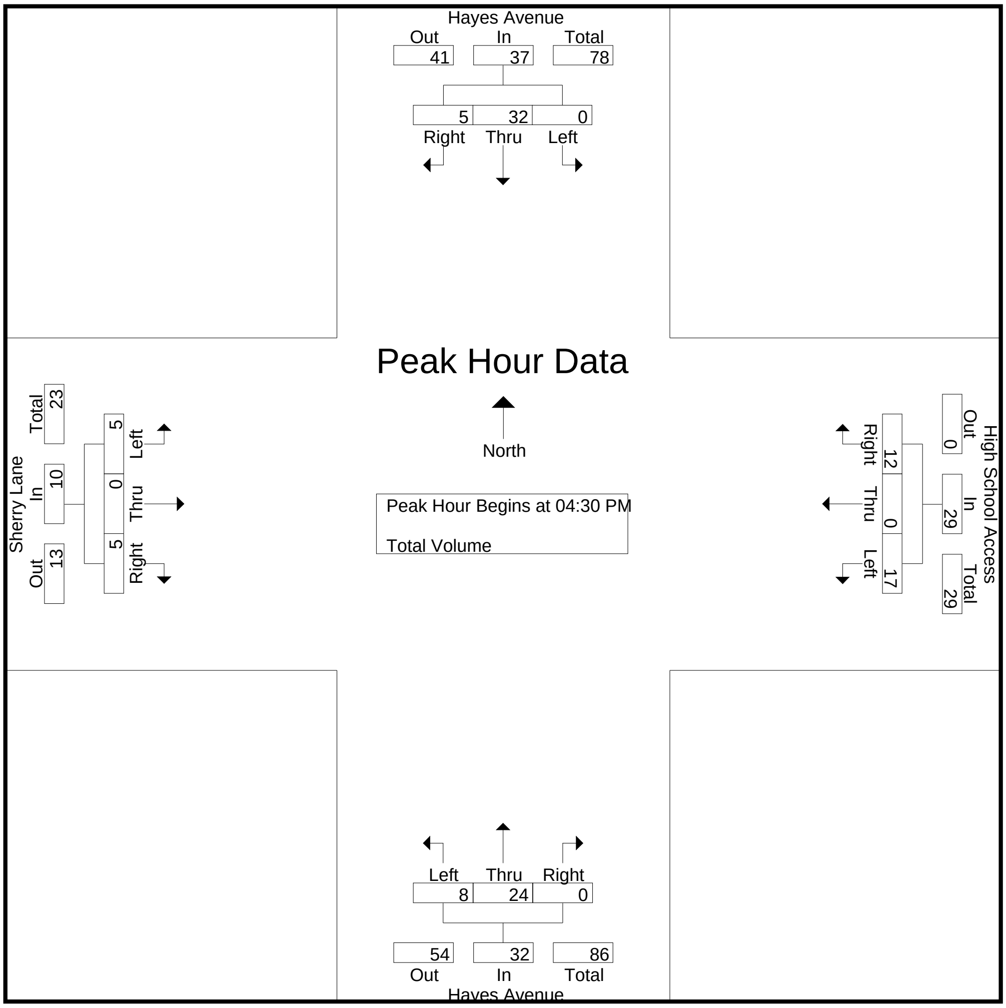
	Hayes Avenue Southbound				High School Access Westbound				Hayes Avenue Northbound				Sherry Lane Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	8	3	11	2	0	1	3	0	7	0	7	2	0	1	3	24
04:15 PM	0	11	0	11	3	0	2	5	1	5	0	6	3	0	1	4	26
04:30 PM	0	6	0	6	5	0	1	6	1	3	0	4	1	0	1	2	18
04:45 PM	0	9	2	11	5	0	2	7	2	6	0	8	1	0	1	2	28
Total	0	34	5	39	15	0	6	21	4	21	0	25	7	0	4	11	96
05:00 PM	0	9	1	10	7	0	6	13	2	7	0	9	2	0	0	2	34
05:15 PM	0	8	2	10	0	0	3	3	3	8	0	11	1	0	3	4	28
05:30 PM	0	1	1	2	2	0	1	3	1	9	0	10	0	0	1	1	16
05:45 PM	0	6	2	8	0	0	0	0	1	5	0	6	2	0	0	2	16
Total	0	24	6	30	9	0	10	19	7	29	0	36	5	0	4	9	94
Grand Total	0	58	11	69	24	0	16	40	11	50	0	61	12	0	8	20	190
Apprch %	0	84.1	15.9		60	0	40		18	82	0		60	0	40		
Total %	0	30.5	5.8	36.3	12.6	0	8.4	21.1	5.8	26.3	0	32.1	6.3	0	4.2	10.5	

	Hayes Avenue Southbound				High School Access Westbound				Hayes Avenue Northbound				Sherry Lane Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	6	0	6	5	0	1	6	1	3	0	4	1	0	1	2	18
04:45 PM	0	**9**	**2**	**11**	5	0	2	7	2	6	0	8	1	0	1	2	28
05:00 PM	0	9	1	10	**7**	0	**6**	**13**	2	7	0	9	**2**	0	0	2	**34**
05:15 PM	0	8	2	10	0	0	3	3	**3**	**8**	0	**11**	1	0	**3**	**4**	28
Total Volume	0	32	5	37	17	0	12	29	8	24	0	32	5	0	5	10	108
% App. Total	0	86.5	13.5		58.6	0	41.4		25	75	0		50	0	50		
PHF	.000	.889	.625	.841	.607	.000	.500	.558	.667	.750	.000	.727	.625	.000	.417	.625	.794

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: Hayes Avenue
E/W: Sherry Lane/High School Access
Weather: Clear

File Name : 09_MUR_Hayes_HS Access PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:15 PM				04:45 PM				04:00 PM			
+0 mins.	0	8	**3**	**11**	3	0	2	5	2	6	0	8	2	0	**1**	3
+15 mins.	0	**11**	0	11	5	0	1	6	2	7	0	9	**3**	0	1	**4**
+30 mins.	0	6	0	6	5	0	2	7	**3**	8	0	**11**	1	0	1	2
+45 mins.	0	9	2	11	**7**	0	**6**	**13**	1	**9**	0	10	1	0	1	2
Total Volume	0	34	5	39	20	0	11	31	8	30	0	38	7	0	4	11
% App. Total	0	87.2	12.8		64.5	0	35.5		21.1	78.9	0		63.6	0	36.4	
PHF	.000	.773	.417	.886	.714	.000	.458	.596	.667	.833	.000	.864	.583	.000	1.000	.688

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: High School Access
E/W: Fullerton Road
Weather: Clear

File Name : 10_MUR_HS Access_Fullerton AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

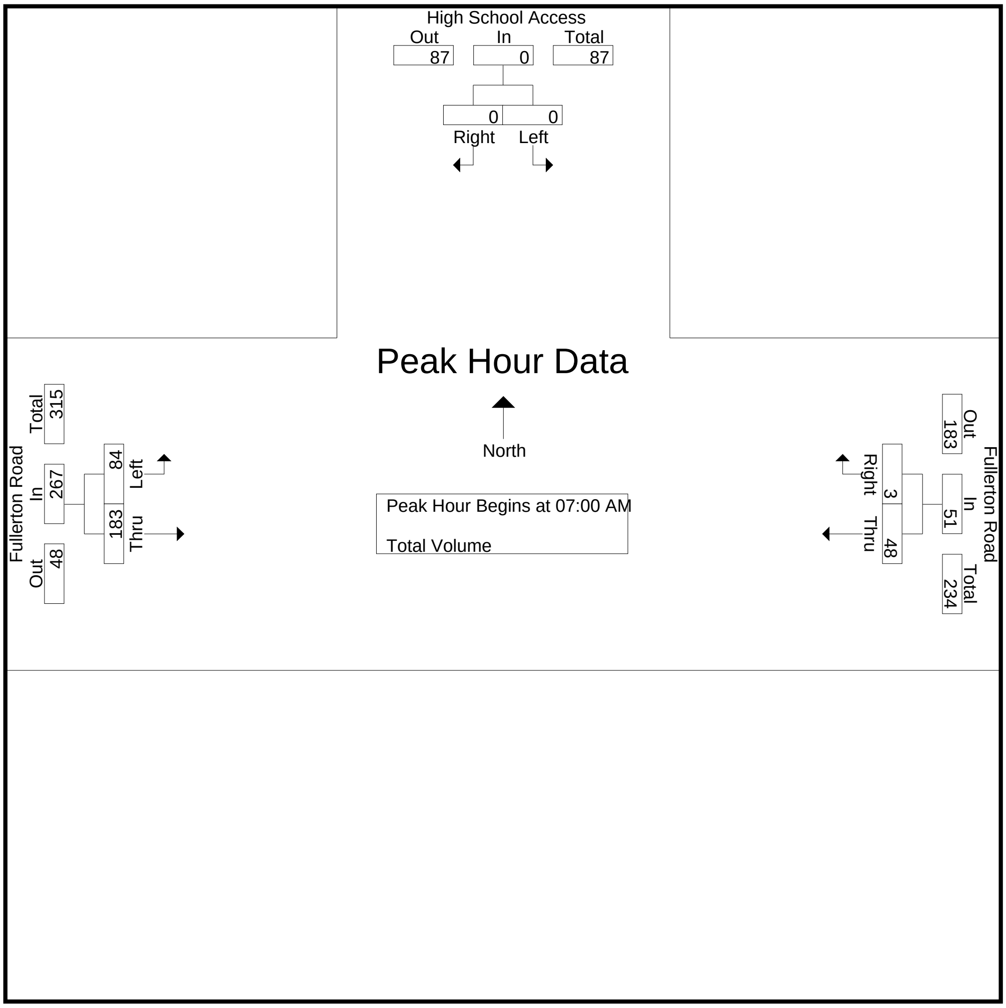
	High School Access Southbound			Fullerton Road Westbound			Fullerton Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
07:00 AM	0	0	0	8	2	10	2	51	53	63
07:15 AM	0	0	0	29	1	30	7	129	136	166
07:30 AM	0	0	0	11	0	11	15	3	18	29
07:45 AM	0	0	0	0	0	0	60	0	60	60
Total	0	0	0	48	3	51	84	183	267	318
08:00 AM	0	0	0	0	0	0	32	0	32	32
08:15 AM	0	0	0	1	0	1	16	3	19	20
08:30 AM	0	0	0	0	0	0	5	0	5	5
08:45 AM	0	1	1	1	0	1	13	0	13	15
Total	0	1	1	2	0	2	66	3	69	72
Grand Total	0	1	1	50	3	53	150	186	336	390
Apprch %	0	100		94.3	5.7		44.6	55.4		
Total %	0	0.3	0.3	12.8	0.8	13.6	38.5	47.7	86.2	

	High School Access Southbound			Fullerton Road Westbound			Fullerton Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	0	0	0	8	**2**	10	2	51	53	63
07:15 AM	0	0	0	**29**	1	**30**	7	**129**	**136**	**166**
07:30 AM	0	0	0	11	0	11	15	3	18	29
07:45 AM	0	0	0	0	0	0	**60**	0	60	60
Total Volume	0	0	0	48	3	51	84	183	267	318
% App. Total	0	0		94.1	5.9		31.5	68.5		
PHF	.000	.000	.000	.414	.375	.425	.350	.355	.491	.479

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: High School Access
E/W: Fullerton Road
Weather: Clear

File Name : 10_MUR_HS Access_Fullerton AM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM			07:00 AM			07:00 AM		
+0 mins.	0	0	0	8	**2**	10	2	51	53
+15 mins.	0	0	0	**29**	1	**30**	7	**129**	**136**
+30 mins.	0	0	0	11	0	11	15	3	18
+45 mins.	0	**1**	**1**	0	0	0	**60**	0	60
Total Volume	0	1	1	48	3	51	84	183	267
% App. Total	0	100		94.1	5.9		31.5	68.5	
PHF	.000	.250	.250	.414	.375	.425	.350	.355	.491

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: High School Access
E/W: Fullerton Road
Weather: Clear

File Name : 10_MUR_HS Access_Fullerton PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 1

Groups Printed- Total Volume

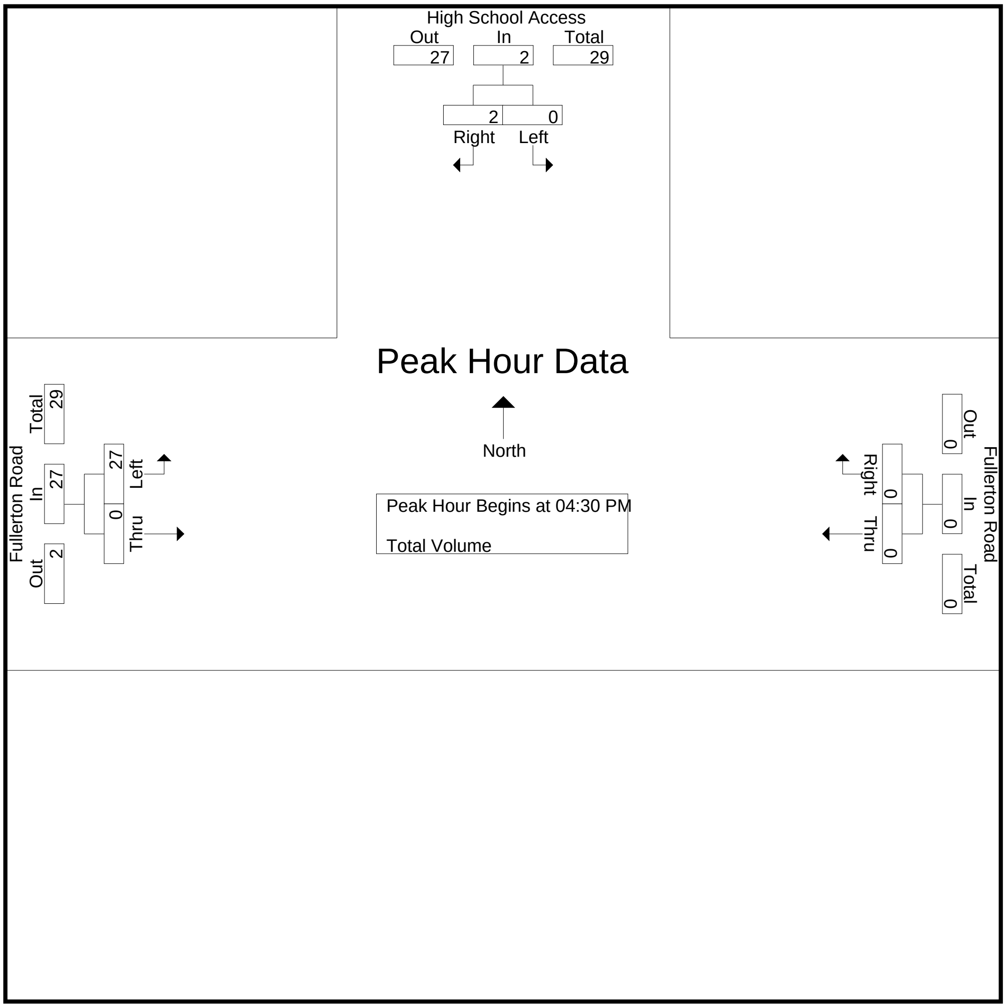
	High School Access Southbound			Fullerton Road Westbound			Fullerton Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	3	0	3	3
04:15 PM	0	0	0	0	0	0	5	0	5	5
04:30 PM	0	0	0	0	0	0	6	0	6	6
04:45 PM	0	0	0	0	0	0	8	0	8	8
Total	0	0	0	0	0	0	22	0	22	22
05:00 PM	0	1	1	0	0	0	8	0	8	9
05:15 PM	0	1	1	0	0	0	5	0	5	6
05:30 PM	0	0	0	0	0	0	3	0	3	3
05:45 PM	0	0	0	0	0	0	2	0	2	2
Total	0	2	2	0	0	0	18	0	18	20
Grand Total	0	2	2	0	0	0	40	0	40	42
Apprch %	0	100		0	0		100	0		
Total %	0	4.8	4.8	0	0	0	95.2	0	95.2	

	High School Access Southbound			Fullerton Road Westbound			Fullerton Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	0	0	0	0	0	0	6	0	6	6
04:45 PM	0	0	0	0	0	0	**8**	0	**8**	8
05:00 PM	0	**1**	**1**	0	0	0	8	0	8	**9**
05:15 PM	0	1	1	0	0	0	5	0	5	6
Total Volume	0	2	2	0	0	0	27	0	27	29
% App. Total	0	100		0	0		100	0		
PHF	.000	.500	.500	.000	.000	.000	.844	.000	.844	.806

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Murrieta
N/S: High School Access
E/W: Fullerton Road
Weather: Clear

File Name : 10_MUR_HS Access_Fullerton PM
Site Code : 10519351
Start Date : 5/15/2019
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM			04:00 PM			04:15 PM		
+0 mins.	0	0	0	0	0	0	5	0	5
+15 mins.	0	0	0	0	0	0	6	0	6
+30 mins.	0	**1**	**1**	0	0	0	**8**	0	**8**
+45 mins.	0	1	1	0	0	0	8	0	8
Total Volume	0	2	2	0	0	0	27	0	27
% App. Total	0	100		0	0		100	0	
PHF	.000	.500	.500	.000	.000	.000	.844	.000	.844

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Murrieta
Hayes Avenue
N/ Sherry Lane
24 Hour Directional Volume Count

MUR001
Site Code: 105-19351

Start	15-May-19	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Wed	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		1	8			1	14				
12:15		1	14			2	19				
12:30		0	10			0	12				
12:45		1	12	3	44	1	12	4	57	7	101
01:00		0	5			1	15				
01:15		0	6			1	3				
01:30		0	8			1	15				
01:45		1	14	1	33	0	14	3	47	4	80
02:00		0	18			0	10				
02:15		0	19			2	9				
02:30		1	**36**			0	12				
02:45		0	**41**	1	114	0	14	2	45	3	159
03:00		0	**41**			0	**19**				
03:15		0	**61**			0	**124**				
03:30		0	31			0	**41**				
03:45		1	16	1	149	0	**21**	0	205	1	354
04:00		0	10			0	11				
04:15		0	10			0	11				
04:30		0	5			1	6				
04:45		0	9	0	34	0	11	1	39	1	73
05:00		1	15			0	10				
05:15		2	12			1	10				
05:30		0	10			0	2				
05:45		3	7	6	44	2	8	3	30	9	74
06:00		2	7			1	9				
06:15		3	7			1	16				
06:30		5	9			3	11				
06:45		10	12	20	35	2	1	7	37	27	72
07:00		29	9			9	8				
07:15		73	5			24	4				
07:30		46	5			41	15				
07:45		55	4	203	23	68	5	142	32	345	55
08:00		**40**	5			**30**	4				
08:15		**74**	5			**53**	8				
08:30		**89**	8			**84**	5				
08:45		**66**	9	269	27	**84**	7	251	24	520	51
09:00		16	5			24	4				
09:15		4	6			12	6				
09:30		6	2			3	5				
09:45		9	1	35	14	13	1	52	16	87	30
10:00		7	4			7	2				
10:15		13	0			8	1				
10:30		17	3			6	0				
10:45		5	0	42	7	9	2	30	5	72	12
11:00		10	0			12	3				
11:15		12	1			8	1				
11:30		4	0			14	2				
11:45		12	0	38	1	5	1	39	7	77	8
Total		619	525	619	525	534	544	534	544	1153	1069
Combined Total		1144		1144		1078		1078		2222	
AM Peak	-	08:00	-	-	-	08:00	-	-	-	-	-
Vol.	-	269	-	-	-	251	-	-	-	-	-
P.H.F.		0.756				0.747					
PM Peak	-	-	02:30	-	-	-	03:00	-	-	-	-
Vol.	-	-	179	-	-	-	205	-	-	-	-
P.H.F.			0.734				0.413				
Percentage		54.1%	45.9%			49.5%	50.5%				
ADT/AADT		ADT 2,222		AADT 2,222							

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Murrieta
Hayes Avenue
B/ Sherry Lane - Fullerton Road
24 Hour Directional Volume Count

MUR002
Site Code: 105-19351

Start	15-May-19	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Wed	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	6			1	12				
12:15		1	11			1	23				
12:30		0	6			0	16				
12:45		0	8	1	31	0	15	2	66	3	97
01:00		0	1			0	18				
01:15		0	3			1	3				
01:30		0	6			1	14				
01:45		1	6	1	16	0	26	2	61	3	77
02:00		1	10			1	24				
02:15		0	18			1	18				
02:30		0	**36**			0	23				
02:45		0	**54**	1	118	0	15	2	80	3	198
03:00		0	**54**			1	**27**				
03:15		0	**57**			0	**149**				
03:30		0	31			0	**44**				
03:45		1	15	1	157	0	**24**	1	244	2	401
04:00		0	7			0	11				
04:15		0	7			0	14				
04:30		0	4			0	13				
04:45		0	7	0	25	0	17	0	55	0	80
05:00		0	10			1	15				
05:15		2	12			2	11				
05:30		0	10			0	4				
05:45		2	6	4	38	4	6	7	36	11	74
06:00		0	5			1	9				
06:15		2	6			1	17				
06:30		3	9			3	11				
06:45		8	10	13	30	2	1	7	38	20	68
07:00		33	6			11	6				
07:15		77	3			29	5				
07:30		40	4			47	11				
07:45		40	5	190	18	**94**	3	181	25	371	43
08:00		**30**	5			**54**	4				
08:15		**73**	7			**59**	5				
08:30		**89**	10			**96**	4				
08:45		**62**	6	254	28	89	11	298	24	552	52
09:00		9	6			26	6				
09:15		3	8			13	5				
09:30		6	1			3	3				
09:45		6	2	24	17	19	7	61	21	85	38
10:00		5	3			12	1				
10:15		5	0			8	1				
10:30		11	3			15	2				
10:45		0	0	21	6	11	2	46	6	67	12
11:00		12	0			17	2				
11:15		7	1			11	0				
11:30		3	0			13	1				
11:45		10	1	32	2	8	1	49	4	81	6
Total		542	486	542	486	656	660	656	660	1198	1146
Combined Total		1028		1028		1316		1316		2344	
AM Peak	-	08:00	-	-	-	07:45	-	-	-	-	-
Vol.	-	254	-	-	-	303	-	-	-	-	-
P.H.F.		0.713				0.789					
PM Peak	-	-	02:30	-	-	-	03:00	-	-	-	-
Vol.	-	-	201	-	-	-	244	-	-	-	-
P.H.F.			0.882				0.409				
Percentage		52.7%	47.3%			49.8%	50.2%				
ADT/AADT		ADT 2,344		AADT 2,344							

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Murrieta
Hayes Avenue
S/ Fullerton Road
24 Hour Directional Volume Count

MUR003
Site Code: 105-19351

Start	15-May-19	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Wed	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	6			1	12				
12:15		1	17			0	19				
12:30		0	9			0	14				
12:45		0	8	1	40	0	12	1	57	2	97
01:00		0	3			0	12				
01:15		0	6			0	2				
01:30		0	8			1	9				
01:45		2	16	2	33	1	19	2	42	4	75
02:00		0	18			0	25				
02:15		0	36			1	15				
02:30		0	**40**			0	**70**				
02:45		0	**59**	0	153	0	**23**	1	133	1	286
03:00		0	**62**			1	**31**				
03:15		0	**77**			0	**132**				
03:30		0	32			0	46				
03:45		1	19	1	190	0	21	1	230	2	420
04:00		0	9			0	11				
04:15		0	10			0	12				
04:30		0	7			0	10				
04:45		0	10	0	36	0	11	0	44	0	80
05:00		0	16			0	14				
05:15		2	14			2	9				
05:30		0	13			0	4				
05:45		2	8	4	51	4	6	6	33	10	84
06:00		0	8			1	8				
06:15		2	9			1	15				
06:30		2	12			1	10				
06:45		15	10	19	39	2	1	5	34	24	73
07:00		**84**	5			11	5				
07:15		**181**	4			35	4				
07:30		**47**	4			45	11				
07:45		**79**	5	391	18	72	3	163	23	554	41
08:00		50	5			**45**	4				
08:15		86	7			**52**	5				
08:30		92	10			**94**	4				
08:45		72	7	300	29	**88**	10	279	23	579	52
09:00		14	6			24	7				
09:15		4	8			8	5				
09:30		9	1			2	3				
09:45		9	2	36	17	15	8	49	23	85	40
10:00		6	3			6	2				
10:15		11	0			4	1				
10:30		16	3			11	4				
10:45		2	0	35	6	10	3	31	10	66	16
11:00		17	0			13	2				
11:15		10	1			8	0				
11:30		7	0			11	1				
11:45		13	1	47	2	7	1	39	4	86	6
Total		836	614	836	614	577	656	577	656	1413	1270
Combined Total		1450		1450		1233		1233		2683	
AM Peak	-	07:00	-	-	-	08:00	-	-	-	-	-
Vol.	-	391	-	-	-	279	-	-	-	-	-
P.H.F.		0.540				0.742					
PM Peak	-	-	02:30	-	-	-	02:30	-	-	-	-
Vol.	-	-	238	-	-	-	256	-	-	-	-
P.H.F.			0.773				0.485				
Percentage		57.7%	42.3%			46.8%	53.2%				
ADT/AADT		ADT 2,683		AADT 2,683							

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Murrieta
Fullerton Road
E/ Hayes Avenue
24 Hour Directional Volume Count

MUR004
Site Code: 105-19351

Start	15-May-19	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Wed	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	0			0	0				
12:15		1	10			0	0				
12:30		0	7			0	2				
12:45		0	4	1	21	0	1	0	3	1	24
01:00		0	8			0	0				
01:15		1	4			0	0				
01:30		0	7			0	0				
01:45		1	18	2	37	1	1	1	1	3	38
02:00		1	11			1	4				
02:15		0	23			0	2				
02:30		0	**18**			0	**61**				
02:45		0	**10**	1	62	0	**13**	1	80	2	142
03:00		1	**13**			1	**9**				
03:15		0	**43**			0	**6**				
03:30		0	5			0	6				
03:45		0	7	1	68	0	0	1	21	2	89
04:00		0	2			0	0				
04:15		0	5			0	0				
04:30		0	6			0	0				
04:45		0	9	0	22	0	0	0	0	0	22
05:00		1	8			0	1				
05:15		0	5			0	1				
05:30		0	3			0	0				
05:45		0	2	1	18	0	0	0	2	1	20
06:00		0	4			0	0				
06:15		0	5			0	0				
06:30		2	4			1	0				
06:45		7	0	9	13	**0**	0	1	0	10	13
07:00		**60**	1			**9**	1				
07:15		**128**	2			**30**	0				
07:30		**18**	0			**9**	0				
07:45		**61**	0	267	3	0	0	48	1	315	4
08:00		29	0			0	0				
08:15		21	0			1	0				
08:30		5	0			0	0				
08:45		13	2	68	2	2	0	3	0	71	2
09:00		7	0			0	1				
09:15		6	0			0	0				
09:30		6	0			2	0				
09:45		7	0	26	0	0	1	2	2	28	2
10:00		8	0			1	1				
10:15		10	0			0	0				
10:30		9	0			0	2				
10:45		3	0	30	0	0	1	1	4	31	4
11:00		9	0			0	0				
11:15		6	0			0	0				
11:30		6	0			0	0				
11:45		4	0	25	0	0	0	0	0	25	0
Total		431	246	431	246	58	114	58	114	489	360
Combined Total		677		677		172		172		849	
AM Peak	-	07:00	-	-	-	06:45	-	-	-	-	-
Vol.	-	267	-	-	-	48	-	-	-	-	-
P.H.F.		0.521				0.400					
PM Peak	-	-	02:30	-	-	-	02:30	-	-	-	-
Vol.	-	-	84	-	-	-	89	-	-	-	-
P.H.F.			0.488				0.365				
Percentage		63.7%	36.3%			33.7%	66.3%				
ADT/AADT		ADT 849		AADT 849							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Murrieta
High School Access
E/ Hayes Avenue
24 Hour Directional Volume Count

MUR005
Site Code: 105-19351

Start	15-May-19	Westbound		Hour Totals		Hour Totals		Combined Totals			
Time	Wed	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	1			0	0				
12:15		0	5			0	0				
12:30		0	13			0	0				
12:45		0	5	0	24	0	0	0	0	0	24
01:00		0	9			0	0				
01:15		0	4			0	0				
01:30		0	4			0	0				
01:45		0	**18**	0	35	0	0	0	0	0	35
02:00		0	**25**			0	0				
02:15		0	**7**			0	0				
02:30		0	**13**			0	0				
02:45		0	4	0	49	0	0	0	0	0	49
03:00		0	4			0	0				
03:15		0	10			0	0				
03:30		0	5			0	0				
03:45		0	6	0	25	0	0	0	0	0	25
04:00		0	3			0	0				
04:15		0	5			0	0				
04:30		0	6			0	0				
04:45		0	7	0	21	0	0	0	0	0	21
05:00		0	13			0	0				
05:15		0	3			0	0				
05:30		0	3			0	0				
05:45		0	0	0	19	0	0	0	0	0	19
06:00		0	0			0	0				
06:15		0	2			0	0				
06:30		0	3			0	0				
06:45		0	0	0	5	0	0	0	0	0	5
07:00		1	1			0	0				
07:15		2	3			0	0				
07:30		7	2			0	0				
07:45		**38**	0	48	6	0	0	0	0	48	6
08:00		**28**	0			0	0				
08:15		**10**	0			0	0				
08:30		**9**	0			0	0				
08:45		9	5	56	5	0	0	0	0	56	5
09:00		6	10			0	0				
09:15		2	0			0	0				
09:30		5	0			0	0				
09:45		8	5	21	15	0	0	0	0	21	15
10:00		3	1			0	0				
10:15		9	0			0	0				
10:30		13	2			0	0				
10:45		7	0	32	3	0	0	0	0	32	3
11:00		4	0			0	0				
11:15		8	0			0	0				
11:30		2	0			0	0				
11:45		5	0	19	0	0	0	0	0	19	0
Total		176	207	176	207	0	0	0	0	176	207
Combined Total		383		383		0		0		383	
AM Peak	-	07:45	-	-	-	-	-	-	-	-	-
Vol.	-	85	-	-	-	-	-	-	-	-	-
P.H.F.		0.559									
PM Peak	-	-	01:45	-	-	-	-	-	-	-	-
Vol.	-	-	63	-	-	-	-	-	-	-	-
P.H.F.			0.630								
Percentage		46.0%	54.0%			0.0%	0.0%				
ADT/AADT		ADT 383		AADT 383							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Murrieta
High School Access
N/ Fullerton Road
24 Hour Directional Volume Count

MUR006
Site Code: 105-19351

Start Time	15-May-19 Wed	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		0	0			0	0				
12:15		0	10			0	0				
12:30		0	6			0	1				
12:45		0	1	0	17	0	0	0	1	0	18
01:00		0	10			0	0				
01:15		0	3			0	0				
01:30		0	**7**			0	0				
01:45		0	**14**	0	34	0	0	0	0	0	34
02:00		0	**12**			0	0				
02:15		0	**8**			0	0				
02:30		0	5			0	1				
02:45		0	4	0	29	0	**1**	0	2	0	31
03:00		0	10			0	**4**				
03:15		0	9			0	**7**				
03:30		0	5			0	**2**				
03:45		0	6	0	30	0	0	0	13	0	43
04:00		0	3			0	0				
04:15		0	5			0	0				
04:30		0	6			0	0				
04:45		0	8	0	22	0	0	0	0	0	22
05:00		0	9			0	1				
05:15		0	5			0	1				
05:30		0	3			0	0				
05:45		0	2	0	19	0	0	0	2	0	21
06:00		0	4			0	0				
06:15		0	5			0	0				
06:30		0	4			0	0				
06:45		2	0	2	13	0	0	0	0	2	13
07:00		4	1			0	0				
07:15		8	2			0	0				
07:30		**15**	0			0	0				
07:45		**60**	0	87	3	0	0	0	0	87	3
08:00		**32**	0			**0**	0				
08:15		**16**	0			**0**	0				
08:30		5	0			**0**	0				
08:45		13	2	66	2	**1**	0	1	0	67	2
09:00		7	0			0	1				
09:15		6	0			0	0				
09:30		6	0			0	0				
09:45		7	0	26	0	0	1	0	2	26	2
10:00		7	0			0	1				
10:15		9	0			0	0				
10:30		10	0			0	2				
10:45		3	0	29	0	0	1	0	4	29	4
11:00		9	0			0	0				
11:15		6	0			0	0				
11:30		6	0			0	0				
11:45		4	0	25	0	0	0	0	0	25	0
Total		235	169	235	169	1	24	1	24	236	193
Combined Total		404		404		25		25		429	
AM Peak	-	07:30	-	-	-	08:00	-	-	-	-	-
Vol.	-	123	-	-	-	1	-	-	-	-	-
P.H.F.		0.513				0.250					
PM Peak	-	-	01:30	-	-	-	02:45	-	-	-	-
Vol.	-	-	41	-	-	-	14	-	-	-	-
P.H.F.			0.732				0.500				
Percentage		58.2%	41.8%			4.0%	96.0%				
ADT/AADT		ADT 429		AADT 429							

Appendix C

Existing Conditions Intersection Analysis

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			1	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.865		
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	0	1611	1770	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	0	1611	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		340	1045		2657	
Travel Time (s)		7.7	23.8		60.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	0	0	0	227	262	0
Future Volume (vph)	0	0	0	227	262	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	0	0	329	380	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	329	380	0

Intersection Summary

Intersection	
Intersection Delay, s/veh	11.6
Intersection LOS	B

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↰		↱	↰	
Traffic Vol, veh/h	0	0	0	227	262	0
Future Vol, veh/h	0	0	0	227	262	0
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	329	380	0
Number of Lanes	0	1	0	1	1	0

Approach	SE	NW	SW
Opposing Approach	NW	SE	
Opposing Lanes	1	1	0
Conflicting Approach Left	SW		NW
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SW	SE
Conflicting Lanes Right	0	1	1
HCM Control Delay	0	10.1	12.9
HCM LOS	-	B	B

Lane	NWLn1	SELn1	SWLn1
Vol Left, %	0%	0%	100%
Vol Thru, %	0%	100%	0%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	227	0	262
LT Vol	0	0	262
Through Vol	0	0	0
RT Vol	227	0	0
Lane Flow Rate	329	0	380
Geometry Grp	1	1	1
Degree of Util (X)	0.394	0	0.512
Departure Headway (Hd)	4.306	5.296	4.853
Convergence, Y/N	Yes	Yes	Yes
Cap	836	0	740
Service Time	2.335	3.358	2.91
HCM Lane V/C Ratio	0.394	0	0.514
HCM Control Delay	10.1	8.4	12.9
HCM Lane LOS	B	N	B
HCM 95th-tile Q	1.9	0	3

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	60			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.923		0.935	
Flt Protected	0.950				0.975	
Satd. Flow (prot)	1770	1863	1719	0	1698	0
Flt Permitted	0.950				0.975	
Satd. Flow (perm)	1770	1863	1719	0	1698	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		237	1361		181	
Travel Time (s)		5.4	30.9		4.1	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	43	138	167	224	25	23
Future Volume (vph)	43	138	167	224	25	23
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	66	212	257	345	38	35
Shared Lane Traffic (%)						
Lane Group Flow (vph)	66	212	602	0	73	0

Intersection Summary

Intersection	
Int Delay, s/veh	1.8

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	43	138	167	224	25	23
Future Vol, veh/h	43	138	167	224	25	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	60	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	65	65	65	65	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	66	212	257	345	38	35

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	602	0	-	0	774	430
Stage 1	-	-	-	-	430	-
Stage 2	-	-	-	-	344	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	975	-	-	-	367	625
Stage 1	-	-	-	-	656	-
Stage 2	-	-	-	-	718	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	975	-	-	-	342	625
Mov Cap-2 Maneuver	-	-	-	-	342	-
Stage 1	-	-	-	-	611	-
Stage 2	-	-	-	-	718	-

Approach	SE	NW	SW
HCM Control Delay, s	2.1	0	14.9
HCM LOS			B

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	975	-	437
HCM Lane V/C Ratio	-	-	0.068	-	0.169
HCM Control Delay (s)	-	-	9	-	14.9
HCM Lane LOS	-	-	A	-	B
HCM 95th %tile Q(veh)	-	-	0.2	-	0.6

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	308	6	6	18	18	299
Future Volume (vph)	308	6	6	18	18	299
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	371	7	7	22	22	360
Shared Lane Traffic (%)						
Lane Group Flow (vph)	371	7	7	22	22	360

Intersection Summary

Intersection	
Intersection Delay, s/veh	15.4
Intersection LOS	C

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	308	6	6	18	18	299
Future Vol, veh/h	308	6	6	18	18	299
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	371	7	7	22	22	360
Number of Lanes	1	1	1	1	1	1

Approach	SE	NE	SW
Opposing Approach		SW	NE
Opposing Lanes	0	2	2
Conflicting Approach Left	SW	SE	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NE		SE
Conflicting Lanes Right	2	0	2
HCM Control Delay	18.5	9.4	12.8
HCM LOS	C	A	B

Lane	NELn1	NELn2	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	6	18	308	6	18	299
LT Vol	6	0	308	0	0	0
Through Vol	0	18	0	0	18	0
RT Vol	0	0	0	6	0	299
Lane Flow Rate	7	22	371	7	22	360
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.014	0.038	0.631	0.01	0.035	0.505
Departure Headway (Hd)	6.811	6.302	6.124	4.919	5.75	5.042
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	527	569	594	731	617	706
Service Time	4.537	4.028	3.828	2.622	3.542	2.834
HCM Lane V/C Ratio	0.013	0.039	0.625	0.01	0.036	0.51
HCM Control Delay	9.6	9.3	18.7	7.7	8.8	13
HCM Lane LOS	A	A	C	A	A	B
HCM 95th-tile Q	0	0.1	4.4	0	0.1	2.9

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	85		0	150		0	150		0	250		100
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.981				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3472	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19				143			162			205
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1461			2630			1510			1533	
Travel Time (s)		33.2			59.8			34.3			34.8	

Intersection Summary	
Area Type:	Other

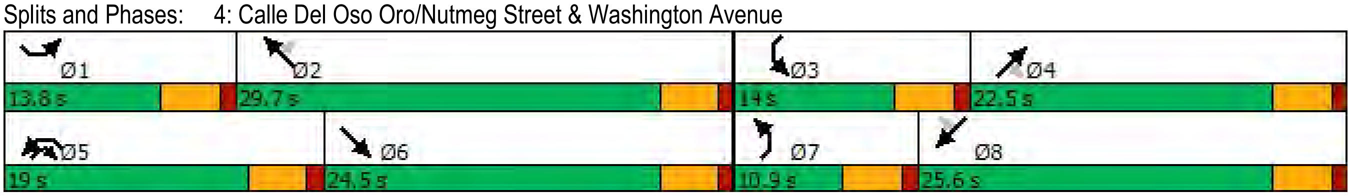
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	77	319	46	240	277	94	42	233	457	159	157	56
Future Volume (vph)	77	319	46	240	277	94	42	233	457	159	157	56
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	87	358	52	270	311	106	47	262	513	179	176	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	410	0	270	311	106	47	262	513	179	176	63

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	77	319	240	277	94	42	233	457	159	157	56
Future Volume (vph)	77	319	240	277	94	42	233	457	159	157	56
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	1	6	5	2		7	4	5	3	8	
Permitted Phases					2			4			8
Detector Phase	1	6	5	2	2	7	4	5	3	8	8
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	9.5	22.5	22.5
Total Split (s)	13.8	24.5	19.0	29.7	29.7	10.9	22.5	19.0	14.0	25.6	25.6
Total Split (%)	17.3%	30.6%	23.8%	37.1%	37.1%	13.6%	28.1%	23.8%	17.5%	32.0%	32.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	8.2	20.1	13.9	28.1	28.1	6.2	14.9	33.4	9.5	22.6	22.6
Actuated g/C Ratio	0.11	0.26	0.18	0.37	0.37	0.08	0.19	0.44	0.12	0.30	0.30
v/c Ratio	0.46	0.44	0.84	0.45	0.16	0.33	0.72	0.66	0.81	0.32	0.10
Control Delay	41.2	24.9	55.0	23.3	2.4	41.0	40.9	15.7	63.7	24.7	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	24.9	55.0	23.3	2.4	41.0	40.9	15.7	63.7	24.7	0.3
LOS	D	C	E	C	A	D	D	B	E	C	A
Approach Delay		27.8		32.6			25.2			37.7	
Approach LOS		C		C			C			D	

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 76.5	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 30.0	Intersection LOS: C
Intersection Capacity Utilization 59.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 4: Calle Del Oso Oro/Nutmeg Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group Flow (vph)	87	410	270	311	106	47	262	513	179	176	63
v/c Ratio	0.46	0.44	0.84	0.45	0.16	0.33	0.72	0.66	0.81	0.32	0.10
Control Delay	41.2	24.9	55.0	23.3	2.4	41.0	40.9	15.7	63.7	24.7	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	24.9	55.0	23.3	2.4	41.0	40.9	15.7	63.7	24.7	0.3
Queue Length 50th (ft)	40	83	127	121	0	22	119	124	86	71	0
Queue Length 95th (ft)	84	127	#254	201	19	55	193	221	#196	125	0
Internal Link Dist (ft)		1381		2550			1430			1453	
Turn Bay Length (ft)	85		150			150			250		100
Base Capacity (vph)	215	924	336	684	671	148	439	793	220	561	619
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.44	0.80	0.45	0.16	0.32	0.60	0.65	0.81	0.31	0.10

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	77	319	46	240	277	94	42	233	457	159	157	56
Future Volume (veh/h)	77	319	46	240	277	94	42	233	457	159	157	56
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	87	358	52	270	311	106	47	262	513	179	176	63
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	112	783	113	309	676	575	72	423	635	213	570	485
Arrive On Green	0.06	0.25	0.25	0.17	0.36	0.36	0.04	0.23	0.23	0.12	0.31	0.31
Sat Flow, veh/h	1774	3106	447	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	87	203	207	270	311	106	47	262	513	179	176	63
Grp Sat Flow(s),veh/h/ln	1774	1770	1784	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.8	7.7	7.8	11.8	10.1	3.6	2.1	10.0	18.0	7.8	5.7	2.3
Cycle Q Clear(g_c), s	3.8	7.7	7.8	11.8	10.1	3.6	2.1	10.0	18.0	7.8	5.7	2.3
Prop In Lane	1.00		0.25	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	112	446	450	309	676	575	72	423	635	213	570	485
V/C Ratio(X)	0.78	0.45	0.46	0.88	0.46	0.18	0.65	0.62	0.81	0.84	0.31	0.13
Avail Cap(c_a), veh/h	208	446	450	324	676	575	143	423	635	213	570	485
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.6	25.0	25.1	31.9	19.3	17.2	37.5	27.6	21.0	34.2	21.1	19.9
Incr Delay (d2), s/veh	10.8	3.3	3.4	21.7	2.2	0.7	9.5	2.8	7.7	25.1	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	4.1	4.2	7.6	5.6	1.7	1.2	5.5	11.3	5.3	3.0	1.0
LnGrp Delay(d),s/veh	47.4	28.3	28.5	53.6	21.6	18.0	47.0	30.3	28.7	59.3	21.4	20.0
LnGrp LOS	D	C	C	D	C	B	D	C	C	E	C	B
Approach Vol, veh/h		497			687			822			418	
Approach Delay, s/veh		31.7			33.6			30.3			37.4	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.5	33.3	14.0	22.5	18.3	24.5	7.7	28.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.3	25.2	9.5	18.0	14.5	20.0	6.4	21.1
Max Q Clear Time (g_c+I1), s	5.8	12.1	9.8	20.0	13.8	9.8	4.1	7.7
Green Ext Time (p_c), s	0.0	1.8	0.0	0.0	0.1	1.7	0.0	0.9

Intersection Summary	
HCM 2010 Ctrl Delay	32.7
HCM 2010 LOS	C

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		280	300		0	350		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.979			0.938			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3465	0	1770	1747	0	1770	3511	0
Flt Permitted	0.950			0.950			0.190			0.489		
Satd. Flow (perm)	1770	3539	1583	1770	3465	0	354	1747	0	911	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			77		19			48			5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2630			1335			2657			1296	
Travel Time (s)		59.8			30.3			60.4			29.5	

Intersection Summary	
Area Type:	Other

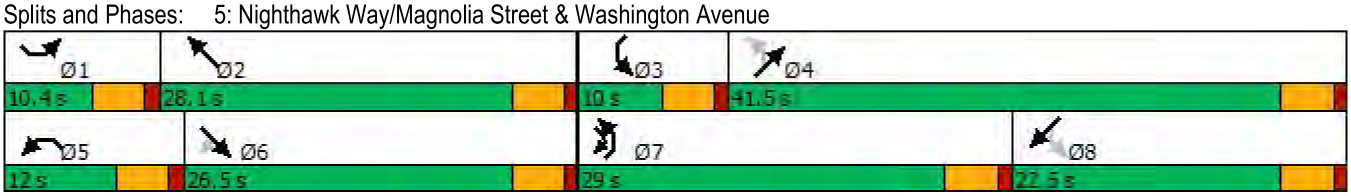
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	22	470	521	76	210	33	311	191	136	51	330	18
Future Volume (vph)	22	470	521	76	210	33	311	191	136	51	330	18
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	32	691	766	112	309	49	457	281	200	75	485	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	691	766	112	358	0	457	481	0	75	511	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	22	470	521	76	210	311	191	51	330
Future Volume (vph)	22	470	521	76	210	311	191	51	330
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+pt	NA	pm+pt	NA
Protected Phases	1	6	7	5	2	7	4	3	8
Permitted Phases			6			4		8	
Detector Phase	1	6	7	5	2	7	4	3	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	10.4	26.5	29.0	12.0	28.1	29.0	41.5	10.0	22.5
Total Split (%)	11.6%	29.4%	32.2%	13.3%	31.2%	32.2%	46.1%	11.1%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	None	Max	None	None	None	None
Act Effct Green (s)	5.8	22.1	49.7	7.5	28.1	43.9	36.1	21.7	16.2
Actuated g/C Ratio	0.07	0.25	0.57	0.09	0.32	0.50	0.41	0.25	0.19
v/c Ratio	0.27	0.77	0.82	0.74	0.32	0.82	0.64	0.27	0.78
Control Delay	46.0	37.6	22.7	68.8	24.0	32.7	23.3	16.7	42.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.0	37.6	22.7	68.8	24.0	32.7	23.3	16.7	42.4
LOS	D	D	C	E	C	C	C	B	D
Approach Delay		30.1			34.7		27.9		39.1
Approach LOS		C			C		C		D

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 87	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 31.7	Intersection LOS: C
Intersection Capacity Utilization 59.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Nighthawk Way/Magnolia Street & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	32	691	766	112	358	457	481	75	511
v/c Ratio	0.27	0.77	0.82	0.74	0.32	0.82	0.64	0.27	0.78
Control Delay	46.0	37.6	22.7	68.8	24.0	32.7	23.3	16.7	42.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.0	37.6	22.7	68.8	24.0	32.7	23.3	16.7	42.4
Queue Length 50th (ft)	18	194	300	64	83	180	192	20	142
Queue Length 95th (ft)	35	182	263	#90	88	184	193	31	141
Internal Link Dist (ft)		2550			1255		2577		1216
Turn Bay Length (ft)	150		280	300		350		150	
Base Capacity (vph)	120	898	962	153	1130	578	772	281	732
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.77	0.80	0.73	0.32	0.79	0.62	0.27	0.70

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	22	470	521	76	210	33	311	191	136	51	330	18
Future Volume (veh/h)	22	470	521	76	210	33	311	191	136	51	330	18
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	32	691	766	112	309	49	457	281	200	75	485	26
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	2	0
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	57	989	811	142	1004	158	542	366	260	287	613	33
Arrive On Green	0.03	0.28	0.28	0.08	0.33	0.33	0.23	0.36	0.36	0.05	0.18	0.18
Sat Flow, veh/h	1774	3539	1583	1774	3066	481	1774	1014	722	1774	3417	183
Grp Volume(v), veh/h	32	691	766	112	177	181	457	0	481	75	251	260
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1778	1774	0	1735	1774	1770	1830
Q Serve(g_s), s	1.4	13.8	22.0	4.9	5.9	6.0	15.4	0.0	19.3	2.7	10.7	10.7
Cycle Q Clear(g_c), s	1.4	13.8	22.0	4.9	5.9	6.0	15.4	0.0	19.3	2.7	10.7	10.7
Prop In Lane	1.00		1.00	1.00		0.27	1.00		0.42	1.00		0.10
Lane Grp Cap(c), veh/h	57	989	811	142	580	582	542	0	626	287	317	328
V/C Ratio(X)	0.56	0.70	0.95	0.79	0.31	0.31	0.84	0.00	0.77	0.26	0.79	0.79
Avail Cap(c_a), veh/h	133	989	811	169	580	582	682	0	816	321	405	419
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.6	25.4	18.2	35.6	19.8	19.8	18.3	0.0	22.3	24.5	30.9	30.9
Incr Delay (d2), s/veh	8.5	4.1	20.8	18.7	1.4	1.4	7.7	0.0	3.3	0.5	7.9	7.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	7.3	20.3	3.1	3.1	3.1	8.5	0.0	9.8	1.3	5.9	6.1
LnGrp Delay(d),s/veh	46.1	29.5	38.9	54.2	21.1	21.2	26.0	0.0	25.6	25.0	38.8	38.8
LnGrp LOS	D	C	D	D	C	C	C		C	C	D	D
Approach Vol, veh/h		1489			470			938			586	
Approach Delay, s/veh		34.7			29.1			25.8			37.0	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.0	30.3	8.5	32.9	10.8	26.5	22.8	18.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.9	23.6	5.5	37.0	7.5	22.0	24.5	18.0
Max Q Clear Time (g_c+I1), s	3.4	8.0	4.7	21.3	6.9	24.0	17.4	12.7
Green Ext Time (p_c), s	0.0	1.8	0.0	2.9	0.0	0.0	0.9	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	31.9
HCM 2010 LOS	C

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		170	150		0	80		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	1583	0	1770	1583	0
Flt Permitted	0.950			0.950			0.746			0.685		
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1390	1583	0	1276	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			338			109		342			509	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1335			1310			2481			639	
Travel Time (s)		30.3			29.8			56.4			14.5	

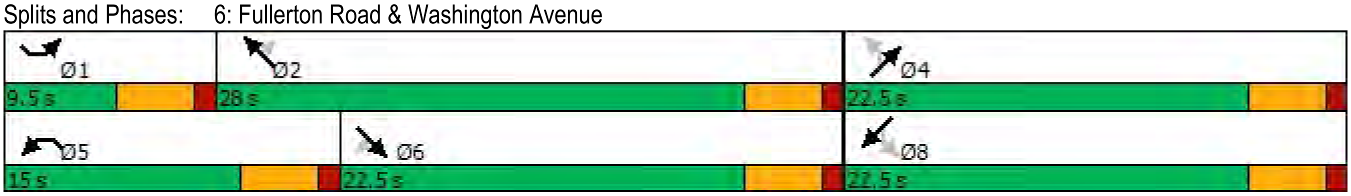
Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	12	341	206	137	207	1	96	0	68	2	0	11
Future Volume (vph)	12	341	206	137	207	1	96	0	68	2	0	11
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	20	559	338	225	339	2	157	0	111	3	0	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	559	338	225	339	2	157	111	0	3	18	0
Intersection Summary												

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Configurations										
Traffic Volume (vph)	12	341	206	137	207	1	96	0	2	0
Future Volume (vph)	12	341	206	137	207	1	96	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	1	6		5	2			4		8
Permitted Phases			6			2	4		8	
Detector Phase	1	6	6	5	2	2	4	4	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	22.5	22.5	15.0	28.0	28.0	22.5	22.5	22.5	22.5
Total Split (%)	15.8%	37.5%	37.5%	25.0%	46.7%	46.7%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	5.1	20.0	20.0	9.9	33.9	33.9	11.2	11.2	11.0	11.0
Actuated g/C Ratio	0.10	0.38	0.38	0.19	0.65	0.65	0.21	0.21	0.21	0.21
v/c Ratio	0.12	0.41	0.41	0.67	0.28	0.00	0.53	0.18	0.01	0.02
Control Delay	25.9	15.3	4.1	33.5	8.4	0.0	25.0	0.7	15.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	15.3	4.1	33.5	8.4	0.0	25.0	0.7	15.5	0.1
LOS	C	B	A	C	A	A	C	A	B	A
Approach Delay		11.4			18.3			14.9		2.3
Approach LOS		B			B			B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 52.1	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 14.0	Intersection LOS: B
Intersection Capacity Utilization 40.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Fullerton Road & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	20	559	338	225	339	2	157	111	3	18
v/c Ratio	0.12	0.41	0.41	0.67	0.28	0.00	0.53	0.18	0.01	0.02
Control Delay	25.9	15.3	4.1	33.5	8.4	0.0	25.0	0.7	15.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	15.3	4.1	33.5	8.4	0.0	25.0	0.7	15.5	0.1
Queue Length 50th (ft)	6	70	0	66	41	0	44	0	1	0
Queue Length 95th (ft)	16	80	3	89	90	0	56	0	4	0
Internal Link Dist (ft)		1255			1230			2401		559
Turn Bay Length (ft)			170	150			80			
Base Capacity (vph)	172	1357	815	361	1213	1069	487	776	447	885
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.41	0.41	0.62	0.28	0.00	0.32	0.14	0.01	0.02

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	12	341	206	137	207	1	96	0	68	2	0	11
Future Volume (veh/h)	12	341	206	137	207	1	96	0	68	2	0	11
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	20	559	338	225	339	2	157	0	111	3	0	18
Adj No. of Lanes	1	2	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	43	1353	605	283	964	819	378	0	272	292	0	272
Arrive On Green	0.02	0.38	0.38	0.16	0.52	0.52	0.17	0.00	0.17	0.17	0.00	0.17
Sat Flow, veh/h	1774	3539	1583	1774	1863	1583	1389	0	1583	1277	0	1583
Grp Volume(v), veh/h	20	559	338	225	339	2	157	0	111	3	0	18
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1863	1583	1389	0	1583	1277	0	1583
Q Serve(g_s), s	0.5	5.5	7.9	5.7	5.1	0.0	5.0	0.0	2.9	0.1	0.0	0.4
Cycle Q Clear(g_c), s	0.5	5.5	7.9	5.7	5.1	0.0	5.5	0.0	2.9	3.0	0.0	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	43	1353	605	283	964	819	378	0	272	292	0	272
V/C Ratio(X)	0.46	0.41	0.56	0.80	0.35	0.00	0.42	0.00	0.41	0.01	0.00	0.07
Avail Cap(c_a), veh/h	188	1353	605	396	964	819	671	0	605	561	0	605
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.7	10.7	11.4	19.1	6.7	5.5	18.6	0.0	17.4	18.7	0.0	16.3
Incr Delay (d2), s/veh	7.4	0.9	3.7	7.4	1.0	0.0	0.7	0.0	1.0	0.0	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.8	4.0	3.4	2.8	0.0	2.0	0.0	1.3	0.0	0.0	0.2
LnGrp Delay(d),s/veh	30.1	11.6	15.1	26.5	7.7	5.5	19.4	0.0	18.4	18.7	0.0	16.4
LnGrp LOS	C	B	B	C	A	A	B		B	B		B
Approach Vol, veh/h		917			566			268			21	
Approach Delay, s/veh		13.3			15.2			18.9			16.8	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.7	28.9		12.6	12.0	22.5		12.6
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	10.5	18.0		18.0
Max Q Clear Time (g_c+I1), s	2.5	7.1		7.5	7.7	9.9		5.0
Green Ext Time (p_c), s	0.0	1.8		0.8	0.2	3.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	14.8
HCM 2010 LOS	B

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.990			0.995			0.880			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3504	0	1770	3522	0	1770	1639	0	1770	1796	0
Flt Permitted	0.950			0.950			0.690			0.421		
Satd. Flow (perm)	1770	3504	0	1770	3522	0	1285	1639	0	784	1796	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			7			275			25	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

Intersection Summary	
Area Type:	Other

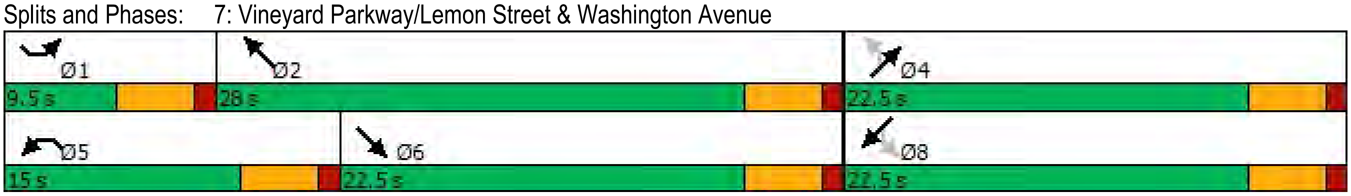
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	12	564	41	221	274	10	40	63	253	13	72	23
Future Volume (vph)	12	564	41	221	274	10	40	63	253	13	72	23
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	13	613	45	240	298	11	43	68	275	14	78	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	658	0	240	309	0	43	343	0	14	103	0

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	12	564	221	274	40	63	13	72
Future Volume (vph)	12	564	221	274	40	63	13	72
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases					4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	22.5	15.0	28.0	22.5	22.5	22.5	22.5
Total Split (%)	15.8%	37.5%	25.0%	46.7%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	5.0	18.2	10.1	31.2	9.5	9.5	9.5	9.5
Actuated g/C Ratio	0.10	0.35	0.20	0.61	0.18	0.18	0.18	0.18
v/c Ratio	0.08	0.53	0.69	0.14	0.18	0.65	0.10	0.29
Control Delay	24.8	15.8	33.7	6.4	18.7	11.3	17.9	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.8	15.8	33.7	6.4	18.7	11.3	17.9	16.1
LOS	C	B	C	A	B	B	B	B
Approach Delay		16.0		18.3		12.1		16.3
Approach LOS		B		B		B		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 51.4	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 15.9	Intersection LOS: B
Intersection Capacity Utilization 59.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	13	658	240	309	43	343	14	103
v/c Ratio	0.08	0.53	0.69	0.14	0.18	0.65	0.10	0.29
Control Delay	24.8	15.8	33.7	6.4	18.7	11.3	17.9	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.8	15.8	33.7	6.4	18.7	11.3	17.9	16.1
Queue Length 50th (ft)	4	74	64	13	11	18	4	20
Queue Length 95th (ft)	18	151	#184	60	31	74	15	52
Internal Link Dist (ft)		1230		2572		2575		1085
Turn Bay Length (ft)	150		255		160		150	
Base Capacity (vph)	173	1247	365	2140	454	757	277	651
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.53	0.66	0.14	0.09	0.45	0.05	0.16

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	12	564	41	221	274	10	40	63	253	13	72	23
Future Volume (veh/h)	12	564	41	221	274	10	40	63	253	13	72	23
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	13	613	45	240	298	11	43	68	275	14	78	25
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	29	1109	81	292	1672	62	402	82	333	191	345	110
Arrive On Green	0.02	0.33	0.33	0.16	0.48	0.48	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	1774	3344	245	1774	3482	128	1286	324	1308	1033	1353	434
Grp Volume(v), veh/h	13	324	334	240	151	158	43	0	343	14	0	103
Grp Sat Flow(s),veh/h/ln	1774	1770	1819	1774	1770	1840	1286	0	1632	1033	0	1786
Q Serve(g_s), s	0.4	8.1	8.2	7.1	2.6	2.6	1.5	0.0	10.8	0.7	0.0	2.5
Cycle Q Clear(g_c), s	0.4	8.1	8.2	7.1	2.6	2.6	4.0	0.0	10.8	11.5	0.0	2.5
Prop In Lane	1.00		0.13	1.00		0.07	1.00		0.80	1.00		0.24
Lane Grp Cap(c), veh/h	29	587	603	292	850	883	402	0	416	191	0	455
V/C Ratio(X)	0.45	0.55	0.55	0.82	0.18	0.18	0.11	0.00	0.83	0.07	0.00	0.23
Avail Cap(c_a), veh/h	163	587	603	343	850	883	501	0	541	270	0	592
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.4	14.8	14.8	21.9	8.0	8.0	17.6	0.0	19.1	24.5	0.0	16.0
Incr Delay (d2), s/veh	10.4	3.7	3.6	12.8	0.5	0.4	0.1	0.0	7.9	0.2	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	4.6	4.7	4.5	1.4	1.4	0.5	0.0	5.8	0.2	0.0	1.2
LnGrp Delay(d),s/veh	36.8	18.6	18.5	34.7	8.5	8.5	17.7	0.0	27.0	24.7	0.0	16.2
LnGrp LOS	D	B	B	C	A	A	B		C	C		B
Approach Vol, veh/h		671			549			386			117	
Approach Delay, s/veh		18.9			19.9			26.0			17.3	
Approach LOS		B			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.4	30.6		18.3	13.4	22.5		18.3
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	10.5	18.0		18.0
Max Q Clear Time (g_c+I1), s	2.4	4.6		12.8	9.1	10.2		13.5
Green Ext Time (p_c), s	0.0	1.6		1.1	0.1	2.5		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	20.7
HCM 2010 LOS	C

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.979				0.850		0.984				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1824	0	1770	1863	1583	1770	1833	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1824	0	1770	1863	1583	1770	1833	0	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13				205		7				344
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary	
Area Type:	Other

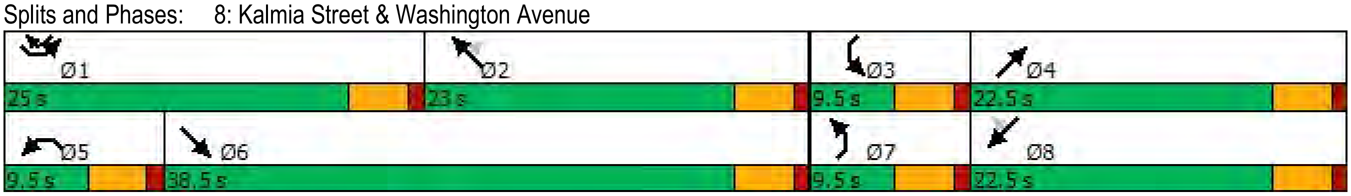
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	671	224	37	3	222	65	58	51	6	59	47	292
Future Volume (vph)	671	224	37	3	222	65	58	51	6	59	47	292
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	789	264	44	4	261	76	68	60	7	69	55	344
Shared Lane Traffic (%)												
Lane Group Flow (vph)	789	308	0	4	261	76	68	67	0	69	55	344

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	671	224	3	222	65	58	51	59	47	292
Future Volume (vph)	671	224	3	222	65	58	51	59	47	292
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	25.0	38.5	9.5	23.0	23.0	9.5	22.5	9.5	22.5	25.0
Total Split (%)	31.3%	48.1%	11.9%	28.8%	28.8%	11.9%	28.1%	11.9%	28.1%	31.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	18.9	42.7	5.2	19.4	19.4	5.2	7.8	5.2	7.7	18.9
Actuated g/C Ratio	0.31	0.69	0.08	0.31	0.31	0.08	0.13	0.08	0.12	0.31
v/c Ratio	0.75	0.24	0.03	0.45	0.12	0.45	0.28	0.46	0.24	0.48
Control Delay	26.8	7.7	31.7	23.8	0.4	43.0	28.7	43.3	30.2	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.8	7.7	31.7	23.8	0.4	43.0	28.7	43.3	30.2	5.2
LOS	C	A	C	C	A	D	C	D	C	A
Approach Delay		21.5		18.7			35.9		13.8	
Approach LOS		C		B			D		B	

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 61.8	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 20.2	Intersection LOS: C
Intersection Capacity Utilization 52.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 8: Kalmia Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	789	308	4	261	76	68	67	69	55	344
v/c Ratio	0.75	0.24	0.03	0.45	0.12	0.45	0.28	0.46	0.24	0.48
Control Delay	26.8	7.7	31.7	23.8	0.4	43.0	28.7	43.3	30.2	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.8	7.7	31.7	23.8	0.4	43.0	28.7	43.3	30.2	5.2
Queue Length 50th (ft)	158	49	2	95	0	29	24	29	22	0
Queue Length 95th (ft)	214	124	10	159	0	#74	55	#75	50	46
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	1194	1264	150	584	637	150	564	150	568	774
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.24	0.03	0.45	0.12	0.45	0.12	0.46	0.10	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	671	224	37	3	222	65	58	51	6	59	47	292
Future Volume (veh/h)	671	224	37	3	222	65	58	51	6	59	47	292
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	789	264	44	4	261	76	68	60	7	69	55	344
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	1
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	893	790	132	9	472	401	91	310	36	91	354	711
Arrive On Green	0.26	0.51	0.51	0.01	0.25	0.25	0.05	0.19	0.19	0.05	0.19	0.19
Sat Flow, veh/h	3442	1557	260	1774	1863	1583	1774	1638	191	1774	1863	1583
Grp Volume(v), veh/h	789	0	308	4	261	76	68	0	67	69	55	344
Grp Sat Flow(s),veh/h/ln	1721	0	1817	1774	1863	1583	1774	0	1829	1774	1863	1583
Q Serve(g_s), s	16.1	0.0	7.3	0.2	8.9	2.8	2.8	0.0	2.3	2.8	1.8	11.2
Cycle Q Clear(g_c), s	16.1	0.0	7.3	0.2	8.9	2.8	2.8	0.0	2.3	2.8	1.8	11.2
Prop In Lane	1.00		0.14	1.00		1.00	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	893	0	922	9	472	401	91	0	347	91	354	711
V/C Ratio(X)	0.88	0.00	0.33	0.42	0.55	0.19	0.75	0.00	0.19	0.75	0.16	0.48
Avail Cap(c_a), veh/h	966	0	922	121	472	401	121	0	451	121	459	801
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.0	0.0	10.7	36.2	23.7	21.4	34.2	0.0	24.9	34.2	24.7	14.2
Incr Delay (d2), s/veh	9.3	0.0	1.0	27.2	4.6	1.0	16.0	0.0	0.3	16.9	0.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.8	0.0	3.9	0.2	5.2	1.3	1.8	0.0	1.2	1.8	0.9	4.9
LnGrp Delay(d),s/veh	35.3	0.0	11.7	63.4	28.3	22.5	50.2	0.0	25.2	51.1	24.9	14.7
LnGrp LOS	D		B	E	C	C	D		C	D	C	B
Approach Vol, veh/h		1097			341			135			468	
Approach Delay, s/veh		28.6			27.4			37.8			21.2	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.5	23.0	8.3	18.3	4.9	41.6	8.2	18.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	20.5	18.5	5.0	18.0	5.0	34.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	18.1	10.9	4.8	4.3	2.2	9.3	4.8	13.2
Green Ext Time (p_c), s	0.9	1.0	0.0	0.2	0.0	1.9	0.0	0.7

Intersection Summary			
HCM 2010 Ctrl Delay			27.3
HCM 2010 LOS			C

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	60		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.997						0.912				0.850
Flt Protected				0.950				0.983			0.950	
Satd. Flow (prot)	0	1857	0	1770	1863	0	0	1670	0	0	1770	1583
Flt Permitted				0.950				0.983			0.950	
Satd. Flow (perm)	0	1857	0	1770	1863	0	0	1670	0	0	1770	1583
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1045			237			351			183	
Travel Time (s)		23.8			5.4			8.0			4.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	0	245	6	6	245	0	7	0	13	39	0	17
Future Volume (vph)	0	245	6	6	245	0	7	0	13	39	0	17
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	318	8	8	318	0	9	0	17	51	0	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	326	0	8	318	0	0	26	0	0	51	22

Intersection Summary

Intersection	
Int Delay, s/veh	1.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	245	6	6	245	0	7	0	13	39	0	17
Future Vol, veh/h	0	245	6	6	245	0	7	0	13	39	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	60	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	318	8	8	318	0	9	0	17	51	0	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	326	0	0	667	656	322	665	660	318
Stage 1	-	-	-	-	-	-	322	322	-	334	334	-
Stage 2	-	-	-	-	-	-	345	334	-	331	326	-
Critical Hdwy	-	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1234	-	0	372	385	719	374	383	723
Stage 1	0	-	-	-	-	0	690	651	-	680	643	-
Stage 2	0	-	-	-	-	0	671	643	-	682	648	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1234	-	-	359	383	719	364	381	723
Mov Cap-2 Maneuver	-	-	-	-	-	-	359	383	-	364	381	-
Stage 1	-	-	-	-	-	-	690	651	-	680	639	-
Stage 2	-	-	-	-	-	-	646	639	-	666	648	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	0.2	12.1	14.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	532	1234	-	-	-	364	723
HCM Lane V/C Ratio	0.049	0.006	-	-	-	0.139	0.031
HCM Control Delay (s)	12.1	7.9	-	-	-	16.5	10.1
HCM Lane LOS	B	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.2	0	-	-	-	0.5	0.1

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.992	
Flt Protected				0.985		
Satd. Flow (prot)	1863	0	0	1835	1848	0
Flt Permitted				0.985		
Satd. Flow (perm)	1863	0	0	1835	1848	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	112			181	2481	
Travel Time (s)	2.5			4.1	56.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	0	0	84	183	48	3
Future Volume (vph)	0	0	84	183	48	3
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.48	0.48	0.48	0.48	0.48	0.48
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	0	0	175	381	100	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	556	106	0

Intersection Summary

Intersection						
Int Delay, s/veh	2					

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	0	0	84	183	48	3
Future Vol, veh/h	0	0	84	183	48	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	48	48	48	48	48	48
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	175	381	100	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	834	103	106	0	-	0
Stage 1	103	-	-	-	-	-
Stage 2	731	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	338	952	1485	-	-	-
Stage 1	921	-	-	-	-	-
Stage 2	476	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	287	952	1485	-	-	-
Mov Cap-2 Maneuver	287	-	-	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	476	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	0	2.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	1485	-	-	-	-
HCM Lane V/C Ratio	0.118	-	-	-	-
HCM Control Delay (s)	7.7	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	-	-

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			1	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.865		
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	0	1611	1770	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	0	1611	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		340	1045		2657	
Travel Time (s)		7.7	23.8		60.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	0	0	0	44	41	0
Future Volume (vph)	0	0	0	44	41	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	0	0	54	50	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	54	50	0

Intersection Summary

Intersection	
Intersection Delay, s/veh	7
Intersection LOS	A

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	44	41	0
Future Vol, veh/h	0	0	0	44	41	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	54	50	0
Number of Lanes	0	1	0	1	1	0

Approach	SE	NW	SW
Opposing Approach	NW	SE	
Opposing Lanes	1	1	0
Conflicting Approach Left	SW		NW
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SW	SE
Conflicting Lanes Right	0	1	1
HCM Control Delay	0	6.6	7.5
HCM LOS	-	A	A

Lane	NWLn1	SELn1	SWLn1
Vol Left, %	0%	0%	100%
Vol Thru, %	0%	100%	0%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	44	0	41
LT Vol	0	0	41
Through Vol	0	0	0
RT Vol	44	0	0
Lane Flow Rate	54	0	50
Geometry Grp	1	1	1
Degree of Util (X)	0.051	0	0.059
Departure Headway (Hd)	3.42	4.062	4.229
Convergence, Y/N	Yes	Yes	Yes
Cap	1045	0	851
Service Time	1.449	2.094	2.234
HCM Lane V/C Ratio	0.052	0	0.059
HCM Control Delay	6.6	7.1	7.5
HCM Lane LOS	A	N	A
HCM 95th-tile Q	0.2	0	0.2

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	60			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.960			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1788	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1788	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		237	1361		181	
Travel Time (s)		5.4	30.9		4.1	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	14	42	33	14	2	0
Future Volume (vph)	14	42	33	14	2	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	17	51	40	17	2	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	17	51	57	0	2	0

Intersection Summary

Intersection						
Int Delay, s/veh	1.1					

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	14	42	33	14	2	0
Future Vol, veh/h	14	42	33	14	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	60	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	51	40	17	2	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	57	0	-	0	134	49
Stage 1	-	-	-	-	49	-
Stage 2	-	-	-	-	85	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1547	-	-	-	860	1020
Stage 1	-	-	-	-	973	-
Stage 2	-	-	-	-	938	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1547	-	-	-	851	1020
Mov Cap-2 Maneuver	-	-	-	-	851	-
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	938	-

Approach	SE	NW	SW
HCM Control Delay, s	1.8	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1547	-	851
HCM Lane V/C Ratio	-	-	0.011	-	0.003
HCM Control Delay (s)	-	-	7.4	-	9.2
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	46	3	2	21	21	77
Future Volume (vph)	46	3	2	21	21	77
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	60	4	3	27	27	100
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	4	3	27	27	100

Intersection Summary

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	46	3	2	21	21	77
Future Vol, veh/h	46	3	2	21	21	77
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	4	3	27	27	100
Number of Lanes	1	1	1	1	1	1

Approach	SE	NE	SW
Opposing Approach		SW	NE
Opposing Lanes	0	2	2
Conflicting Approach Left	SW	SE	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NE		SE
Conflicting Lanes Right	2	0	2
HCM Control Delay	8.5	7.7	7.3
HCM LOS	A	A	A

Lane	NELn1	NELn2	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	2	21	46	3	21	77
LT Vol	2	0	46	0	0	0
Through Vol	0	21	0	0	21	0
RT Vol	0	0	0	3	0	77
Lane Flow Rate	3	27	60	4	27	100
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.004	0.036	0.088	0.004	0.035	0.11
Departure Headway (Hd)	5.21	4.709	5.295	4.094	4.659	3.958
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	679	750	670	862	760	893
Service Time	3.004	2.503	3.079	1.878	2.439	1.737
HCM Lane V/C Ratio	0.004	0.036	0.09	0.005	0.036	0.112
HCM Control Delay	8	7.7	8.6	6.9	7.6	7.2
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0	0.1	0.3	0	0.1	0.4

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	85		0	150		0	150		0	250		100
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.992				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3511	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3511	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				143			211			205
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1461			2630			1510			1533	
Travel Time (s)		33.2			59.8			34.3			34.8	

Intersection Summary	
Area Type:	Other

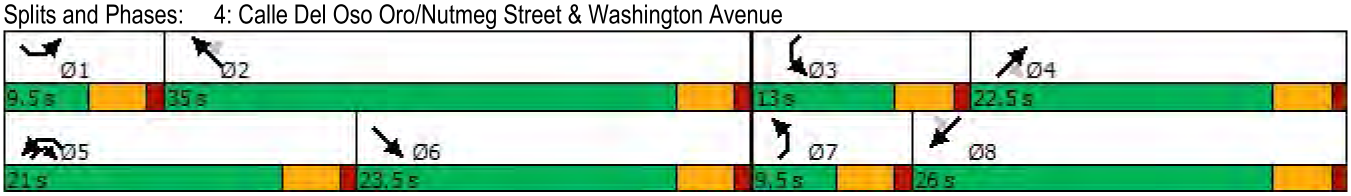
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	57	222	12	280	490	113	16	87	200	121	247	178
Future Volume (vph)	57	222	12	280	490	113	16	87	200	121	247	178
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	60	234	13	295	516	119	17	92	211	127	260	187
Shared Lane Traffic (%)												
Lane Group Flow (vph)	60	247	0	295	516	119	17	92	211	127	260	187

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	57	222	280	490	113	16	87	200	121	247	178
Future Volume (vph)	57	222	280	490	113	16	87	200	121	247	178
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	1	6	5	2		7	4	5	3	8	
Permitted Phases					2			4			8
Detector Phase	1	6	5	2	2	7	4	5	3	8	8
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	9.5	22.5	22.5
Total Split (s)	9.5	23.5	21.0	35.0	35.0	9.5	22.5	21.0	13.0	26.0	26.0
Total Split (%)	11.9%	29.4%	26.3%	43.8%	43.8%	11.9%	28.1%	26.3%	16.3%	32.5%	32.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	5.1	19.7	15.0	32.1	32.1	5.1	10.5	30.1	8.2	18.7	18.7
Actuated g/C Ratio	0.07	0.29	0.22	0.47	0.47	0.07	0.15	0.44	0.12	0.27	0.27
v/c Ratio	0.46	0.24	0.76	0.59	0.15	0.13	0.32	0.26	0.60	0.51	0.32
Control Delay	46.7	21.5	41.9	20.2	2.7	35.9	30.7	2.8	45.5	25.7	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.7	21.5	41.9	20.2	2.7	35.9	30.7	2.8	45.5	25.7	4.6
LOS	D	C	D	C	A	D	C	A	D	C	A
Approach Delay		26.4		24.8			12.6			23.2	
Approach LOS		C		C			B			C	

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 68.8	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 22.8	Intersection LOS: C
Intersection Capacity Utilization 54.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 4: Calle Del Oso Oro/Nutmeg Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group Flow (vph)	60	247	295	516	119	17	92	211	127	260	187
v/c Ratio	0.46	0.24	0.76	0.59	0.15	0.13	0.32	0.26	0.60	0.51	0.32
Control Delay	46.7	21.5	41.9	20.2	2.7	35.9	30.7	2.8	45.5	25.7	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.7	21.5	41.9	20.2	2.7	35.9	30.7	2.8	45.5	25.7	4.6
Queue Length 50th (ft)	26	43	119	170	0	7	38	0	54	90	0
Queue Length 95th (ft)	#80	83	#269	331	23	28	77	32	#139	182	39
Internal Link Dist (ft)		1381		2550			1430			1453	
Turn Bay Length (ft)	85		150			150			250		100
Base Capacity (vph)	131	1009	433	869	814	131	497	848	223	604	651
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.24	0.68	0.59	0.15	0.13	0.19	0.25	0.57	0.43	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	57	222	12	280	490	113	16	87	200	121	247	178
Future Volume (veh/h)	57	222	12	280	490	113	16	87	200	121	247	178
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	60	234	13	295	516	119	17	92	211	127	260	187
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	89	1043	58	344	838	713	36	267	534	162	399	339
Arrive On Green	0.05	0.31	0.31	0.19	0.45	0.45	0.02	0.14	0.14	0.09	0.21	0.21
Sat Flow, veh/h	1774	3411	188	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	60	121	126	295	516	119	17	92	211	127	260	187
Grp Sat Flow(s),veh/h/ln	1774	1770	1829	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	2.3	3.4	3.5	10.9	14.3	3.0	0.6	3.0	6.9	4.7	8.6	7.1
Cycle Q Clear(g_c), s	2.3	3.4	3.5	10.9	14.3	3.0	0.6	3.0	6.9	4.7	8.6	7.1
Prop In Lane	1.00		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	89	541	560	344	838	713	36	267	534	162	399	339
V/C Ratio(X)	0.68	0.22	0.23	0.86	0.62	0.17	0.47	0.34	0.39	0.79	0.65	0.55
Avail Cap(c_a), veh/h	131	541	560	432	838	713	131	495	728	223	591	502
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.7	17.5	17.5	26.4	14.2	11.1	32.8	26.2	17.2	30.1	24.3	23.7
Incr Delay (d2), s/veh	8.7	1.0	0.9	13.0	3.4	0.5	9.4	0.8	0.5	11.9	1.8	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	1.8	1.9	6.6	8.1	1.4	0.4	1.6	3.1	2.9	4.6	3.2
LnGrp Delay(d),s/veh	40.3	18.5	18.5	39.4	17.5	11.6	42.3	26.9	17.6	42.0	26.1	25.1
LnGrp LOS	D	B	B	D	B	B	D	C	B	D	C	C
Approach Vol, veh/h		307			930			320			574	
Approach Delay, s/veh		22.7			23.7			21.6			29.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	35.0	10.7	14.2	17.7	25.2	5.9	19.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.0	30.5	8.5	18.0	16.5	19.0	5.0	21.5
Max Q Clear Time (g_c+I1), s	4.3	16.3	6.7	8.9	12.9	5.5	2.6	10.6
Green Ext Time (p_c), s	0.0	3.2	0.0	0.8	0.3	1.1	0.0	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	24.8
HCM 2010 LOS	C

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		280	300		0	350		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.998			0.931			0.911	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3532	0	1770	1734	0	1770	3224	0
Flt Permitted	0.950			0.950			0.476			0.695		
Satd. Flow (perm)	1770	3539	1583	1770	3532	0	887	1734	0	1295	3224	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			176		2			44			75	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2630			1335			2657			1296	
Travel Time (s)		59.8			30.3			60.4			29.5	

Intersection Summary	
Area Type:	Other

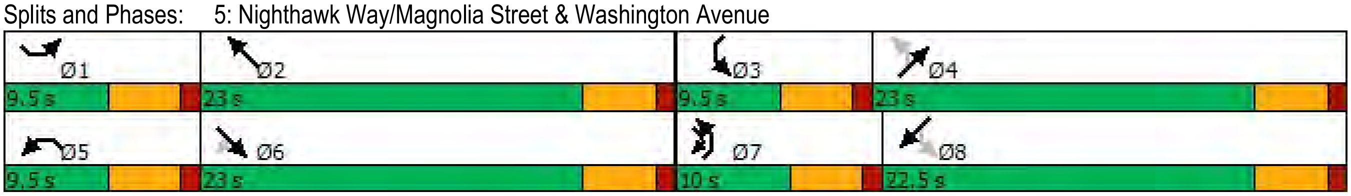
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	36	422	101	54	533	8	91	49	42	9	48	71
Future Volume (vph)	36	422	101	54	533	8	91	49	42	9	48	71
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	38	444	106	57	561	8	96	52	44	9	51	75
Shared Lane Traffic (%)												
Lane Group Flow (vph)	38	444	106	57	569	0	96	96	0	9	126	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	36	422	101	54	533	91	49	9	48
Future Volume (vph)	36	422	101	54	533	91	49	9	48
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+pt	NA	pm+pt	NA
Protected Phases	1	6	7	5	2	7	4	3	8
Permitted Phases			6			4		8	
Detector Phase	1	6	7	5	2	7	4	3	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	9.5	23.0	10.0	9.5	23.0	10.0	23.0	9.5	22.5
Total Split (%)	14.6%	35.4%	15.4%	14.6%	35.4%	15.4%	35.4%	14.6%	34.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	None	Max	None	None	None	None
Act Effct Green (s)	5.1	24.0	5.6	5.1	25.7	13.7	12.8	10.5	6.7
Actuated g/C Ratio	0.10	0.49	0.11	0.10	0.52	0.28	0.26	0.21	0.14
v/c Ratio	0.21	0.26	0.31	0.31	0.31	0.27	0.20	0.03	0.25
Control Delay	26.1	12.4	4.0	28.0	11.5	15.2	11.7	13.0	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	12.4	4.0	28.0	11.5	15.2	11.7	13.0	11.9
LOS	C	B	A	C	B	B	B	B	B
Approach Delay		11.8			13.0		13.5		12.0
Approach LOS		B			B		B		B

Intersection Summary	
Cycle Length: 65	
Actuated Cycle Length: 49	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.31	
Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 42.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Nighthawk Way/Magnolia Street & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	38	444	106	57	569	96	96	9	126
v/c Ratio	0.21	0.26	0.31	0.31	0.31	0.27	0.20	0.03	0.25
Control Delay	26.1	12.4	4.0	28.0	11.5	15.2	11.7	13.0	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	12.4	4.0	28.0	11.5	15.2	11.7	13.0	11.9
Queue Length 50th (ft)	11	53	0	17	47	22	12	2	7
Queue Length 95th (ft)	36	93	13	48	119	49	49	10	26
Internal Link Dist (ft)		2550			1255		2577		1216
Turn Bay Length (ft)	150		280	300		350		150	
Base Capacity (vph)	184	1732	337	184	1855	350	697	325	1260
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.26	0.31	0.31	0.31	0.27	0.14	0.03	0.10

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	36	422	101	54	533	8	91	49	42	9	48	71
Future Volume (veh/h)	36	422	101	54	533	8	91	49	42	9	48	71
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	38	444	106	57	561	8	96	52	44	9	51	75
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	74	1379	736	99	1442	21	356	153	130	302	177	159
Arrive On Green	0.04	0.39	0.39	0.06	0.40	0.40	0.08	0.16	0.16	0.01	0.10	0.10
Sat Flow, veh/h	1774	3539	1583	1774	3572	51	1774	933	790	1774	1770	1583
Grp Volume(v), veh/h	38	444	106	57	278	291	96	0	96	9	51	75
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1854	1774	0	1723	1774	1770	1583
Q Serve(g_s), s	1.0	4.2	1.8	1.5	5.3	5.3	2.2	0.0	2.3	0.2	1.3	2.1
Cycle Q Clear(g_c), s	1.0	4.2	1.8	1.5	5.3	5.3	2.2	0.0	2.3	0.2	1.3	2.1
Prop In Lane	1.00		1.00	1.00		0.03	1.00		0.46	1.00		1.00
Lane Grp Cap(c), veh/h	74	1379	736	99	714	748	356	0	283	302	177	159
V/C Ratio(X)	0.52	0.32	0.14	0.58	0.39	0.39	0.27	0.00	0.34	0.03	0.29	0.47
Avail Cap(c_a), veh/h	187	1379	736	187	714	748	427	0	671	468	671	600
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.3	10.1	7.3	21.9	10.0	10.0	16.7	0.0	17.6	18.8	19.8	20.2
Incr Delay (d2), s/veh	5.5	0.6	0.4	5.2	1.6	1.5	0.4	0.0	0.7	0.0	0.9	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	2.2	0.9	0.9	2.9	3.0	1.1	0.0	1.2	0.1	0.7	1.0
LnGrp Delay(d),s/veh	27.8	10.7	7.7	27.1	11.6	11.5	17.1	0.0	18.3	18.9	20.7	22.4
LnGrp LOS	C	B	A	C	B	B	B		B	B	C	C
Approach Vol, veh/h		588			626			192			135	
Approach Delay, s/veh		11.3			13.0			17.7			21.5	
Approach LOS		B			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.5	23.7	5.1	12.3	7.1	23.0	8.1	9.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.0	18.5	5.0	18.5	5.0	18.5	5.5	18.0
Max Q Clear Time (g_c+I1), s	3.0	7.3	2.2	4.3	3.5	6.2	4.2	4.1
Green Ext Time (p_c), s	0.0	2.6	0.0	0.3	0.0	2.6	0.0	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	13.7
HCM 2010 LOS	B

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		170	150		0	80		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	1583	0	1770	1583	0
Flt Permitted	0.950			0.950								
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1863	1583	0	1863	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			109		363			307	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1335			1310			2481			639	
Travel Time (s)		30.3			29.8			56.4			14.5	

Intersection Summary

Area Type: Other

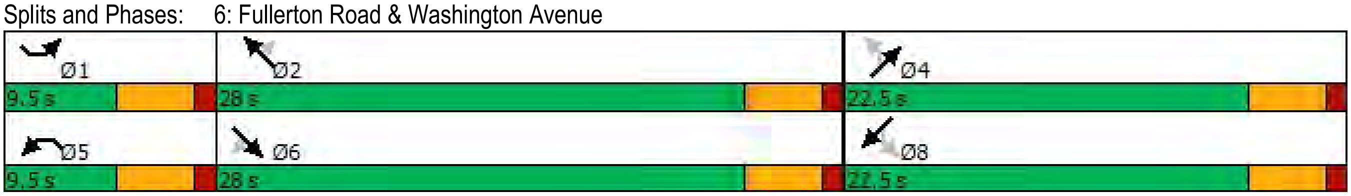
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	3	476	10	6	585	1	10	0	3	1	0	4
Future Volume (vph)	3	476	10	6	585	1	10	0	3	1	0	4
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	496	10	6	609	1	10	0	3	1	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	496	10	6	609	1	10	3	0	1	4	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Configurations										
Traffic Volume (vph)	3	476	10	6	585	1	10	0	1	0
Future Volume (vph)	3	476	10	6	585	1	10	0	1	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	1	6		5	2			4		8
Permitted Phases			6			2	4		8	
Detector Phase	1	6	6	5	2	2	4	4	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	28.0	28.0	9.5	28.0	28.0	22.5	22.5	22.5	22.5
Total Split (%)	15.8%	46.7%	46.7%	15.8%	46.7%	46.7%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	5.0	39.6	39.6	5.0	39.6	39.6	5.9	5.9	5.8	5.8
Actuated g/C Ratio	0.11	0.90	0.90	0.11	0.90	0.90	0.13	0.13	0.13	0.13
v/c Ratio	0.01	0.16	0.01	0.03	0.36	0.00	0.04	0.01	0.00	0.01
Control Delay	18.7	2.6	0.0	19.0	4.2	0.0	17.8	0.0	18.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.7	2.6	0.0	19.0	4.2	0.0	17.8	0.0	18.0	0.0
LOS	B	A	A	B	A	A	B	A	B	A
Approach Delay		2.6			4.4			13.7		3.6
Approach LOS		A			A			B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 44.2	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.36	
Intersection Signal Delay: 3.7	Intersection LOS: A
Intersection Capacity Utilization 45.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Fullerton Road & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	3	496	10	6	609	1	10	3	1	4
v/c Ratio	0.01	0.16	0.01	0.03	0.36	0.00	0.04	0.01	0.00	0.01
Control Delay	18.7	2.6	0.0	19.0	4.2	0.0	17.8	0.0	18.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.7	2.6	0.0	19.0	4.2	0.0	17.8	0.0	18.0	0.0
Queue Length 50th (ft)	1	0	0	1	0	0	2	0	0	0
Queue Length 95th (ft)	6	65	0	10	215	0	13	0	4	0
Internal Link Dist (ft)		1255			1230			2401		559
Turn Bay Length (ft)			170	150			80			
Base Capacity (vph)	200	3172	1430	200	1670	1430	761	861	761	828
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.16	0.01	0.03	0.36	0.00	0.01	0.00	0.00	0.00

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	3	476	10	6	585	1	10	0	3	1	0	4
Future Volume (veh/h)	3	476	10	6	585	1	10	0	3	1	0	4
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	3	496	10	6	609	1	10	0	3	1	0	4
Adj No. of Lanes	1	2	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	7	2179	975	14	1154	981	217	0	36	218	0	36
Arrive On Green	0.00	0.62	0.62	0.01	0.62	0.62	0.02	0.00	0.02	0.02	0.00	0.02
Sat Flow, veh/h	1774	3539	1583	1774	1863	1583	1407	0	1583	1408	0	1583
Grp Volume(v), veh/h	3	496	10	6	609	1	10	0	3	1	0	4
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1863	1583	1407	0	1583	1408	0	1583
Q Serve(g_s), s	0.1	2.4	0.1	0.1	7.1	0.0	0.3	0.0	0.1	0.0	0.0	0.1
Cycle Q Clear(g_c), s	0.1	2.4	0.1	0.1	7.1	0.0	0.4	0.0	0.1	0.1	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	7	2179	975	14	1154	981	217	0	36	218	0	36
V/C Ratio(X)	0.41	0.23	0.01	0.42	0.53	0.00	0.05	0.00	0.08	0.00	0.00	0.11
Avail Cap(c_a), veh/h	232	2179	975	232	1154	981	848	0	747	850	0	747
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.0	3.3	2.8	18.8	4.1	2.8	18.5	0.0	18.3	18.3	0.0	18.3
Incr Delay (d2), s/veh	33.3	0.2	0.0	18.3	1.7	0.0	0.1	0.0	1.0	0.0	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.2	0.0	0.1	4.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1
LnGrp Delay(d),s/veh	52.3	3.5	2.9	37.1	5.8	2.8	18.5	0.0	19.2	18.3	0.0	19.6
LnGrp LOS	D	A	A	D	A	A	B		B	B		B
Approach Vol, veh/h		509			616			13			5	
Approach Delay, s/veh		3.8			6.1			18.7			19.4	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.7	28.2		5.4	4.8	28.0		5.4
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	5.0	23.5		18.0
Max Q Clear Time (g_c+I1), s	2.1	9.1		2.4	2.1	4.4		2.1
Green Ext Time (p_c), s	0.0	3.6		0.0	0.0	3.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	5.3
HCM 2010 LOS	A

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.990			0.997			0.878			0.933	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3504	0	1770	3529	0	1770	1635	0	1770	1738	0
Flt Permitted	0.950			0.950			0.952			0.952		
Satd. Flow (perm)	1770	3504	0	1770	3529	0	1773	1635	0	1773	1738	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			4			69			28	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

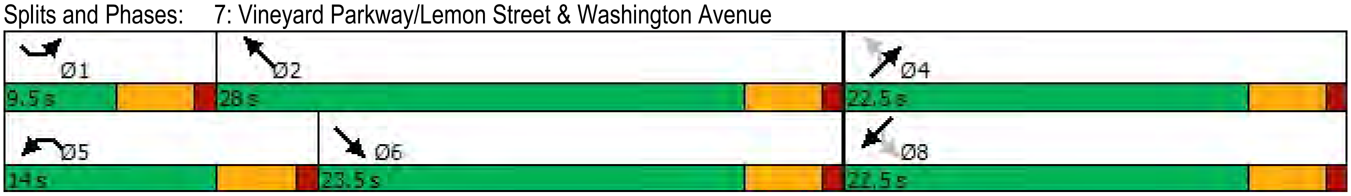
Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	13	446	33	95	551	11	29	15	65	10	33	26
Future Volume (vph)	13	446	33	95	551	11	29	15	65	10	33	26
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	14	474	35	101	586	12	31	16	69	11	35	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	509	0	101	598	0	31	85	0	11	63	0
Intersection Summary												

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	13	446	95	551	29	15	10	33
Future Volume (vph)	13	446	95	551	29	15	10	33
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases					4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	23.5	14.0	28.0	22.5	22.5	22.5	22.5
Total Split (%)	15.8%	39.2%	23.3%	46.7%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	5.1	28.6	7.7	34.4	6.7	6.7	6.7	6.7
Actuated g/C Ratio	0.11	0.63	0.17	0.76	0.15	0.15	0.15	0.15
v/c Ratio	0.07	0.23	0.34	0.22	0.12	0.28	0.04	0.23
Control Delay	21.2	8.5	20.6	4.4	19.0	10.4	18.1	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.2	8.5	20.6	4.4	19.0	10.4	18.1	14.4
LOS	C	A	C	A	B	B	B	B
Approach Delay		8.8		6.7		12.7		15.0
Approach LOS		A		A		B		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 45.2	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.34	
Intersection Signal Delay: 8.4	Intersection LOS: A
Intersection Capacity Utilization 39.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	14	509	101	598	31	85	11	63
v/c Ratio	0.07	0.23	0.34	0.22	0.12	0.28	0.04	0.23
Control Delay	21.2	8.5	20.6	4.4	19.0	10.4	18.1	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.2	8.5	20.6	4.4	19.0	10.4	18.1	14.4
Queue Length 50th (ft)	4	46	25	24	8	4	3	9
Queue Length 95th (ft)	17	86	60	85	26	33	13	35
Internal Link Dist (ft)		1230		2572		2575		1085
Turn Bay Length (ft)	150		255		160		150	
Base Capacity (vph)	198	2224	377	2683	716	701	716	718
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.23	0.27	0.22	0.04	0.12	0.02	0.09

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	13	446	33	95	551	11	29	15	65	10	33	26
Future Volume (veh/h)	13	446	33	95	551	11	29	15	65	10	33	26
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	14	474	35	101	586	12	31	16	69	11	35	28
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	32	1646	121	146	1974	40	266	32	140	244	101	81
Arrive On Green	0.02	0.49	0.49	0.08	0.56	0.56	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	1774	3343	246	1774	3547	73	1334	307	1323	1307	960	768
Grp Volume(v), veh/h	14	250	259	101	292	306	31	0	85	11	0	63
Grp Sat Flow(s),veh/h/ln	1774	1770	1819	1774	1770	1850	1334	0	1629	1307	0	1727
Q Serve(g_s), s	0.3	3.5	3.6	2.3	3.7	3.7	0.9	0.0	2.1	0.3	0.0	1.4
Cycle Q Clear(g_c), s	0.3	3.5	3.6	2.3	3.7	3.7	2.4	0.0	2.1	2.4	0.0	1.4
Prop In Lane	1.00		0.14	1.00		0.04	1.00		0.81	1.00		0.44
Lane Grp Cap(c), veh/h	32	871	896	146	985	1030	266	0	172	244	0	183
V/C Ratio(X)	0.44	0.29	0.29	0.69	0.30	0.30	0.12	0.00	0.49	0.05	0.00	0.35
Avail Cap(c_a), veh/h	210	871	896	399	985	1030	694	0	695	664	0	736
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.5	6.3	6.3	18.9	5.0	5.0	18.6	0.0	17.8	19.0	0.0	17.5
Incr Delay (d2), s/veh	9.3	0.8	0.8	5.8	0.8	0.7	0.2	0.0	2.2	0.1	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.9	1.9	1.4	2.0	2.1	0.4	0.0	1.0	0.1	0.0	0.7
LnGrp Delay(d),s/veh	29.8	7.2	7.2	24.6	5.7	5.7	18.8	0.0	20.0	19.0	0.0	18.6
LnGrp LOS	C	A	A	C	A	A	B		B	B		B
Approach Vol, veh/h		523			699			116			74	
Approach Delay, s/veh		7.8			8.5			19.7			18.7	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.3	28.0		9.0	8.0	25.3		9.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	9.5	19.0		18.0
Max Q Clear Time (g_c+I1), s	2.3	5.7		4.4	4.3	5.6		4.4
Green Ext Time (p_c), s	0.0	3.4		0.4	0.1	2.5		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	9.7
HCM 2010 LOS	A

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.980				0.850		0.985				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1825	0	1770	1863	1583	1770	1835	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1825	0	1770	1863	1583	1770	1835	0	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				164		8				452
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	386	169	26	5	273	99	44	72	8	79	49	443
Future Volume (vph)	386	169	26	5	273	99	44	72	8	79	49	443
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	394	172	27	5	279	101	45	73	8	81	50	452
Shared Lane Traffic (%)												
Lane Group Flow (vph)	394	199	0	5	279	101	45	81	0	81	50	452

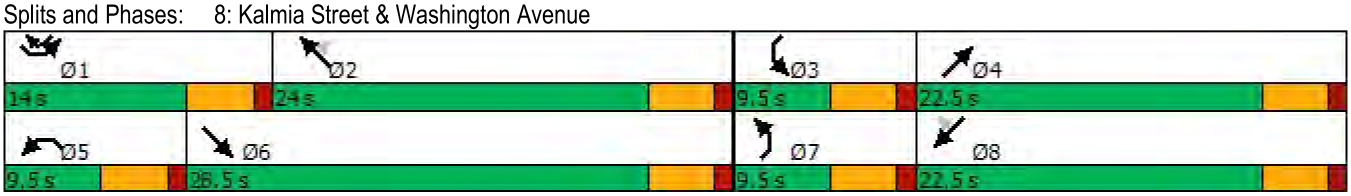
Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	386	169	5	273	99	44	72	79	49	443
Future Volume (vph)	386	169	5	273	99	44	72	79	49	443
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	14.0	28.5	9.5	24.0	24.0	9.5	22.5	9.5	22.5	14.0
Total Split (%)	20.0%	40.7%	13.6%	34.3%	34.3%	13.6%	32.1%	13.6%	32.1%	20.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	9.5	34.2	5.2	20.3	20.3	5.2	7.8	5.2	9.6	9.5
Actuated g/C Ratio	0.17	0.61	0.09	0.36	0.36	0.09	0.14	0.09	0.17	0.17
v/c Ratio	0.67	0.18	0.03	0.41	0.15	0.27	0.31	0.49	0.16	0.70
Control Delay	31.0	9.0	26.6	18.4	1.5	31.1	24.8	39.7	23.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	9.0	26.6	18.4	1.5	31.1	24.8	39.7	23.6	10.2
LOS	C	A	C	B	A	C	C	D	C	B
Approach Delay		23.6		14.1			27.0		15.4	
Approach LOS		C		B			C		B	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 55.7
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 18.9 Intersection LOS: B
Intersection Capacity Utilization 57.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 8: Kalmia Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	394	199	5	279	101	45	81	81	50	452
v/c Ratio	0.67	0.18	0.03	0.41	0.15	0.27	0.31	0.49	0.16	0.70
Control Delay	31.0	9.0	26.6	18.4	1.5	31.1	24.8	39.7	23.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	9.0	26.6	18.4	1.5	31.1	24.8	39.7	23.6	10.2
Queue Length 50th (ft)	70	29	2	78	0	16	24	29	16	0
Queue Length 95th (ft)	#132	90	11	148	10	44	58	#84	43	#105
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	609	1124	165	678	681	165	622	165	626	652
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.18	0.03	0.41	0.15	0.27	0.13	0.49	0.08	0.69

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	386	169	26	5	273	99	44	72	8	79	49	443
Future Volume (veh/h)	386	169	26	5	273	99	44	72	8	79	49	443
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	394	172	27	5	279	101	45	73	8	81	50	452
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	482	662	104	12	535	455	75	411	45	103	494	642
Arrive On Green	0.14	0.42	0.42	0.01	0.29	0.29	0.04	0.25	0.25	0.06	0.27	0.27
Sat Flow, veh/h	3442	1572	247	1774	1863	1583	1774	1650	181	1774	1863	1583
Grp Volume(v), veh/h	394	0	199	5	279	101	45	0	81	81	50	452
Grp Sat Flow(s),veh/h/ln	1721	0	1819	1774	1863	1583	1774	0	1831	1774	1863	1583
Q Serve(g_s), s	7.5	0.0	4.8	0.2	8.5	3.3	1.7	0.0	2.4	3.1	1.4	16.1
Cycle Q Clear(g_c), s	7.5	0.0	4.8	0.2	8.5	3.3	1.7	0.0	2.4	3.1	1.4	16.1
Prop In Lane	1.00		0.14	1.00		1.00	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	482	0	765	12	535	455	75	0	456	103	494	642
V/C Ratio(X)	0.82	0.00	0.26	0.43	0.52	0.22	0.60	0.00	0.18	0.78	0.10	0.70
Avail Cap(c_a), veh/h	482	0	765	131	535	455	131	0	486	131	494	642
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.3	0.0	12.8	33.6	20.3	18.4	31.9	0.0	20.0	31.5	18.8	16.8
Incr Delay (d2), s/veh	10.6	0.0	0.8	22.5	3.6	1.1	7.6	0.0	0.2	20.8	0.1	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	2.6	0.2	4.9	1.6	1.0	0.0	1.2	2.1	0.7	7.6
LnGrp Delay(d),s/veh	38.9	0.0	13.6	56.1	23.9	19.5	39.5	0.0	20.2	52.4	18.9	20.3
LnGrp LOS	D		B	E	C	B	D		C	D	B	C
Approach Vol, veh/h		593			385			126			583	
Approach Delay, s/veh		30.4			23.1			27.1			24.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	24.0	8.5	21.4	4.9	33.1	7.4	22.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.5	19.5	5.0	18.0	5.0	24.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	9.5	10.5	5.1	4.4	2.2	6.8	3.7	18.1
Green Ext Time (p_c), s	0.0	1.3	0.0	0.3	0.0	1.0	0.0	0.0

Intersection Summary			
HCM 2010 Ctrl Delay			26.5
HCM 2010 LOS			C

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	60		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.983						0.932				0.850
Flt Protected				0.950				0.976			0.950	
Satd. Flow (prot)	0	1831	0	1770	1863	0	0	1694	0	0	1770	1583
Flt Permitted				0.950				0.976			0.950	
Satd. Flow (perm)	0	1831	0	1770	1863	0	0	1694	0	0	1770	1583
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1045			237			351			183	
Travel Time (s)		23.8			5.4			8.0			4.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	0	32	5	8	24	0	5	0	5	17	0	12
Future Volume (vph)	0	32	5	8	24	0	5	0	5	17	0	12
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	41	6	10	30	0	6	0	6	22	0	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	47	0	10	30	0	0	12	0	0	22	15

Intersection Summary

Intersection	
Int Delay, s/veh	3.7

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	32	5	8	24	0	5	0	5	17	0	12
Future Vol, veh/h	0	32	5	8	24	0	5	0	5	17	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	60	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	41	6	10	30	0	6	0	6	22	0	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	47	0	0	102	94	44	97	97	30
Stage 1	-	-	-	-	-	-	44	44	-	50	50	-
Stage 2	-	-	-	-	-	-	58	50	-	47	47	-
Critical Hdwy	-	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1560	-	0	879	796	1026	885	793	1044
Stage 1	0	-	-	-	-	0	970	858	-	963	853	-
Stage 2	0	-	-	-	-	0	954	853	-	967	856	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1560	-	-	862	791	1026	875	788	1044
Mov Cap-2 Maneuver	-	-	-	-	-	-	862	791	-	875	788	-
Stage 1	-	-	-	-	-	-	970	858	-	963	848	-
Stage 2	-	-	-	-	-	-	934	848	-	961	856	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	1.8	8.9	8.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	937	1560	-	-	-	875	1044
HCM Lane V/C Ratio	0.014	0.006	-	-	-	0.025	0.015
HCM Control Delay (s)	8.9	7.3	-	-	-	9.2	8.5
HCM Lane LOS	A	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	0	-	-	-	0.1	0

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected				0.950		
Satd. Flow (prot)	1863	0	0	1770	1863	0
Flt Permitted				0.950		
Satd. Flow (perm)	1863	0	0	1770	1863	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	112			181	2481	
Travel Time (s)	2.5			4.1	56.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	0	0	27	0	0	0
Future Volume (vph)	0	0	27	0	0	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	0	0	33	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	33	0	0

Intersection Summary

Intersection						
Int Delay, s/veh	7					

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	0	0	27	0	0	0
Future Vol, veh/h	0	0	27	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	33	0	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	67	1	1	0	-	0
Stage 1	1	-	-	-	-	-
Stage 2	66	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	938	1084	1622	-	-	-
Stage 1	1022	-	-	-	-	-
Stage 2	957	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	919	1084	1622	-	-	-
Mov Cap-2 Maneuver	919	-	-	-	-	-
Stage 1	1002	-	-	-	-	-
Stage 2	957	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	0	7.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	1622	-	-	-	-
HCM Lane V/C Ratio	0.021	-	-	-	-
HCM Control Delay (s)	7.3	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-	-

Appendix D

Existing Plus Project Conditions
Intersection Analysis

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			1	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.865		
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	0	1611	1770	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	0	1611	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		340	1045		2657	
Travel Time (s)		7.7	23.8		60.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	0	0	0	271	299	0
Future Volume (vph)	0	0	0	271	299	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	0	0	393	433	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	393	433	0

Intersection Summary

Intersection	
Intersection Delay, s/veh	13.7
Intersection LOS	B

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↰		↱	↰	
Traffic Vol, veh/h	0	0	0	271	299	0
Future Vol, veh/h	0	0	0	271	299	0
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	393	433	0
Number of Lanes	0	1	0	1	1	0

Approach	SE	NW	SW
Opposing Approach	NW	SE	
Opposing Lanes	1	1	0
Conflicting Approach Left	SW		NW
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SW	SE
Conflicting Lanes Right	0	1	1
HCM Control Delay	0	11.7	15.5
HCM LOS	-	B	C

Lane	NWLn1	SELn1	SWLn1
Vol Left, %	0%	0%	100%
Vol Thru, %	0%	100%	0%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	271	0	299
LT Vol	0	0	299
Through Vol	0	0	0
RT Vol	271	0	0
Lane Flow Rate	393	0	433
Geometry Grp	1	1	1
Degree of Util (X)	0.487	0	0.603
Departure Headway (Hd)	4.468	5.56	5.013
Convergence, Y/N	Yes	Yes	Yes
Cap	805	0	715
Service Time	2.513	3.655	3.093
HCM Lane V/C Ratio	0.488	0	0.606
HCM Control Delay	11.7	8.7	15.5
HCM Lane LOS	B	N	C
HCM 95th-tile Q	2.7	0	4.1

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	60			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.907		0.935	
Flt Protected	0.950				0.975	
Satd. Flow (prot)	1770	1863	1690	0	1698	0
Flt Permitted	0.950				0.975	
Satd. Flow (perm)	1770	1863	1690	0	1698	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		237	1361		181	
Travel Time (s)		5.4	30.9		4.1	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	80	220	167	373	25	23
Future Volume (vph)	80	220	167	373	25	23
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	123	338	257	574	38	35
Shared Lane Traffic (%)						
Lane Group Flow (vph)	123	338	831	0	73	0

Intersection Summary

Intersection	
Int Delay, s/veh	2.1

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	80	220	167	373	25	23
Future Vol, veh/h	80	220	167	373	25	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	60	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	65	65	65	65	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	123	338	257	574	38	35

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	831	0	-	0	1128	544
Stage 1	-	-	-	-	544	-
Stage 2	-	-	-	-	584	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	801	-	-	-	226	539
Stage 1	-	-	-	-	582	-
Stage 2	-	-	-	-	557	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	801	-	-	-	191	539
Mov Cap-2 Maneuver	-	-	-	-	191	-
Stage 1	-	-	-	-	492	-
Stage 2	-	-	-	-	557	-

Approach	SE	NW	SW
HCM Control Delay, s	2.7	0	22.7
HCM LOS			C

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	801	-	277
HCM Lane V/C Ratio	-	-	0.154	-	0.267
HCM Control Delay (s)	-	-	10.3	-	22.7
HCM Lane LOS	-	-	B	-	C
HCM 95th %tile Q(veh)	-	-	0.5	-	1

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	390	6	6	18	18	448
Future Volume (vph)	390	6	6	18	18	448
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	470	7	7	22	22	540
Shared Lane Traffic (%)						
Lane Group Flow (vph)	470	7	7	22	22	540

Intersection Summary

Intersection	
Intersection Delay, s/veh	33.5
Intersection LOS	D

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	390	6	6	18	18	448
Future Vol, veh/h	390	6	6	18	18	448
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	470	7	7	22	22	540
Number of Lanes	1	1	1	1	1	1

Approach	SE	NE	SW
Opposing Approach		SW	NE
Opposing Lanes	0	2	2
Conflicting Approach Left	SW	SE	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NE		SE
Conflicting Lanes Right	2	0	2
HCM Control Delay	39.5	10.4	29.5
HCM LOS	E	B	D

Lane	NELn1	NELn2	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	6	18	390	6	18	448
LT Vol	6	0	390	0	0	0
Through Vol	0	18	0	0	18	0
RT Vol	0	0	0	6	0	448
Lane Flow Rate	7	22	470	7	22	540
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.015	0.043	0.875	0.011	0.038	0.835
Departure Headway (Hd)	7.702	7.187	6.707	5.498	6.279	5.567
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	462	494	540	650	568	648
Service Time	5.5	4.985	4.446	3.237	4.038	3.326
HCM Lane V/C Ratio	0.015	0.045	0.87	0.011	0.039	0.833
HCM Control Delay	10.6	10.3	40	8.3	9.3	30.3
HCM Lane LOS	B	B	E	A	A	D
HCM 95th-tile Q	0	0.1	9.7	0	0.1	9

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	85		0	150		0	150		0	250		100
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.981				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3472	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18				143			524			205
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1461			2630			1510			1533	
Travel Time (s)		33.2			59.8			34.3			34.8	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	77	328	46	253	290	107	42	233	466	168	157	56
Future Volume (vph)	77	328	46	253	290	107	42	233	466	168	157	56
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	87	369	52	284	326	120	47	262	524	189	176	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	421	0	284	326	120	47	262	524	189	176	63

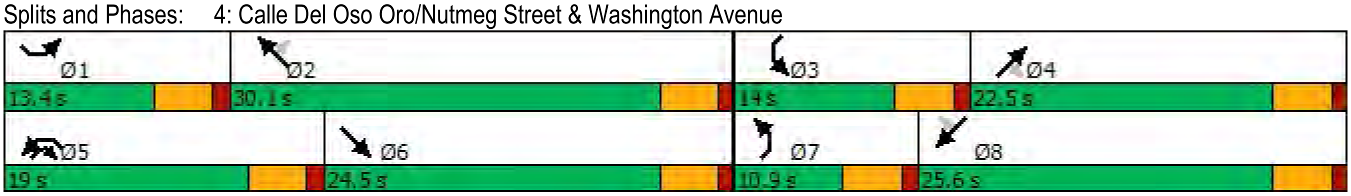
Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	77	328	253	290	107	42	233	466	168	157	56
Future Volume (vph)	77	328	253	290	107	42	233	466	168	157	56
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	1	6	5	2		7	4	5	3	8	
Permitted Phases					2			4			8
Detector Phase	1	6	5	2	2	7	4	5	3	8	8
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	9.5	22.5	22.5
Total Split (s)	13.4	24.5	19.0	30.1	30.1	10.9	22.5	19.0	14.0	25.6	25.6
Total Split (%)	16.8%	30.6%	23.8%	37.6%	37.6%	13.6%	28.1%	23.8%	17.5%	32.0%	32.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	8.0	20.0	14.2	28.5	28.5	6.2	14.9	14.2	9.5	22.6	22.6
Actuated g/C Ratio	0.10	0.26	0.19	0.37	0.37	0.08	0.19	0.19	0.12	0.29	0.29
v/c Ratio	0.48	0.46	0.87	0.47	0.18	0.33	0.72	0.73	0.86	0.32	0.10
Control Delay	42.2	25.2	59.1	23.4	3.4	41.0	41.0	9.8	70.3	24.7	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.2	25.2	59.1	23.4	3.4	41.0	41.0	9.8	70.3	24.7	0.3
LOS	D	C	E	C	A	D	D	A	E	C	A
Approach Delay		28.1		34.0			21.4			41.3	
Approach LOS		C		C			C			D	

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 76.7
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 29.9 Intersection LOS: C
Intersection Capacity Utilization 61.1% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 4: Calle Del Oso Oro/Nutmeg Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group Flow (vph)	87	421	284	326	120	47	262	524	189	176	63
v/c Ratio	0.48	0.46	0.87	0.47	0.18	0.33	0.72	0.73	0.86	0.32	0.10
Control Delay	42.2	25.2	59.1	23.4	3.4	41.0	41.0	9.8	70.3	24.7	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.2	25.2	59.1	23.4	3.4	41.0	41.0	9.8	70.3	24.7	0.3
Queue Length 50th (ft)	40	86	135	127	0	22	119	0	92	71	0
Queue Length 95th (ft)	85	131	#272	209	25	55	193	85	#209	125	0
Internal Link Dist (ft)		1381		2550			1430			1453	
Turn Bay Length (ft)	85		150			150			250		100
Base Capacity (vph)	205	920	335	691	677	148	438	724	219	559	618
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.46	0.85	0.47	0.18	0.32	0.60	0.72	0.86	0.31	0.10

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	77	328	46	253	290	107	42	233	466	168	157	56
Future Volume (veh/h)	77	328	46	253	290	107	42	233	466	168	157	56
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	87	369	52	284	326	120	47	262	524	189	176	63
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	112	780	109	321	685	582	72	419	643	211	565	480
Arrive On Green	0.06	0.25	0.25	0.18	0.37	0.37	0.04	0.23	0.23	0.12	0.30	0.30
Sat Flow, veh/h	1774	3119	436	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	87	208	213	284	326	120	47	262	524	189	176	63
Grp Sat Flow(s),veh/h/ln	1774	1770	1786	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.9	8.0	8.1	12.5	10.7	4.1	2.1	10.1	18.0	8.4	5.8	2.3
Cycle Q Clear(g_c), s	3.9	8.0	8.1	12.5	10.7	4.1	2.1	10.1	18.0	8.4	5.8	2.3
Prop In Lane	1.00		0.24	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	112	443	447	321	685	582	72	419	643	211	565	480
V/C Ratio(X)	0.78	0.47	0.48	0.89	0.48	0.21	0.65	0.62	0.82	0.90	0.31	0.13
Avail Cap(c_a), veh/h	197	443	447	322	685	582	142	419	643	211	565	480
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.9	25.5	25.5	31.9	19.4	17.3	37.8	27.9	21.1	34.7	21.4	20.2
Incr Delay (d2), s/veh	10.9	3.6	3.6	24.1	2.4	0.8	9.6	2.9	8.0	35.3	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	4.3	4.4	8.2	6.0	1.9	1.2	5.5	11.7	6.2	3.0	1.0
LnGrp Delay(d),s/veh	47.8	29.0	29.1	56.0	21.7	18.1	47.4	30.8	29.1	70.1	21.7	20.3
LnGrp LOS	D	C	C	E	C	B	D	C	C	E	C	C
Approach Vol, veh/h		508			730			833			428	
Approach Delay, s/veh		32.3			34.5			30.7			42.9	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	33.9	14.0	22.5	19.0	24.5	7.7	28.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.9	25.6	9.5	18.0	14.5	20.0	6.4	21.1
Max Q Clear Time (g_c+I1), s	5.9	12.7	10.4	20.0	14.5	10.1	4.1	7.8
Green Ext Time (p_c), s	0.0	1.9	0.0	0.0	0.0	1.7	0.0	0.9

Intersection Summary	
HCM 2010 Ctrl Delay	34.2
HCM 2010 LOS	C

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		280	300		0	350		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.979			0.939			0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3465	0	1770	1749	0	1770	3514	0
Flt Permitted	0.950			0.950			0.182			0.485		
Satd. Flow (perm)	1770	3539	1583	1770	3465	0	339	1749	0	903	3514	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			554		19			48			5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2630			1335			2657			1296	
Travel Time (s)		59.8			30.3			60.4			29.5	

Intersection Summary	
Area Type:	Other

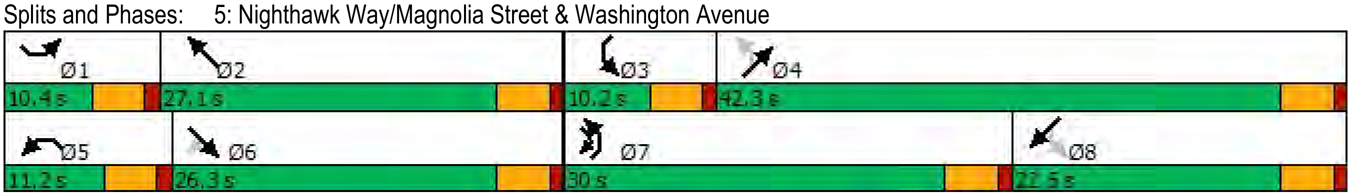
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	22	470	549	76	210	33	349	197	136	51	339	18
Future Volume (vph)	22	470	549	76	210	33	349	197	136	51	339	18
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	32	691	807	112	309	49	513	290	200	75	499	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	691	807	112	358	0	513	490	0	75	525	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	22	470	549	76	210	349	197	51	339
Future Volume (vph)	22	470	549	76	210	349	197	51	339
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+pt	NA	pm+pt	NA
Protected Phases	1	6	7	5	2	7	4	3	8
Permitted Phases			6			4		8	
Detector Phase	1	6	7	5	2	7	4	3	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	10.4	26.3	30.0	11.2	27.1	30.0	42.3	10.2	22.5
Total Split (%)	11.6%	29.2%	33.3%	12.4%	30.1%	33.3%	47.0%	11.3%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	None	Max	None	None	None	None
Act Effct Green (s)	5.8	21.8	24.9	6.7	26.9	46.0	37.9	22.2	16.5
Actuated g/C Ratio	0.07	0.25	0.28	0.08	0.31	0.52	0.43	0.25	0.19
v/c Ratio	0.27	0.79	0.96	0.84	0.33	0.88	0.63	0.27	0.79
Control Delay	46.2	39.0	33.1	86.6	25.2	38.8	22.4	16.5	43.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.2	39.0	33.1	86.6	25.2	38.8	22.4	16.5	43.5
LOS	D	D	C	F	C	D	C	B	D
Approach Delay		36.1			39.8		30.8		40.1
Approach LOS		D			D		C		D

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 88	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 35.8	Intersection LOS: D
Intersection Capacity Utilization 61.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Nighthawk Way/Magnolia Street & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	32	691	807	112	358	513	490	75	525
v/c Ratio	0.27	0.79	0.96	0.84	0.33	0.88	0.63	0.27	0.79
Control Delay	46.2	39.0	33.1	86.6	25.2	38.8	22.4	16.5	43.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.2	39.0	33.1	86.6	25.2	38.8	22.4	16.5	43.5
Queue Length 50th (ft)	18	195	163	64	84	219	194	20	147
Queue Length 95th (ft)	35	183	108	#102	90	216	194	30	145
Internal Link Dist (ft)		2550			1255		2577		1216
Turn Bay Length (ft)	150		280	300		350		150	
Base Capacity (vph)	119	877	852	134	1073	592	788	284	723
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.79	0.95	0.84	0.33	0.87	0.62	0.26	0.73

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	22	470	549	76	210	33	349	197	136	51	339	18
Future Volume (veh/h)	22	470	549	76	210	33	349	197	136	51	339	18
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	32	691	807	112	309	49	513	290	200	75	499	26
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	2	0
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	56	940	825	141	962	151	576	397	273	306	617	32
Arrive On Green	0.03	0.27	0.27	0.08	0.31	0.31	0.26	0.39	0.39	0.05	0.18	0.18
Sat Flow, veh/h	1774	3539	1583	1774	3066	481	1774	1028	709	1774	3423	178
Grp Volume(v), veh/h	32	691	807	112	177	181	513	0	490	75	258	267
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1778	1774	0	1738	1774	1770	1831
Q Serve(g_s), s	1.5	14.6	21.8	5.1	6.3	6.4	18.0	0.0	19.8	2.8	11.5	11.5
Cycle Q Clear(g_c), s	1.5	14.6	21.8	5.1	6.3	6.4	18.0	0.0	19.8	2.8	11.5	11.5
Prop In Lane	1.00		1.00	1.00		0.27	1.00		0.41	1.00		0.10
Lane Grp Cap(c), veh/h	56	940	825	141	555	558	576	0	670	306	319	330
V/C Ratio(X)	0.57	0.74	0.98	0.79	0.32	0.32	0.89	0.00	0.73	0.24	0.81	0.81
Avail Cap(c_a), veh/h	128	940	825	145	555	558	674	0	800	341	388	402
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.2	27.5	19.2	37.1	21.5	21.5	18.5	0.0	21.6	25.5	32.3	32.3
Incr Delay (d2), s/veh	8.9	5.1	26.6	24.8	1.5	1.5	12.7	0.0	2.8	0.4	10.0	9.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	7.8	23.6	3.5	3.3	3.4	10.7	0.0	9.9	1.4	6.5	6.7
LnGrp Delay(d),s/veh	48.1	32.6	45.8	61.9	23.0	23.1	31.2	0.0	24.4	25.9	42.3	42.2
LnGrp LOS	D	C	D	E	C	C	C		C	C	D	D
Approach Vol, veh/h		1530			470			1003			600	
Approach Delay, s/veh		39.9			32.3			27.9			40.2	
Approach LOS		D			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.1	30.2	8.6	36.1	11.0	26.3	25.5	19.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.9	22.6	5.7	37.8	6.7	21.8	25.5	18.0
Max Q Clear Time (g_c+I1), s	3.5	8.4	4.8	21.8	7.1	23.8	20.0	13.5
Green Ext Time (p_c), s	0.0	1.7	0.0	3.0	0.0	0.0	0.9	1.3

Intersection Summary	
HCM 2010 Ctrl Delay	35.6
HCM 2010 LOS	D

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		170	150		0	80		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	1583	0	1770	1583	0
Flt Permitted	0.950			0.950			0.746			0.685		
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1390	1583	0	1276	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			338			109		307			509	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1335			1310			2481			639	
Travel Time (s)		30.3			29.8			56.4			14.5	

Intersection Summary	
Area Type:	Other

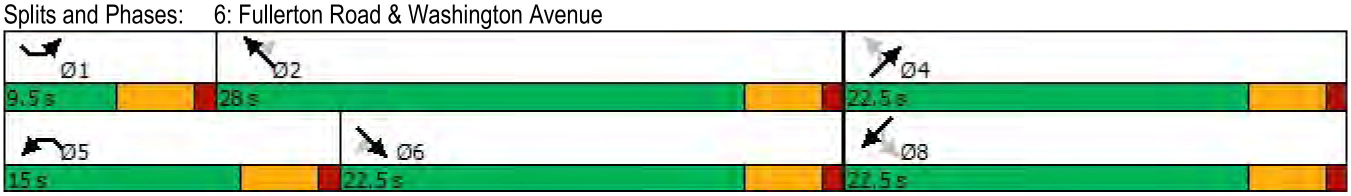
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	12	431	206	137	207	1	96	0	68	2	0	11
Future Volume (vph)	12	431	206	137	207	1	96	0	68	2	0	11
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	20	707	338	225	339	2	157	0	111	3	0	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	707	338	225	339	2	157	111	0	3	18	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Configurations										
Traffic Volume (vph)	12	431	206	137	207	1	96	0	2	0
Future Volume (vph)	12	431	206	137	207	1	96	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	1	6		5	2			4		8
Permitted Phases			6			2	4		8	
Detector Phase	1	6	6	5	2	2	4	4	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	22.5	22.5	15.0	28.0	28.0	22.5	22.5	22.5	22.5
Total Split (%)	15.8%	37.5%	37.5%	25.0%	46.7%	46.7%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	5.1	20.0	20.0	9.9	33.9	33.9	11.2	11.2	11.0	11.0
Actuated g/C Ratio	0.10	0.38	0.38	0.19	0.65	0.65	0.21	0.21	0.21	0.21
v/c Ratio	0.12	0.52	0.41	0.67	0.28	0.00	0.53	0.19	0.01	0.02
Control Delay	25.9	16.4	4.1	33.5	8.4	0.0	25.0	0.7	15.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	16.4	4.1	33.5	8.4	0.0	25.0	0.7	15.5	0.1
LOS	C	B	A	C	A	A	C	A	B	A
Approach Delay		12.7			18.3			15.0		2.3
Approach LOS		B			B			B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 52.1	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 14.5	Intersection LOS: B
Intersection Capacity Utilization 42.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Fullerton Road & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	20	707	338	225	339	2	157	111	3	18
v/c Ratio	0.12	0.52	0.41	0.67	0.28	0.00	0.53	0.19	0.01	0.02
Control Delay	25.9	16.4	4.1	33.5	8.4	0.0	25.0	0.7	15.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	16.4	4.1	33.5	8.4	0.0	25.0	0.7	15.5	0.1
Queue Length 50th (ft)	6	94	0	66	41	0	44	0	1	0
Queue Length 95th (ft)	16	101	3	89	90	0	56	0	4	0
Internal Link Dist (ft)		1255			1230			2401		559
Turn Bay Length (ft)			170	150			80			
Base Capacity (vph)	172	1357	815	361	1213	1069	487	754	447	885
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.52	0.41	0.62	0.28	0.00	0.32	0.15	0.01	0.02

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	12	431	206	137	207	1	96	0	68	2	0	11
Future Volume (veh/h)	12	431	206	137	207	1	96	0	68	2	0	11
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	20	707	338	225	339	2	157	0	111	3	0	18
Adj No. of Lanes	1	2	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	43	1353	605	283	964	819	378	0	272	292	0	272
Arrive On Green	0.02	0.38	0.38	0.16	0.52	0.52	0.17	0.00	0.17	0.17	0.00	0.17
Sat Flow, veh/h	1774	3539	1583	1774	1863	1583	1389	0	1583	1277	0	1583
Grp Volume(v), veh/h	20	707	338	225	339	2	157	0	111	3	0	18
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1863	1583	1389	0	1583	1277	0	1583
Q Serve(g_s), s	0.5	7.3	7.9	5.7	5.1	0.0	5.0	0.0	2.9	0.1	0.0	0.4
Cycle Q Clear(g_c), s	0.5	7.3	7.9	5.7	5.1	0.0	5.5	0.0	2.9	3.0	0.0	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	43	1353	605	283	964	819	378	0	272	292	0	272
V/C Ratio(X)	0.46	0.52	0.56	0.80	0.35	0.00	0.42	0.00	0.41	0.01	0.00	0.07
Avail Cap(c_a), veh/h	188	1353	605	396	964	819	671	0	605	561	0	605
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.7	11.2	11.4	19.1	6.7	5.5	18.6	0.0	17.4	18.7	0.0	16.3
Incr Delay (d2), s/veh	7.4	1.4	3.7	7.4	1.0	0.0	0.7	0.0	1.0	0.0	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	3.8	4.0	3.4	2.8	0.0	2.0	0.0	1.3	0.0	0.0	0.2
LnGrp Delay(d),s/veh	30.1	12.7	15.1	26.5	7.7	5.5	19.4	0.0	18.4	18.7	0.0	16.4
LnGrp LOS	C	B	B	C	A	A	B		B	B		B
Approach Vol, veh/h		1065			566			268			21	
Approach Delay, s/veh		13.8			15.2			18.9			16.8	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.7	28.9		12.6	12.0	22.5		12.6
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	10.5	18.0		18.0
Max Q Clear Time (g_c+I1), s	2.5	7.1		7.5	7.7	9.9		5.0
Green Ext Time (p_c), s	0.0	1.8		0.8	0.2	3.8		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		14.9
HCM 2010 LOS		B

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.990			0.995			0.876			0.967	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3504	0	1770	3522	0	1770	1632	0	1770	1801	0
Flt Permitted	0.950			0.950			0.684			0.385		
Satd. Flow (perm)	1770	3504	0	1770	3522	0	1274	1632	0	717	1801	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			7			358			22	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

Intersection Summary	
Area Type:	Other

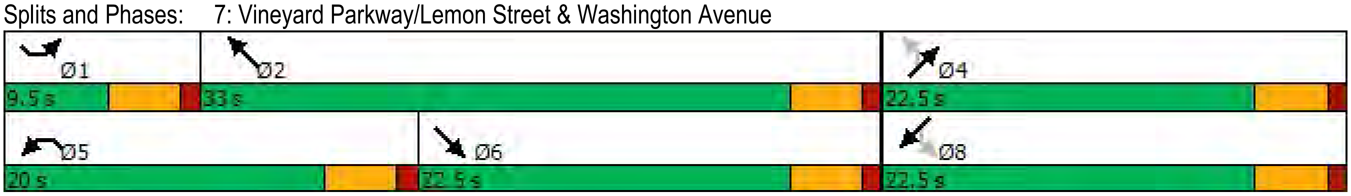
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	12	564	41	361	274	10	40	69	329	13	81	23
Future Volume (vph)	12	564	41	361	274	10	40	69	329	13	81	23
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	13	613	45	392	298	11	43	75	358	14	88	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	658	0	392	309	0	43	433	0	14	113	0

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	12	564	361	274	40	69	13	81
Future Volume (vph)	12	564	361	274	40	69	13	81
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases					4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	22.5	20.0	33.0	22.5	22.5	22.5	22.5
Total Split (%)	14.6%	34.6%	30.8%	50.8%	34.6%	34.6%	34.6%	34.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	5.0	18.1	15.3	36.3	10.4	10.4	10.4	10.4
Actuated g/C Ratio	0.09	0.32	0.27	0.63	0.18	0.18	0.18	0.18
v/c Ratio	0.08	0.59	0.83	0.14	0.19	0.74	0.11	0.33
Control Delay	27.9	19.8	39.6	6.1	21.0	13.1	20.5	19.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	19.8	39.6	6.1	21.0	13.1	20.5	19.1
LOS	C	B	D	A	C	B	C	B
Approach Delay		20.0		24.8		13.8		19.3
Approach LOS		B		C		B		B

Intersection Summary	
Cycle Length: 65	
Actuated Cycle Length: 57.4	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 20.2	Intersection LOS: C
Intersection Capacity Utilization 72.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	13	658	392	309	43	433	14	113
v/c Ratio	0.08	0.59	0.83	0.14	0.19	0.74	0.11	0.33
Control Delay	27.9	19.8	39.6	6.1	21.0	13.1	20.5	19.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	19.8	39.6	6.1	21.0	13.1	20.5	19.1
Queue Length 50th (ft)	4	94	122	15	13	22	4	27
Queue Length 95th (ft)	20	172	#305	60	35	96	17	63
Internal Link Dist (ft)		1230		2572		2575		1085
Turn Bay Length (ft)	150		255		160		150	
Base Capacity (vph)	155	1114	481	2230	402	760	226	583
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.59	0.81	0.14	0.11	0.57	0.06	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	12	564	41	361	274	10	40	69	329	13	81	23
Future Volume (veh/h)	12	564	41	361	274	10	40	69	329	13	81	23
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	13	613	45	392	298	11	43	75	358	14	88	25
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	29	926	68	423	1738	64	402	78	372	124	387	110
Arrive On Green	0.02	0.28	0.28	0.24	0.50	0.50	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1774	3344	245	1774	3482	128	1275	282	1344	951	1396	397
Grp Volume(v), veh/h	13	324	334	392	151	158	43	0	433	14	0	113
Grp Sat Flow(s),veh/h/ln	1774	1770	1819	1774	1770	1840	1275	0	1626	951	0	1793
Q Serve(g_s), s	0.5	10.5	10.6	14.0	3.0	3.1	1.8	0.0	17.1	0.9	0.0	3.2
Cycle Q Clear(g_c), s	0.5	10.5	10.6	14.0	3.0	3.1	4.9	0.0	17.1	18.0	0.0	3.2
Prop In Lane	1.00		0.13	1.00		0.07	1.00		0.83	1.00		0.22
Lane Grp Cap(c), veh/h	29	490	504	423	884	919	402	0	450	124	0	496
V/C Ratio(X)	0.46	0.66	0.66	0.93	0.17	0.17	0.11	0.00	0.96	0.11	0.00	0.23
Avail Cap(c_a), veh/h	136	490	504	423	884	919	402	0	450	124	0	496
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.7	20.8	20.8	24.2	8.9	8.9	20.0	0.0	23.2	32.0	0.0	18.1
Incr Delay (d2), s/veh	10.9	6.9	6.7	26.4	0.4	0.4	0.1	0.0	32.7	0.4	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	6.1	6.2	10.0	1.6	1.6	0.6	0.0	11.7	0.3	0.0	1.6
LnGrp Delay(d),s/veh	42.6	27.7	27.5	50.6	9.3	9.3	20.1	0.0	55.8	32.4	0.0	18.4
LnGrp LOS	D	C	C	D	A	A	C		E	C		B
Approach Vol, veh/h		671			701			476			127	
Approach Delay, s/veh		27.9			32.4			52.6			19.9	
Approach LOS		C			C			D			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.5	37.0		22.5	20.0	22.5		22.5
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	28.5		18.0	15.5	18.0		18.0
Max Q Clear Time (g_c+I1), s	2.5	5.1		19.1	16.0	12.6		20.0
Green Ext Time (p_c), s	0.0	1.8		0.0	0.0	1.9		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	34.9
HCM 2010 LOS	C

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.980				0.850		0.984				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1825	0	1770	1863	1583	1770	1833	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1825	0	1770	1863	1583	1770	1833	0	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				205		7				453
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	721	249	37	3	269	65	58	51	6	59	47	385
Future Volume (vph)	721	249	37	3	269	65	58	51	6	59	47	385
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	848	293	44	4	316	76	68	60	7	69	55	453
Shared Lane Traffic (%)												
Lane Group Flow (vph)	848	337	0	4	316	76	68	67	0	69	55	453

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	721	249	3	269	65	58	51	59	47	385
Future Volume (vph)	721	249	3	269	65	58	51	59	47	385
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	25.3	38.5	9.5	22.7	22.7	9.5	22.5	9.5	22.5	25.3
Total Split (%)	31.6%	48.1%	11.9%	28.4%	28.4%	11.9%	28.1%	11.9%	28.1%	31.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	20.2	43.5	5.2	18.9	18.9	5.2	7.7	5.2	7.7	20.2
Actuated g/C Ratio	0.32	0.69	0.08	0.30	0.30	0.08	0.12	0.08	0.12	0.32
v/c Ratio	0.77	0.27	0.03	0.56	0.12	0.47	0.29	0.47	0.24	0.56
Control Delay	27.2	7.8	31.7	26.6	0.4	43.7	28.9	44.1	30.4	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.2	7.8	31.7	26.6	0.4	43.7	28.9	44.1	30.4	5.3
LOS	C	A	C	C	A	D	C	D	C	A
Approach Delay		21.7		21.6			36.4		12.4	
Approach LOS		C		C			D		B	

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 62.7	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 20.2	Intersection LOS: C
Intersection Capacity Utilization 55.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 8: Kalmia Street & Washington Avenue

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	848	337	4	316	76	68	67	69	55	453
v/c Ratio	0.77	0.27	0.03	0.56	0.12	0.47	0.29	0.47	0.24	0.56
Control Delay	27.2	7.8	31.7	26.6	0.4	43.7	28.9	44.1	30.4	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.2	7.8	31.7	26.6	0.4	43.7	28.9	44.1	30.4	5.3
Queue Length 50th (ft)	172	55	2	120	0	29	24	29	22	0
Queue Length 95th (ft)	#240	137	10	195	0	#74	55	#75	50	50
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	1184	1268	146	562	621	146	552	146	556	842
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.27	0.03	0.56	0.12	0.47	0.12	0.47	0.10	0.54

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	721	249	37	3	269	65	58	51	6	59	47	385
Future Volume (veh/h)	721	249	37	3	269	65	58	51	6	59	47	385
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	848	293	44	4	316	76	68	60	7	69	55	453
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	1
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	908	774	116	9	430	365	87	373	43	88	425	779
Arrive On Green	0.26	0.49	0.49	0.01	0.23	0.23	0.05	0.23	0.23	0.05	0.23	0.23
Sat Flow, veh/h	3442	1583	238	1774	1863	1583	1774	1638	191	1774	1863	1583
Grp Volume(v), veh/h	848	0	337	4	316	76	68	0	67	69	55	453
Grp Sat Flow(s),veh/h/ln	1721	0	1821	1774	1863	1583	1774	0	1829	1774	1863	1583
Q Serve(g_s), s	19.0	0.0	9.2	0.2	12.4	3.1	3.0	0.0	2.3	3.0	1.9	16.1
Cycle Q Clear(g_c), s	19.0	0.0	9.2	0.2	12.4	3.1	3.0	0.0	2.3	3.0	1.9	16.1
Prop In Lane	1.00		0.13	1.00		1.00	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	908	0	891	9	430	365	87	0	416	88	425	779
V/C Ratio(X)	0.93	0.00	0.38	0.42	0.74	0.21	0.78	0.00	0.16	0.78	0.13	0.58
Avail Cap(c_a), veh/h	908	0	891	112	430	365	112	0	417	112	425	779
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.4	0.0	12.6	39.1	28.1	24.5	37.1	0.0	24.4	37.1	24.2	14.3
Incr Delay (d2), s/veh	16.3	0.0	1.2	27.4	10.7	1.3	22.7	0.0	0.2	23.3	0.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	0.0	4.9	0.2	7.6	1.5	2.0	0.0	1.2	2.0	1.0	7.2
LnGrp Delay(d),s/veh	44.7	0.0	13.9	66.5	38.8	25.8	59.8	0.0	24.6	60.3	24.3	15.4
LnGrp LOS	D		B	E	D	C	E		C	E	C	B
Approach Vol, veh/h		1185			396			135			577	
Approach Delay, s/veh		35.9			36.6			42.3			21.6	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.3	22.7	8.4	22.4	4.9	43.1	8.4	22.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	20.8	18.2	5.0	18.0	5.0	34.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	21.0	14.4	5.0	4.3	2.2	11.2	5.0	18.1
Green Ext Time (p_c), s	0.0	0.8	0.0	0.2	0.0	2.1	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	32.8
HCM 2010 LOS	C

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	60		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.997						0.912				0.850
Flt Protected				0.950				0.983			0.950	
Satd. Flow (prot)	0	1857	0	1770	1863	0	0	1670	0	0	1770	1583
Flt Permitted				0.950				0.983			0.950	
Satd. Flow (perm)	0	1857	0	1770	1863	0	0	1670	0	0	1770	1583
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1045			237			351			183	
Travel Time (s)		23.8			5.4			8.0			4.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	0	282	6	6	245	0	7	0	13	121	0	61
Future Volume (vph)	0	282	6	6	245	0	7	0	13	121	0	61
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	366	8	8	318	0	9	0	17	157	0	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	374	0	8	318	0	0	26	0	0	157	79

Intersection Summary

Intersection	
Int Delay, s/veh	5.3

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	282	6	6	245	0	7	0	13	121	0	61
Future Vol, veh/h	0	282	6	6	245	0	7	0	13	121	0	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	60	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	366	8	8	318	0	9	0	17	157	0	79

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	374	0	0	744	704	370	713	708	318
Stage 1	-	-	-	-	-	-	370	370	-	334	334	-
Stage 2	-	-	-	-	-	-	374	334	-	379	374	-
Critical Hdwy	-	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1184	-	0	331	361	676	347	360	723
Stage 1	0	-	-	-	-	0	650	620	-	680	643	-
Stage 2	0	-	-	-	-	0	647	643	-	643	618	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1184	-	-	293	358	676	337	357	723
Mov Cap-2 Maneuver	-	-	-	-	-	-	293	358	-	337	357	-
Stage 1	-	-	-	-	-	-	650	620	-	680	638	-
Stage 2	-	-	-	-	-	-	572	638	-	627	618	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	0.2	13.2	20
HCM LOS			B	C

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	464	1184	-	-	-	337	723
HCM Lane V/C Ratio	0.056	0.007	-	-	-	0.466	0.11
HCM Control Delay (s)	13.2	8.1	-	-	-	24.7	10.6
HCM Lane LOS	B	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.2	0	-	-	-	2.4	0.4

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.992	
Flt Protected				0.971		
Satd. Flow (prot)	1863	0	0	1809	1848	0
Flt Permitted				0.971		
Satd. Flow (perm)	1863	0	0	1809	1848	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	112			181	2481	
Travel Time (s)	2.5			4.1	56.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	0	0	270	183	48	3
Future Volume (vph)	0	0	270	183	48	3
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.48	0.48	0.48	0.48	0.48	0.48
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	0	0	563	381	100	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	944	106	0
Intersection Summary						

Intersection						
Int Delay, s/veh	4.8					

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	0	0	270	183	48	3
Future Vol, veh/h	0	0	270	183	48	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	48	48	48	48	48	48
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	563	381	100	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1610	103	106	0	-	0
Stage 1	103	-	-	-	-	-
Stage 2	1507	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	115	952	1485	-	-	-
Stage 1	921	-	-	-	-	-
Stage 2	202	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	60	952	1485	-	-	-
Mov Cap-2 Maneuver	60	-	-	-	-	-
Stage 1	478	-	-	-	-	-
Stage 2	202	-	-	-	-	-

Approach	SE		NE		SW	
HCM Control Delay, s	0		5.3		0	
HCM LOS	A					

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	1485	-	-	-	-
HCM Lane V/C Ratio	0.379	-	-	-	-
HCM Control Delay (s)	8.9	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	1.8	-	-	-	-

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			1	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.865		
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	0	1611	1770	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	0	1611	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		340	1045		2657	
Travel Time (s)		7.7	23.8		60.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	0	0	0	61	49	0
Future Volume (vph)	0	0	0	61	49	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	0	0	74	60	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	74	60	0
Intersection Summary						

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↰		↱	↰	
Traffic Vol, veh/h	0	0	0	61	49	0
Future Vol, veh/h	0	0	0	61	49	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	74	60	0
Number of Lanes	0	1	0	1	1	0

Approach	SE	NW	SW
Opposing Approach	NW	SE	
Opposing Lanes	1	1	0
Conflicting Approach Left	SW		NW
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SW	SE
Conflicting Lanes Right	0	1	1
HCM Control Delay	0	6.7	7.6
HCM LOS	-	A	A

Lane	NWLn1	SELn1	SWLn1
Vol Left, %	0%	0%	100%
Vol Thru, %	0%	100%	0%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	61	0	49
LT Vol	0	0	49
Through Vol	0	0	0
RT Vol	61	0	0
Lane Flow Rate	74	0	60
Geometry Grp	1	1	1
Degree of Util (X)	0.071	0	0.071
Departure Headway (Hd)	3.438	4.095	4.264
Convergence, Y/N	Yes	Yes	Yes
Cap	1038	0	843
Service Time	1.473	2.135	2.274
HCM Lane V/C Ratio	0.071	0	0.071
HCM Control Delay	6.7	7.1	7.6
HCM Lane LOS	A	N	A
HCM 95th-tile Q	0.2	0	0.2

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	60			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.920			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1714	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1714	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		237	1361		181	
Travel Time (s)		5.4	30.9		4.1	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	22	73	33	48	2	0
Future Volume (vph)	22	73	33	48	2	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	27	89	40	59	2	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	89	99	0	2	0

Intersection Summary

Intersection	
Int Delay, s/veh	1

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	22	73	33	48	2	0
Future Vol, veh/h	22	73	33	48	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	60	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	89	40	59	2	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	99	0	-	0	213	70
Stage 1	-	-	-	-	70	-
Stage 2	-	-	-	-	143	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1494	-	-	-	775	993
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	884	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1494	-	-	-	761	993
Mov Cap-2 Maneuver	-	-	-	-	761	-
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	884	-

Approach	SE	NW	SW
HCM Control Delay, s	1.7	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1494	-	761
HCM Lane V/C Ratio	-	-	0.018	-	0.003
HCM Control Delay (s)	-	-	7.5	-	9.7
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	77	3	2	21	21	111
Future Volume (vph)	77	3	2	21	21	111
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	100	4	3	27	27	144
Shared Lane Traffic (%)						
Lane Group Flow (vph)	100	4	3	27	27	144

Intersection Summary

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations	↰	↱	↰	↑	↑	↱
Traffic Vol, veh/h	77	3	2	21	21	111
Future Vol, veh/h	77	3	2	21	21	111
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	100	4	3	27	27	144
Number of Lanes	1	1	1	1	1	1

Approach	SE	NE	SW
Opposing Approach		SW	NE
Opposing Lanes	0	2	2
Conflicting Approach Left	SW	SE	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NE		SE
Conflicting Lanes Right	2	0	2
HCM Control Delay	9.1	7.9	7.7
HCM LOS	A	A	A

Lane	NELn1	NELn2	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	2	21	77	3	21	111
LT Vol	2	0	77	0	0	0
Through Vol	0	21	0	0	21	0
RT Vol	0	0	0	3	0	111
Lane Flow Rate	3	27	100	4	27	144
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.004	0.038	0.152	0.005	0.037	0.167
Departure Headway (Hd)	5.467	4.965	5.475	4.273	4.862	4.16
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	657	724	657	839	740	866
Service Time	3.178	2.676	3.192	1.989	2.57	1.867
HCM Lane V/C Ratio	0.005	0.037	0.152	0.005	0.036	0.166
HCM Control Delay	8.2	7.9	9.2	7	7.8	7.7
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0	0.1	0.5	0	0.1	0.6

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	85		0	150		0	150		0	250		100
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.992				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3511	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3511	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				143			213			205
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1461			2630			1510			1533	
Travel Time (s)		33.2			59.8			34.3			34.8	

Intersection Summary	
Area Type:	Other

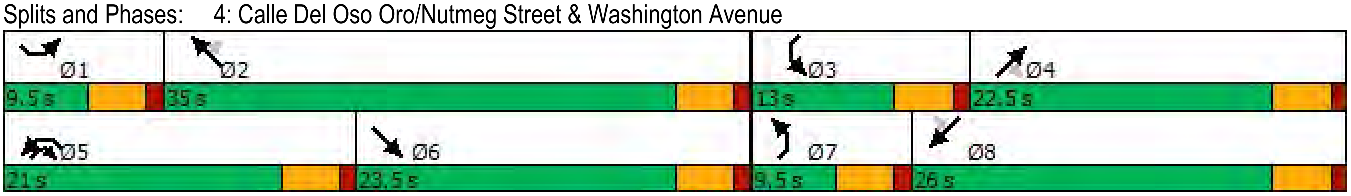
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	57	224	12	285	495	118	16	87	202	123	247	178
Future Volume (vph)	57	224	12	285	495	118	16	87	202	123	247	178
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	60	236	13	300	521	124	17	92	213	129	260	187
Shared Lane Traffic (%)												
Lane Group Flow (vph)	60	249	0	300	521	124	17	92	213	129	260	187

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	57	224	285	495	118	16	87	202	123	247	178
Future Volume (vph)	57	224	285	495	118	16	87	202	123	247	178
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	1	6	5	2		7	4	5	3	8	
Permitted Phases					2			4			8
Detector Phase	1	6	5	2	2	7	4	5	3	8	8
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	9.5	22.5	22.5
Total Split (s)	9.5	23.5	21.0	35.0	35.0	9.5	22.5	21.0	13.0	26.0	26.0
Total Split (%)	11.9%	29.4%	26.3%	43.8%	43.8%	11.9%	28.1%	26.3%	16.3%	32.5%	32.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	5.1	19.6	15.2	32.1	32.1	5.1	10.6	15.2	8.2	18.7	18.7
Actuated g/C Ratio	0.07	0.28	0.22	0.47	0.47	0.07	0.15	0.22	0.12	0.27	0.27
v/c Ratio	0.46	0.25	0.77	0.60	0.15	0.13	0.32	0.41	0.61	0.51	0.32
Control Delay	46.7	21.5	42.2	20.3	2.9	35.9	30.7	7.0	46.0	25.7	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.7	21.5	42.2	20.3	2.9	35.9	30.7	7.0	46.0	25.7	4.6
LOS	D	C	D	C	A	D	C	A	D	C	A
Approach Delay		26.4		25.0			15.3			23.4	
Approach LOS		C		C			B			C	

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 68.9	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 23.3	Intersection LOS: C
Intersection Capacity Utilization 55.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 4: Calle Del Oso Oro/Nutmeg Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group Flow (vph)	60	249	300	521	124	17	92	213	129	260	187
v/c Ratio	0.46	0.25	0.77	0.60	0.15	0.13	0.32	0.41	0.61	0.51	0.32
Control Delay	46.7	21.5	42.2	20.3	2.9	35.9	30.7	7.0	46.0	25.7	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.7	21.5	42.2	20.3	2.9	35.9	30.7	7.0	46.0	25.7	4.6
Queue Length 50th (ft)	26	43	121	172	0	7	38	0	54	90	0
Queue Length 95th (ft)	#80	84	#274	336	25	28	77	54	#143	182	39
Internal Link Dist (ft)		1381		2550			1430			1453	
Turn Bay Length (ft)	85		150			150			250		100
Base Capacity (vph)	131	1003	432	869	814	131	496	547	222	602	651
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.25	0.69	0.60	0.15	0.13	0.19	0.39	0.58	0.43	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	57	224	12	285	495	118	16	87	202	123	247	178
Future Volume (veh/h)	57	224	12	285	495	118	16	87	202	123	247	178
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	60	236	13	300	521	124	17	92	213	129	260	187
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	88	1031	56	349	836	711	36	268	539	164	402	342
Arrive On Green	0.05	0.30	0.30	0.20	0.45	0.45	0.02	0.14	0.14	0.09	0.22	0.22
Sat Flow, veh/h	1774	3412	187	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	60	122	127	300	521	124	17	92	213	129	260	187
Grp Sat Flow(s),veh/h/ln	1774	1770	1830	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	2.3	3.5	3.5	11.1	14.5	3.2	0.6	3.0	7.0	4.8	8.6	7.1
Cycle Q Clear(g_c), s	2.3	3.5	3.5	11.1	14.5	3.2	0.6	3.0	7.0	4.8	8.6	7.1
Prop In Lane	1.00		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	88	534	553	349	836	711	36	268	539	164	402	342
V/C Ratio(X)	0.68	0.23	0.23	0.86	0.62	0.17	0.47	0.34	0.39	0.79	0.65	0.55
Avail Cap(c_a), veh/h	131	534	553	431	836	711	131	494	731	222	589	501
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.7	17.8	17.8	26.4	14.3	11.2	32.9	26.2	17.1	30.2	24.3	23.7
Incr Delay (d2), s/veh	8.7	1.0	1.0	13.6	3.5	0.5	9.4	0.8	0.5	12.3	1.7	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	1.8	1.9	6.7	8.2	1.5	0.4	1.6	3.1	2.9	4.6	3.2
LnGrp Delay(d),s/veh	40.5	18.8	18.8	40.0	17.8	11.7	42.3	27.0	17.5	42.5	26.0	25.0
LnGrp LOS	D	B	B	D	B	B	D	C	B	D	C	C
Approach Vol, veh/h		309			945			322			576	
Approach Delay, s/veh		23.0			24.0			21.5			29.4	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	35.0	10.8	14.3	17.9	25.0	5.9	19.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.0	30.5	8.5	18.0	16.5	19.0	5.0	21.5
Max Q Clear Time (g_c+I1), s	4.3	16.5	6.8	9.0	13.1	5.5	2.6	10.6
Green Ext Time (p_c), s	0.0	3.3	0.0	0.8	0.3	1.1	0.0	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	24.9
HCM 2010 LOS	C

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		280	300		0	350		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.998			0.933			0.912	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3532	0	1770	1738	0	1770	3228	0
Flt Permitted	0.950			0.950			0.477			0.694		
Satd. Flow (perm)	1770	3539	1583	1770	3532	0	889	1738	0	1293	3228	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			176		2			44			75	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2630			1335			2657			1296	
Travel Time (s)		59.8			30.3			60.4			29.5	

Intersection Summary	
Area Type:	Other

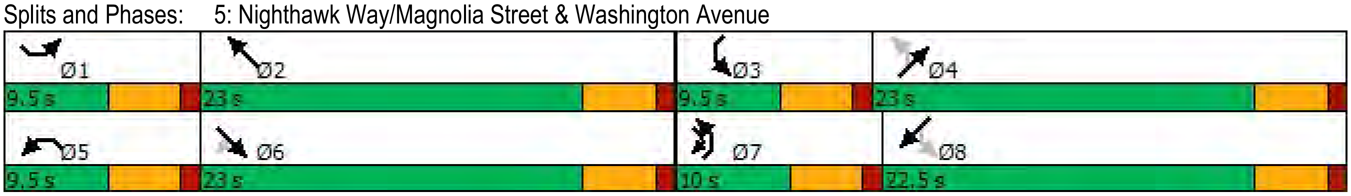
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	36	422	107	54	533	8	105	51	42	9	50	71
Future Volume (vph)	36	422	107	54	533	8	105	51	42	9	50	71
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	38	444	113	57	561	8	111	54	44	9	53	75
Shared Lane Traffic (%)												
Lane Group Flow (vph)	38	444	113	57	569	0	111	98	0	9	128	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	36	422	107	54	533	105	51	9	50
Future Volume (vph)	36	422	107	54	533	105	51	9	50
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+pt	NA	pm+pt	NA
Protected Phases	1	6	7	5	2	7	4	3	8
Permitted Phases			6			4		8	
Detector Phase	1	6	7	5	2	7	4	3	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	9.5	23.0	10.0	9.5	23.0	10.0	23.0	9.5	22.5
Total Split (%)	14.6%	35.4%	15.4%	14.6%	35.4%	15.4%	35.4%	14.6%	34.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	None	Max	None	None	None	None
Act Effct Green (s)	5.1	24.0	5.6	5.1	25.7	13.7	12.8	10.5	6.8
Actuated g/C Ratio	0.10	0.49	0.11	0.10	0.52	0.28	0.26	0.21	0.14
v/c Ratio	0.21	0.26	0.34	0.31	0.31	0.32	0.20	0.03	0.25
Control Delay	26.1	12.4	4.6	28.0	11.5	15.7	11.8	13.0	12.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	12.4	4.6	28.0	11.5	15.7	11.8	13.0	12.0
LOS	C	B	A	C	B	B	B	B	B
Approach Delay		11.8			13.0		13.9		12.1
Approach LOS		B			B		B		B

Intersection Summary	
Cycle Length: 65	
Actuated Cycle Length: 49	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.34	
Intersection Signal Delay: 12.6	Intersection LOS: B
Intersection Capacity Utilization 44.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Nighthawk Way/Magnolia Street & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	38	444	113	57	569	111	98	9	128
v/c Ratio	0.21	0.26	0.34	0.31	0.31	0.32	0.20	0.03	0.25
Control Delay	26.1	12.4	4.6	28.0	11.5	15.7	11.8	13.0	12.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	12.4	4.6	28.0	11.5	15.7	11.8	13.0	12.0
Queue Length 50th (ft)	11	53	0	17	47	26	12	2	7
Queue Length 95th (ft)	36	93	17	48	120	55	50	10	27
Internal Link Dist (ft)		2550			1255		2577		1216
Turn Bay Length (ft)	150		280	300		350		150	
Base Capacity (vph)	184	1731	337	184	1854	350	698	326	1260
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.26	0.34	0.31	0.31	0.32	0.14	0.03	0.10

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	36	422	107	54	533	8	105	51	42	9	50	71
Future Volume (veh/h)	36	422	107	54	533	8	105	51	42	9	50	71
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	38	444	113	57	561	8	111	54	44	9	53	75
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	74	1370	741	99	1433	20	363	161	131	301	177	158
Arrive On Green	0.04	0.39	0.39	0.06	0.40	0.40	0.08	0.17	0.17	0.01	0.10	0.10
Sat Flow, veh/h	1774	3539	1583	1774	3572	51	1774	951	775	1774	1770	1583
Grp Volume(v), veh/h	38	444	113	57	278	291	111	0	98	9	53	75
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1854	1774	0	1726	1774	1770	1583
Q Serve(g_s), s	1.0	4.2	2.0	1.5	5.3	5.3	2.6	0.0	2.4	0.2	1.3	2.1
Cycle Q Clear(g_c), s	1.0	4.2	2.0	1.5	5.3	5.3	2.6	0.0	2.4	0.2	1.3	2.1
Prop In Lane	1.00		1.00	1.00		0.03	1.00		0.45	1.00		1.00
Lane Grp Cap(c), veh/h	74	1370	741	99	710	744	363	0	291	301	177	158
V/C Ratio(X)	0.52	0.32	0.15	0.58	0.39	0.39	0.31	0.00	0.34	0.03	0.30	0.47
Avail Cap(c_a), veh/h	186	1370	741	186	710	744	424	0	668	465	667	596
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.4	10.3	7.3	22.0	10.2	10.2	16.5	0.0	17.5	18.9	20.0	20.3
Incr Delay (d2), s/veh	5.5	0.6	0.4	5.3	1.6	1.5	0.5	0.0	0.7	0.0	0.9	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	2.2	0.9	0.9	2.9	3.0	1.3	0.0	1.2	0.1	0.7	1.0
LnGrp Delay(d),s/veh	28.0	10.9	7.7	27.3	11.8	11.7	17.0	0.0	18.2	19.0	20.9	22.5
LnGrp LOS	C	B	A	C	B	B	B		B	B	C	C
Approach Vol, veh/h		595			626			209			137	
Approach Delay, s/veh		11.4			13.2			17.5			21.6	
Approach LOS		B			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.5	23.7	5.1	12.6	7.2	23.0	8.4	9.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.0	18.5	5.0	18.5	5.0	18.5	5.5	18.0
Max Q Clear Time (g_c+I1), s	3.0	7.3	2.2	4.4	3.5	6.2	4.6	4.1
Green Ext Time (p_c), s	0.0	2.6	0.0	0.4	0.0	2.7	0.0	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	13.8
HCM 2010 LOS	B

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		170	150		0	80		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	1583	0	1770	1583	0
Flt Permitted	0.950			0.950								
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1863	1583	0	1863	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			109		363			307	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1335			1310			2481			639	
Travel Time (s)		30.3			29.8			56.4			14.5	

Intersection Summary	
Area Type:	Other

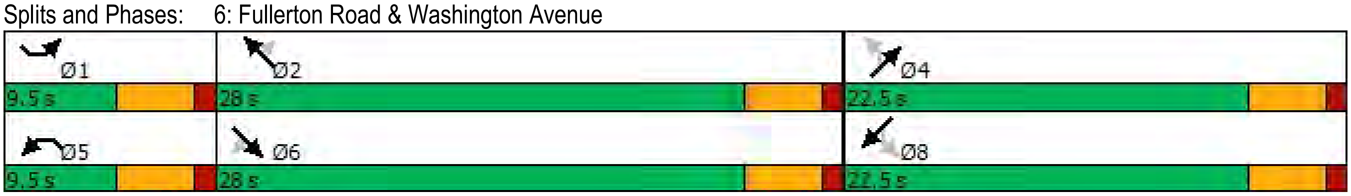
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	3	476	10	6	585	1	10	0	3	1	0	4
Future Volume (vph)	3	476	10	6	585	1	10	0	3	1	0	4
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	496	10	6	609	1	10	0	3	1	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	496	10	6	609	1	10	3	0	1	4	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Configurations										
Traffic Volume (vph)	3	476	10	6	585	1	10	0	1	0
Future Volume (vph)	3	476	10	6	585	1	10	0	1	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	1	6		5	2			4		8
Permitted Phases			6			2	4		8	
Detector Phase	1	6	6	5	2	2	4	4	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	28.0	28.0	9.5	28.0	28.0	22.5	22.5	22.5	22.5
Total Split (%)	15.8%	46.7%	46.7%	15.8%	46.7%	46.7%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	5.0	39.6	39.6	5.0	39.6	39.6	5.9	5.9	5.8	5.8
Actuated g/C Ratio	0.11	0.90	0.90	0.11	0.90	0.90	0.13	0.13	0.13	0.13
v/c Ratio	0.01	0.16	0.01	0.03	0.36	0.00	0.04	0.01	0.00	0.01
Control Delay	18.7	2.6	0.0	19.0	4.2	0.0	17.8	0.0	18.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.7	2.6	0.0	19.0	4.2	0.0	17.8	0.0	18.0	0.0
LOS	B	A	A	B	A	A	B	A	B	A
Approach Delay		2.6			4.4			13.7		3.6
Approach LOS		A			A			B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 44.2	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.36	
Intersection Signal Delay: 3.7	Intersection LOS: A
Intersection Capacity Utilization 45.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Fullerton Road & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	3	496	10	6	609	1	10	3	1	4
v/c Ratio	0.01	0.16	0.01	0.03	0.36	0.00	0.04	0.01	0.00	0.01
Control Delay	18.7	2.6	0.0	19.0	4.2	0.0	17.8	0.0	18.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.7	2.6	0.0	19.0	4.2	0.0	17.8	0.0	18.0	0.0
Queue Length 50th (ft)	1	0	0	1	0	0	2	0	0	0
Queue Length 95th (ft)	6	65	0	10	215	0	13	0	4	0
Internal Link Dist (ft)		1255			1230			2401		559
Turn Bay Length (ft)			170	150			80			
Base Capacity (vph)	200	3172	1430	200	1670	1430	761	861	761	828
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.16	0.01	0.03	0.36	0.00	0.01	0.00	0.00	0.00

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	3	476	10	6	585	1	10	0	3	1	0	4
Future Volume (veh/h)	3	476	10	6	585	1	10	0	3	1	0	4
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	3	496	10	6	609	1	10	0	3	1	0	4
Adj No. of Lanes	1	2	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	7	2179	975	14	1154	981	217	0	36	218	0	36
Arrive On Green	0.00	0.62	0.62	0.01	0.62	0.62	0.02	0.00	0.02	0.02	0.00	0.02
Sat Flow, veh/h	1774	3539	1583	1774	1863	1583	1407	0	1583	1408	0	1583
Grp Volume(v), veh/h	3	496	10	6	609	1	10	0	3	1	0	4
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1863	1583	1407	0	1583	1408	0	1583
Q Serve(g_s), s	0.1	2.4	0.1	0.1	7.1	0.0	0.3	0.0	0.1	0.0	0.0	0.1
Cycle Q Clear(g_c), s	0.1	2.4	0.1	0.1	7.1	0.0	0.4	0.0	0.1	0.1	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	7	2179	975	14	1154	981	217	0	36	218	0	36
V/C Ratio(X)	0.41	0.23	0.01	0.42	0.53	0.00	0.05	0.00	0.08	0.00	0.00	0.11
Avail Cap(c_a), veh/h	232	2179	975	232	1154	981	848	0	747	850	0	747
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.0	3.3	2.8	18.8	4.1	2.8	18.5	0.0	18.3	18.3	0.0	18.3
Incr Delay (d2), s/veh	33.3	0.2	0.0	18.3	1.7	0.0	0.1	0.0	1.0	0.0	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.2	0.0	0.1	4.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1
LnGrp Delay(d),s/veh	52.3	3.5	2.9	37.1	5.8	2.8	18.5	0.0	19.2	18.3	0.0	19.6
LnGrp LOS	D	A	A	D	A	A	B		B	B		B
Approach Vol, veh/h		509			616			13			5	
Approach Delay, s/veh		3.8			6.1			18.7			19.4	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.7	28.2		5.4	4.8	28.0		5.4
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	5.0	23.5		18.0
Max Q Clear Time (g_c+I1), s	2.1	9.1		2.4	2.1	4.4		2.1
Green Ext Time (p_c), s	0.0	3.6		0.0	0.0	3.2		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		5.3
HCM 2010 LOS		A

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.990			0.997			0.873			0.935	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3504	0	1770	3529	0	1770	1626	0	1770	1742	0
Flt Permitted	0.950			0.950			0.715			0.714		
Satd. Flow (perm)	1770	3504	0	1770	3529	0	1332	1626	0	1330	1742	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			4			100			28	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

Intersection Summary	
Area Type:	Other

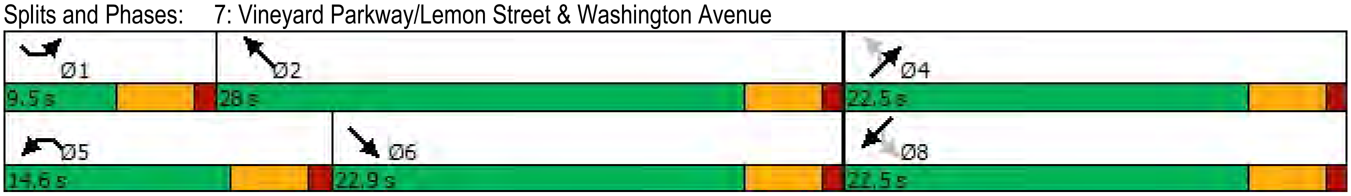
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	13	446	33	127	551	11	29	17	94	10	35	26
Future Volume (vph)	13	446	33	127	551	11	29	17	94	10	35	26
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	14	474	35	135	586	12	31	18	100	11	37	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	509	0	135	598	0	31	118	0	11	65	0

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	13	446	127	551	29	17	10	35
Future Volume (vph)	13	446	127	551	29	17	10	35
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases					4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	22.9	14.6	28.0	22.5	22.5	22.5	22.5
Total Split (%)	15.8%	38.2%	24.3%	46.7%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	5.0	23.9	8.4	32.8	6.8	6.8	6.8	6.8
Actuated g/C Ratio	0.11	0.51	0.18	0.69	0.14	0.14	0.14	0.14
v/c Ratio	0.07	0.29	0.43	0.24	0.16	0.37	0.06	0.24
Control Delay	21.6	10.5	22.2	5.0	20.1	10.2	18.4	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	10.5	22.2	5.0	20.1	10.2	18.4	14.5
LOS	C	B	C	A	C	B	B	B
Approach Delay		10.8		8.2		12.3		15.0
Approach LOS		B		A		B		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 47.2	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.43	
Intersection Signal Delay: 9.9	Intersection LOS: A
Intersection Capacity Utilization 39.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	14	509	135	598	31	118	11	65
v/c Ratio	0.07	0.29	0.43	0.24	0.16	0.37	0.06	0.24
Control Delay	21.6	10.5	22.2	5.0	20.1	10.2	18.4	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	10.5	22.2	5.0	20.1	10.2	18.4	14.5
Queue Length 50th (ft)	4	48	33	24	8	4	3	9
Queue Length 95th (ft)	17	90	77	88	26	38	13	35
Internal Link Dist (ft)		1230		2572		2575		1085
Turn Bay Length (ft)	150		255		160		150	
Base Capacity (vph)	188	1778	380	2451	509	684	508	684
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.29	0.36	0.24	0.06	0.17	0.02	0.10

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	13	446	33	127	551	11	29	17	94	10	35	26
Future Volume (veh/h)	13	446	33	127	551	11	29	17	94	10	35	26
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	14	474	35	135	586	12	31	18	100	11	37	28
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	32	1559	115	176	1942	40	282	30	165	232	118	90
Arrive On Green	0.02	0.47	0.47	0.10	0.55	0.55	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1774	3343	246	1774	3547	73	1331	247	1373	1269	985	746
Grp Volume(v), veh/h	14	250	259	135	292	306	31	0	118	11	0	65
Grp Sat Flow(s),veh/h/ln	1774	1770	1819	1774	1770	1850	1331	0	1620	1269	0	1731
Q Serve(g_s), s	0.3	3.8	3.8	3.2	3.8	3.8	0.9	0.0	3.0	0.4	0.0	1.5
Cycle Q Clear(g_c), s	0.3	3.8	3.8	3.2	3.8	3.8	2.4	0.0	3.0	3.3	0.0	1.5
Prop In Lane	1.00		0.14	1.00		0.04	1.00		0.85	1.00		0.43
Lane Grp Cap(c), veh/h	32	825	848	176	969	1013	282	0	195	232	0	208
V/C Ratio(X)	0.44	0.30	0.30	0.77	0.30	0.30	0.11	0.00	0.61	0.05	0.00	0.31
Avail Cap(c_a), veh/h	207	825	848	417	969	1013	680	0	679	612	0	726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.9	7.1	7.1	18.9	5.3	5.3	18.4	0.0	17.9	19.5	0.0	17.3
Incr Delay (d2), s/veh	9.3	0.9	0.9	6.9	0.8	0.8	0.2	0.0	3.0	0.1	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	2.0	2.1	1.9	2.1	2.2	0.4	0.0	1.5	0.1	0.0	0.8
LnGrp Delay(d),s/veh	30.2	8.1	8.1	25.7	6.1	6.0	18.5	0.0	20.9	19.6	0.0	18.1
LnGrp LOS	C	A	A	C	A	A	B		C	B		B
Approach Vol, veh/h		523			733			149			76	
Approach Delay, s/veh		8.7			9.7			20.4			18.3	
Approach LOS		A			A			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.3	28.0		9.7	8.8	24.5		9.7
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	10.1	18.4		18.0
Max Q Clear Time (g_c+I1), s	2.3	5.8		5.0	5.2	5.8		5.3
Green Ext Time (p_c), s	0.0	3.4		0.5	0.1	2.5		0.2

Intersection Summary		
HCM 2010 Ctrl Delay		10.8
HCM 2010 LOS		B

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.981				0.850		0.985				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1827	0	1770	1863	1583	1770	1835	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1827	0	1770	1863	1583	1770	1835	0	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				164		8				473
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary

Area Type: Other

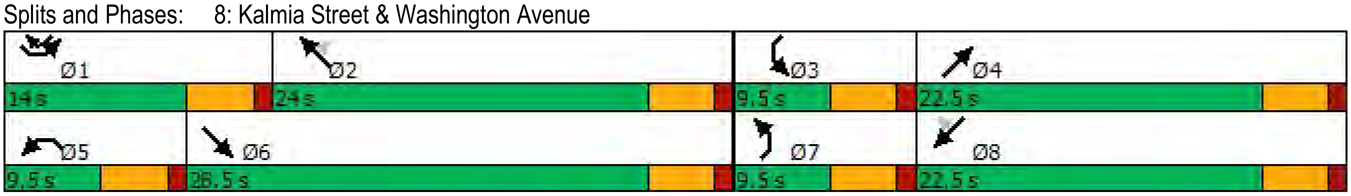
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	405	179	26	5	284	99	44	72	8	79	49	464
Future Volume (vph)	405	179	26	5	284	99	44	72	8	79	49	464
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	413	183	27	5	290	101	45	73	8	81	50	473
Shared Lane Traffic (%)												
Lane Group Flow (vph)	413	210	0	5	290	101	45	81	0	81	50	473
Intersection Summary												

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	405	179	5	284	99	44	72	79	49	464
Future Volume (vph)	405	179	5	284	99	44	72	79	49	464
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	14.0	28.5	9.5	24.0	24.0	9.5	22.5	9.5	22.5	14.0
Total Split (%)	20.0%	40.7%	13.6%	34.3%	34.3%	13.6%	32.1%	13.6%	32.1%	20.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	9.7	34.2	5.2	20.3	20.3	5.2	7.8	5.2	9.6	9.7
Actuated g/C Ratio	0.17	0.61	0.09	0.36	0.36	0.09	0.14	0.09	0.17	0.17
v/c Ratio	0.70	0.19	0.03	0.43	0.15	0.27	0.31	0.49	0.16	0.71
Control Delay	31.9	9.1	26.6	18.6	1.5	31.1	24.8	39.8	23.6	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.9	9.1	26.6	18.6	1.5	31.1	24.8	39.8	23.6	10.3
LOS	C	A	C	B	A	C	C	D	C	B
Approach Delay		24.2		14.4			27.0		15.4	
Approach LOS		C		B			C		B	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 55.8
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 19.1 Intersection LOS: B
Intersection Capacity Utilization 59.1% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 8: Kalmia Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	413	210	5	290	101	45	81	81	50	473
v/c Ratio	0.70	0.19	0.03	0.43	0.15	0.27	0.31	0.49	0.16	0.71
Control Delay	31.9	9.1	26.6	18.6	1.5	31.1	24.8	39.8	23.6	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.9	9.1	26.6	18.6	1.5	31.1	24.8	39.8	23.6	10.3
Queue Length 50th (ft)	74	31	2	82	0	16	24	29	16	0
Queue Length 95th (ft)	#142	94	11	154	10	44	58	#84	43	#111
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	607	1125	164	676	679	164	620	164	624	669
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.19	0.03	0.43	0.15	0.27	0.13	0.49	0.08	0.71

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	405	179	26	5	284	99	44	72	8	79	49	464
Future Volume (veh/h)	405	179	26	5	284	99	44	72	8	79	49	464
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	413	183	27	5	290	101	45	73	8	81	50	473
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	482	668	99	12	535	455	75	411	45	103	494	642
Arrive On Green	0.14	0.42	0.42	0.01	0.29	0.29	0.04	0.25	0.25	0.06	0.27	0.27
Sat Flow, veh/h	3442	1587	234	1774	1863	1583	1774	1650	181	1774	1863	1583
Grp Volume(v), veh/h	413	0	210	5	290	101	45	0	81	81	50	473
Grp Sat Flow(s),veh/h/ln	1721	0	1821	1774	1863	1583	1774	0	1831	1774	1863	1583
Q Serve(g_s), s	8.0	0.0	5.1	0.2	8.9	3.3	1.7	0.0	2.4	3.1	1.4	17.2
Cycle Q Clear(g_c), s	8.0	0.0	5.1	0.2	8.9	3.3	1.7	0.0	2.4	3.1	1.4	17.2
Prop In Lane	1.00		0.13	1.00		1.00	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	482	0	766	12	535	455	75	0	456	103	494	642
V/C Ratio(X)	0.86	0.00	0.27	0.43	0.54	0.22	0.60	0.00	0.18	0.78	0.10	0.74
Avail Cap(c_a), veh/h	482	0	766	131	535	455	131	0	486	131	494	642
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	0.0	12.9	33.6	20.4	18.4	31.9	0.0	20.0	31.5	18.8	17.1
Incr Delay (d2), s/veh	14.2	0.0	0.9	22.5	3.9	1.1	7.6	0.0	0.2	20.8	0.1	4.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	0.0	2.8	0.2	5.2	1.6	1.0	0.0	1.2	2.1	0.7	8.2
LnGrp Delay(d),s/veh	42.8	0.0	13.8	56.1	24.3	19.5	39.5	0.0	20.2	52.4	18.9	21.6
LnGrp LOS	D		B	E	C	B	D		C	D	B	C
Approach Vol, veh/h		623			396			126			604	
Approach Delay, s/veh		33.0			23.5			27.1			25.5	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	24.0	8.5	21.4	4.9	33.1	7.4	22.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.5	19.5	5.0	18.0	5.0	24.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	10.0	10.9	5.1	4.4	2.2	7.1	3.7	19.2
Green Ext Time (p_c), s	0.0	1.3	0.0	0.3	0.0	1.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	27.8
HCM 2010 LOS	C

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	60		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.986						0.932				0.850
Flt Protected				0.950				0.976			0.950	
Satd. Flow (prot)	0	1837	0	1770	1863	0	0	1694	0	0	1770	1583
Flt Permitted				0.950				0.976			0.950	
Satd. Flow (perm)	0	1837	0	1770	1863	0	0	1694	0	0	1770	1583
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1045			237			351			183	
Travel Time (s)		23.8			5.4			8.0			4.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	0	40	5	8	24	0	5	0	5	48	0	29
Future Volume (vph)	0	40	5	8	24	0	5	0	5	48	0	29
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	51	6	10	30	0	6	0	6	61	0	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	57	0	10	30	0	0	12	0	0	61	37

Intersection Summary

Intersection	
Int Delay, s/veh	5.2

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	40	5	8	24	0	5	0	5	48	0	29
Future Vol, veh/h	0	40	5	8	24	0	5	0	5	48	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	60	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	51	6	10	30	0	6	0	6	61	0	37

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	57	0	0	123	104	54	107	107	30
Stage 1	-	-	-	-	-	-	54	54	-	50	50	-
Stage 2	-	-	-	-	-	-	69	50	-	57	57	-
Critical Hdwy	-	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1547	-	0	852	786	1013	872	783	1044
Stage 1	0	-	-	-	-	0	958	850	-	963	853	-
Stage 2	0	-	-	-	-	0	941	853	-	955	847	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1547	-	-	818	781	1013	862	778	1044
Mov Cap-2 Maneuver	-	-	-	-	-	-	818	781	-	862	778	-
Stage 1	-	-	-	-	-	-	958	850	-	963	848	-
Stage 2	-	-	-	-	-	-	902	848	-	949	847	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	1.8	9	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	905	1547	-	-	-	862	1044
HCM Lane V/C Ratio	0.014	0.007	-	-	-	0.07	0.035
HCM Control Delay (s)	9	7.3	-	-	-	9.5	8.6
HCM Lane LOS	A	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	0	-	-	-	0.2	0.1

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.865					
Flt Protected				0.950		
Satd. Flow (prot)	1611	0	0	1770	1863	0
Flt Permitted				0.950		
Satd. Flow (perm)	1611	0	0	1770	1863	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	112			181	2481	
Travel Time (s)	2.5			4.1	56.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	0	2	69	0	0	0
Future Volume (vph)	0	2	69	0	0	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	0	2	85	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2	0	0	85	0	0

Intersection Summary

Intersection	
Int Delay, s/veh	7.2

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	0	2	69	0	0	0
Future Vol, veh/h	0	2	69	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	2	85	0	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	171	1	1	0	-	0
Stage 1	1	-	-	-	-	-
Stage 2	170	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	819	1084	1622	-	-	-
Stage 1	1022	-	-	-	-	-
Stage 2	860	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	776	1084	1622	-	-	-
Mov Cap-2 Maneuver	776	-	-	-	-	-
Stage 1	969	-	-	-	-	-
Stage 2	860	-	-	-	-	-

Approach	SE		NE		SW	
HCM Control Delay, s	8.3		7.3		0	
HCM LOS	A					

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	1622	-	1084	-	-
HCM Lane V/C Ratio	0.053	-	0.002	-	-
HCM Control Delay (s)	7.3	0	8.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0	-	-

Appendix E

MUTCD Signal Warrant Analysis Worksheets

2014 Edition

WARRANT 3, PEAK HOUR
(Urban Areas)

Traffic Conditions = **Existing Conditions - AM**

Major Street Name = **Vineyard Parkway**

Total of Both Approaches (VPH) = **341**

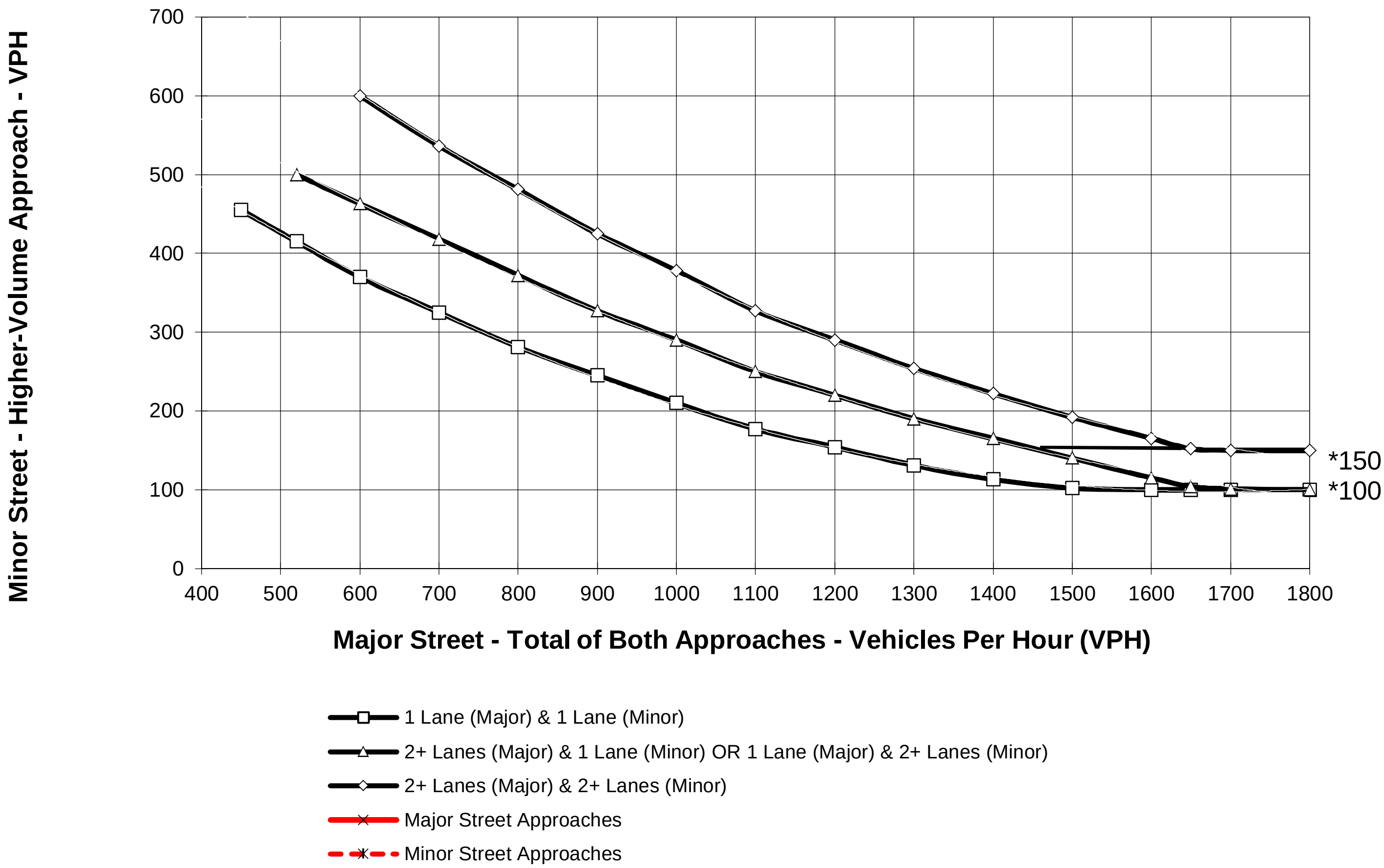
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Hayes Avenue**

High Volume Approach (VPH) = **314**

Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT 3, PEAK HOUR
(Urban Areas)

Traffic Conditions = **Existing Conditions - PM**

Major Street Name = **Vineyard Parkway**

Total of Both Approaches (VPH) = **121**

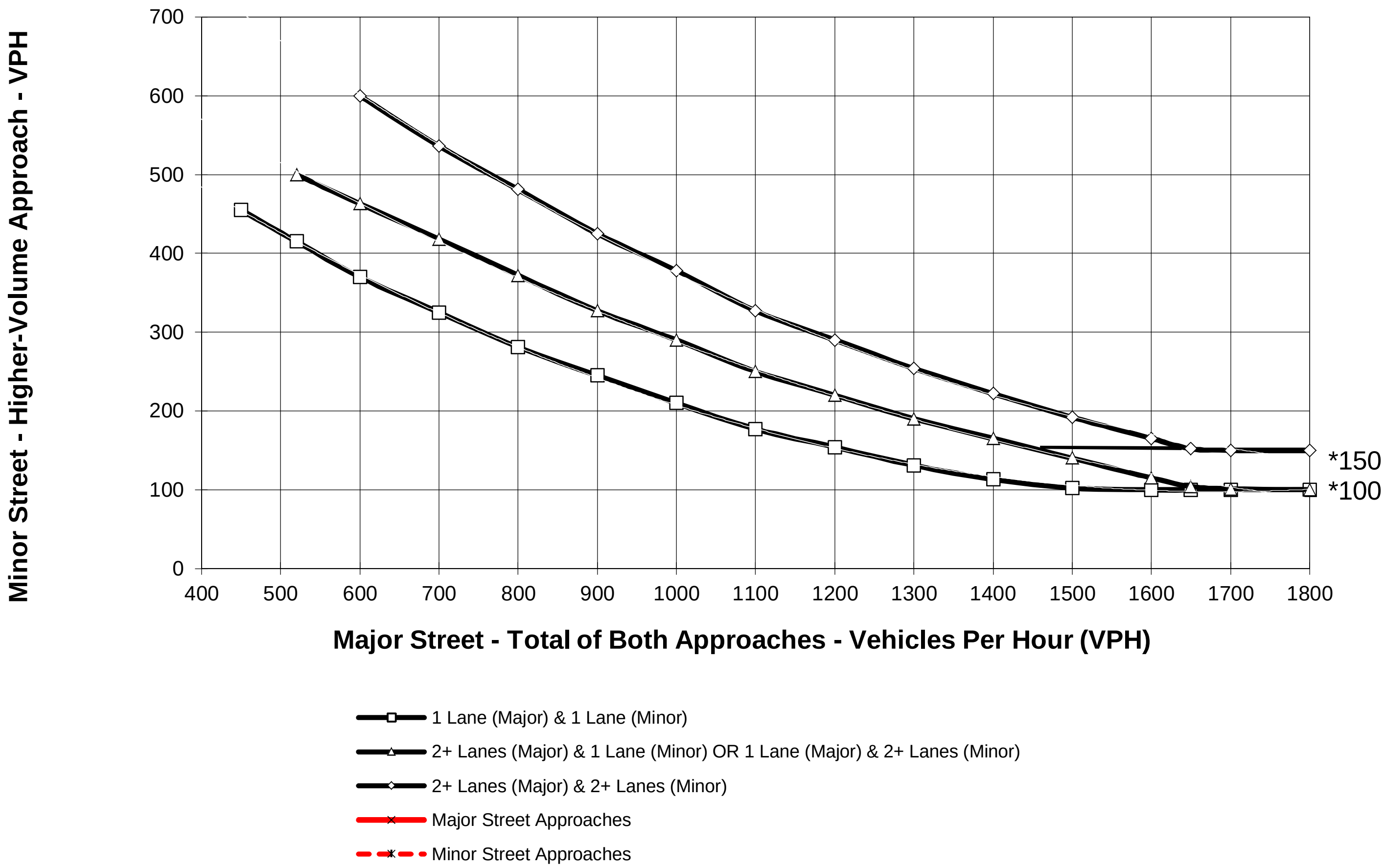
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Hayes Avenue**

High Volume Approach (VPH) = **49**

Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT 3, PEAK HOUR
(Urban Areas)

Traffic Conditions = **Existing Plus Project - AM**

Major Street Name = **Vineyard Parkway**

Total of Both Approaches (VPH) = **490**

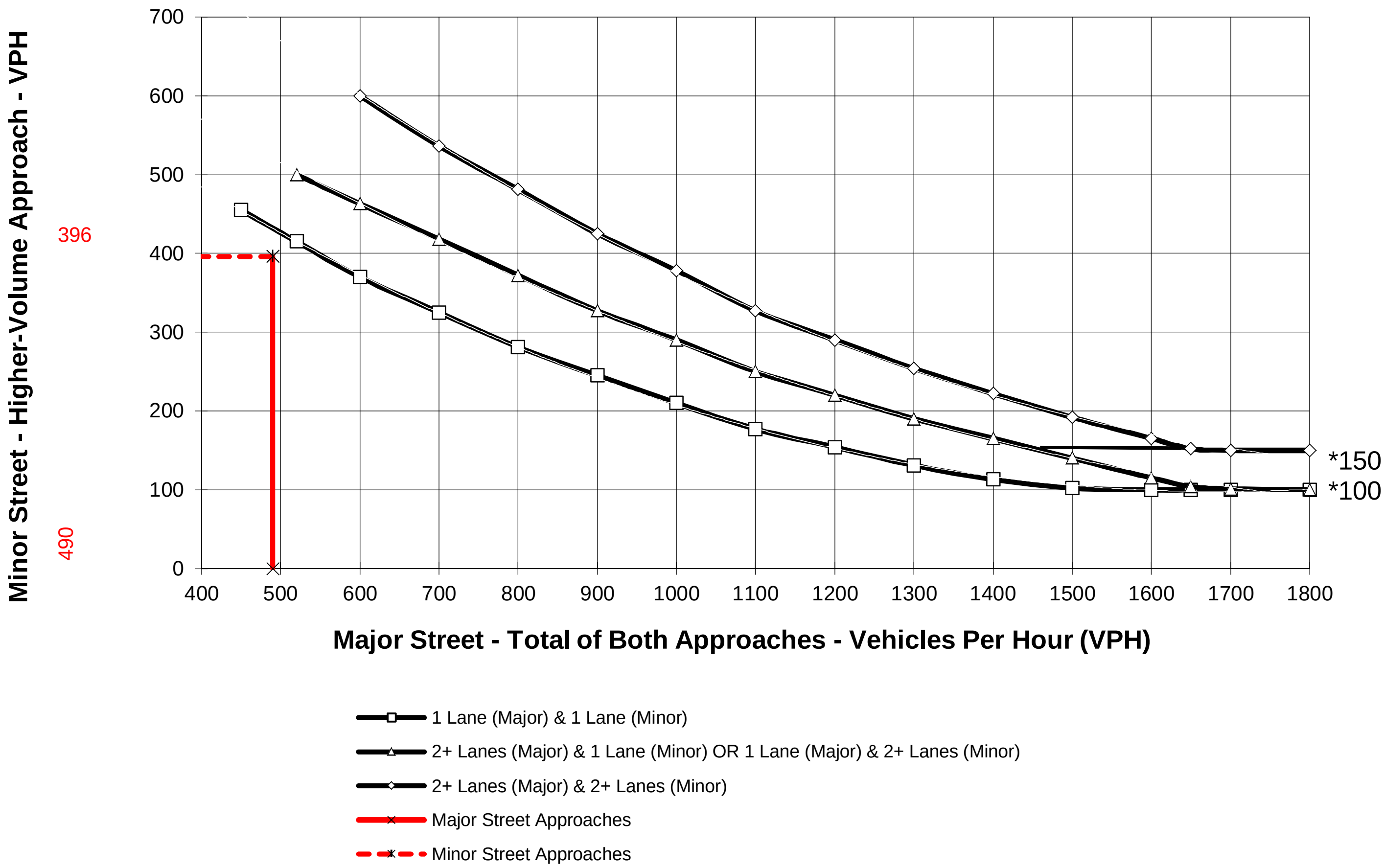
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Hayes Avenue**

High Volume Approach (VPH) = **396**

Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

2014 Edition

WARRANT 3, PEAK HOUR
(Urban Areas)

Traffic Conditions = **Existing Plus Project - PM**

Major Street Name = **Vineyard Parkway**

Total of Both Approaches (VPH) = **155**

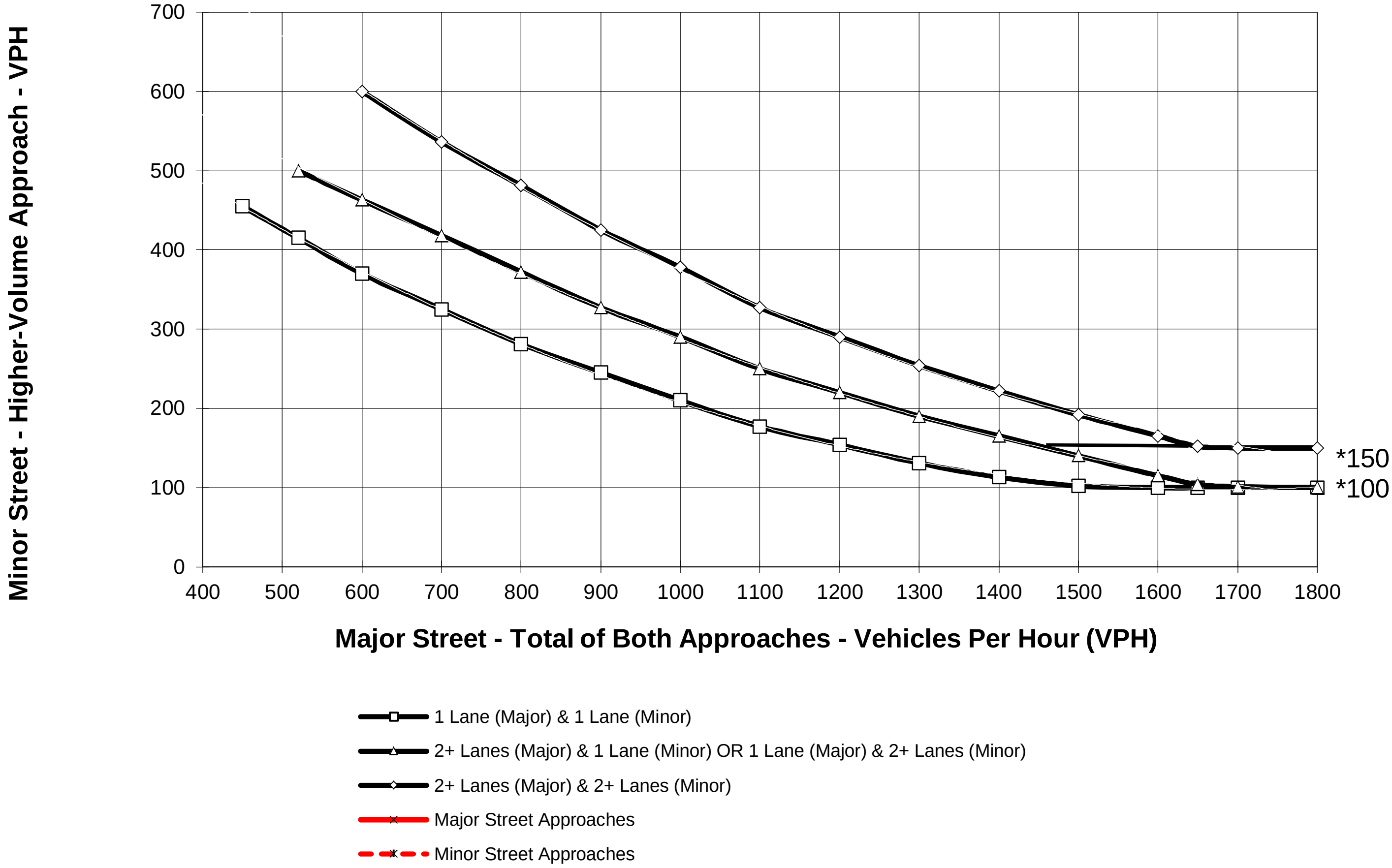
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Hayes Avenue**

High Volume Approach (VPH) = **80**

Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT 3, PEAK HOUR
(Urban Areas)

Traffic Conditions = **Buildout Year Plus Project - AM**

Major Street Name = **Vineyard Parkway**

Total of Both Approaches (VPH) = **517**

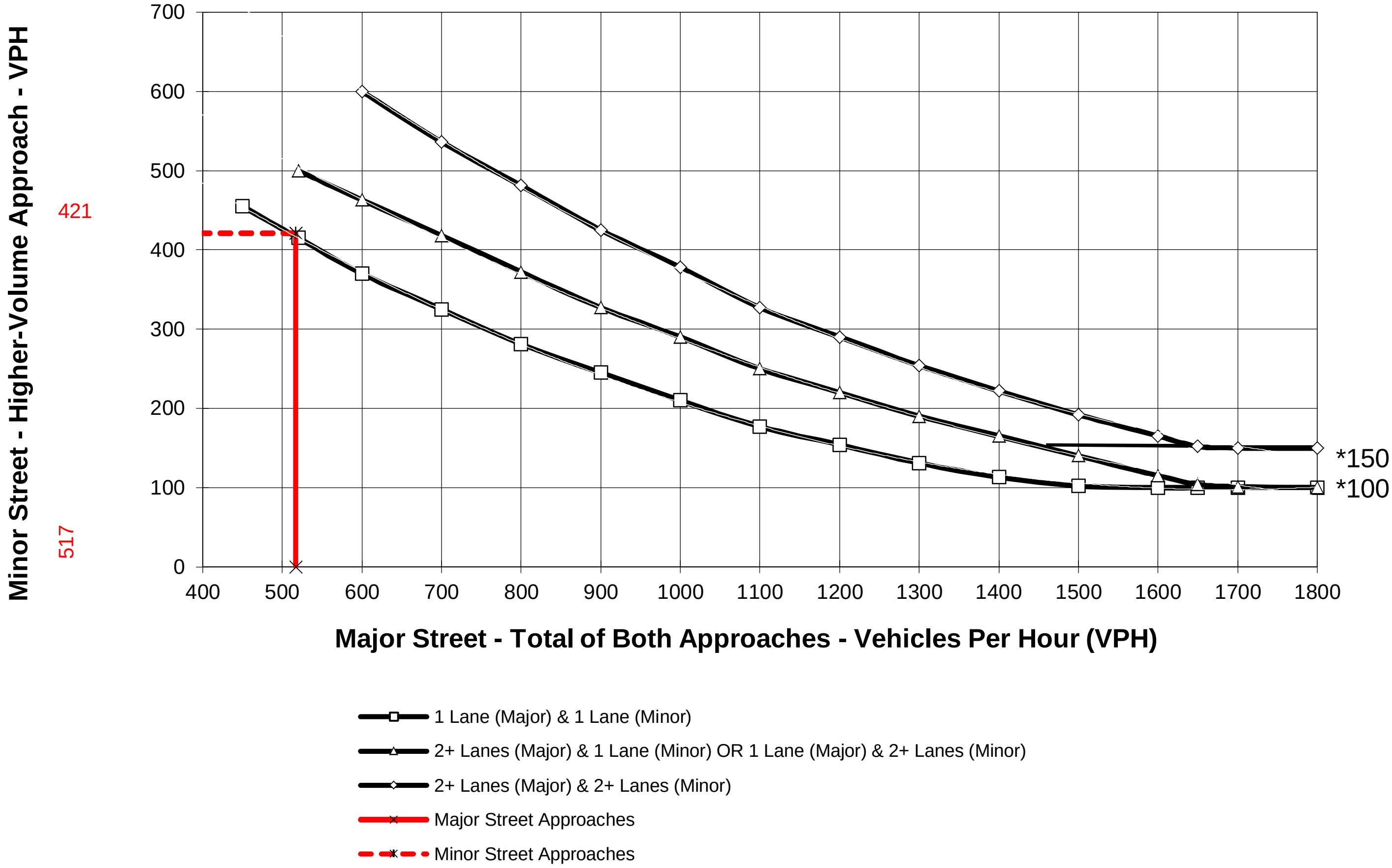
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Hayes Avenue**

High Volume Approach (VPH) = **421**

Number of Approach Lanes On Minor Street = **1**

WARRANTED FOR A SIGNAL



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT 3, PEAK HOUR
(Urban Areas)

Traffic Conditions = **Buildout Year Plus Project - PM**

Major Street Name = **Vineyard Parkway**

Total of Both Approaches (VPH) = **165**

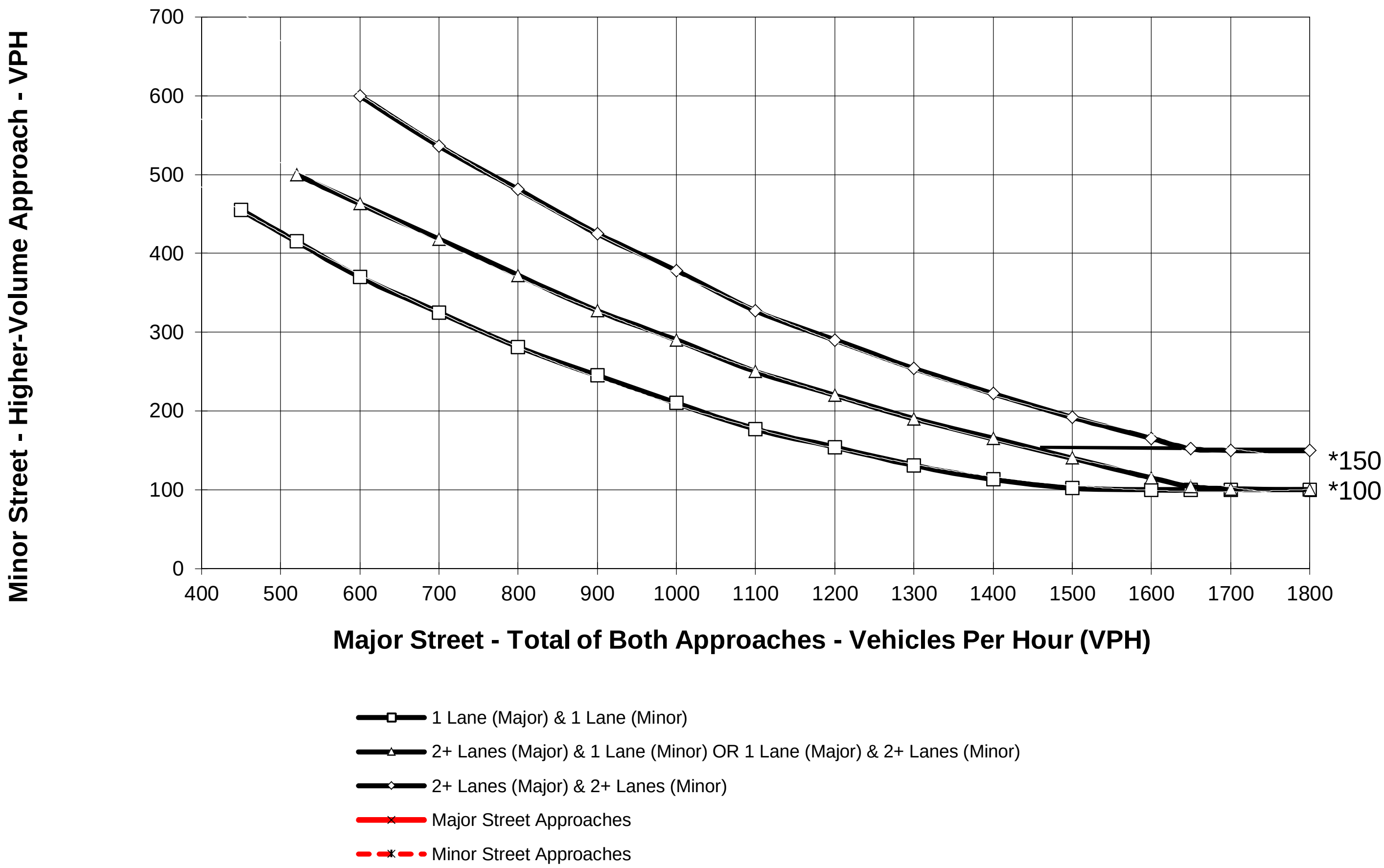
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Hayes Avenue**

High Volume Approach (VPH) = **84**

Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT 3, PEAK HOUR
(Urban Areas)

Traffic Conditions = **Buildout Year With Cuml. - AM**

Major Street Name = **Vineyard Parkway**

Total of Both Approaches (VPH) = **1068**

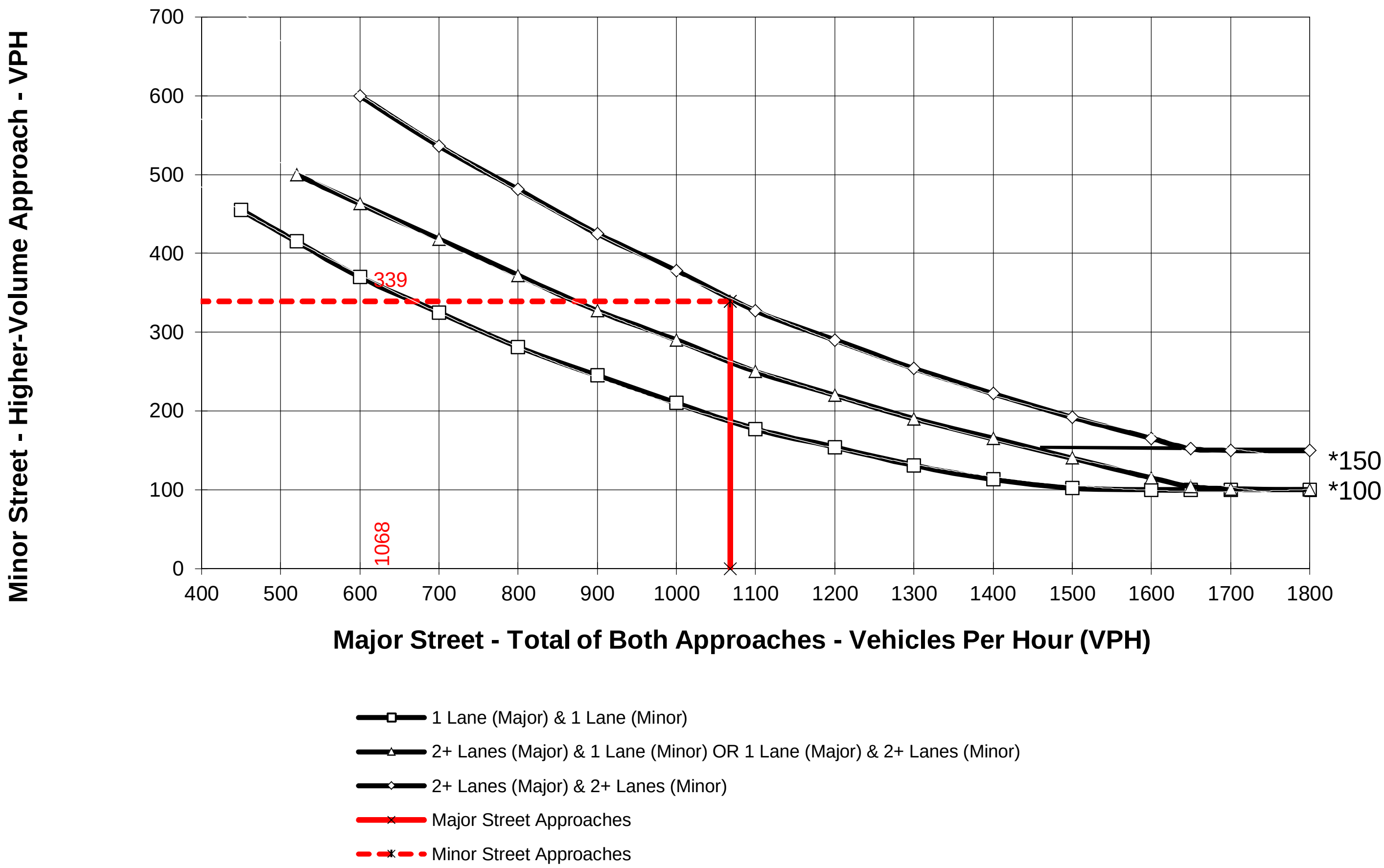
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Hayes Avenue**

High Volume Approach (VPH) = **339**

Number of Approach Lanes On Minor Street = **1**

WARRANTED FOR A SIGNAL



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT 3, PEAK HOUR
(Urban Areas)

Traffic Conditions = **Buildout Year With Cuml. - PM**

Major Street Name = **Vineyard Parkway**

Total of Both Approaches (VPH) = **932**

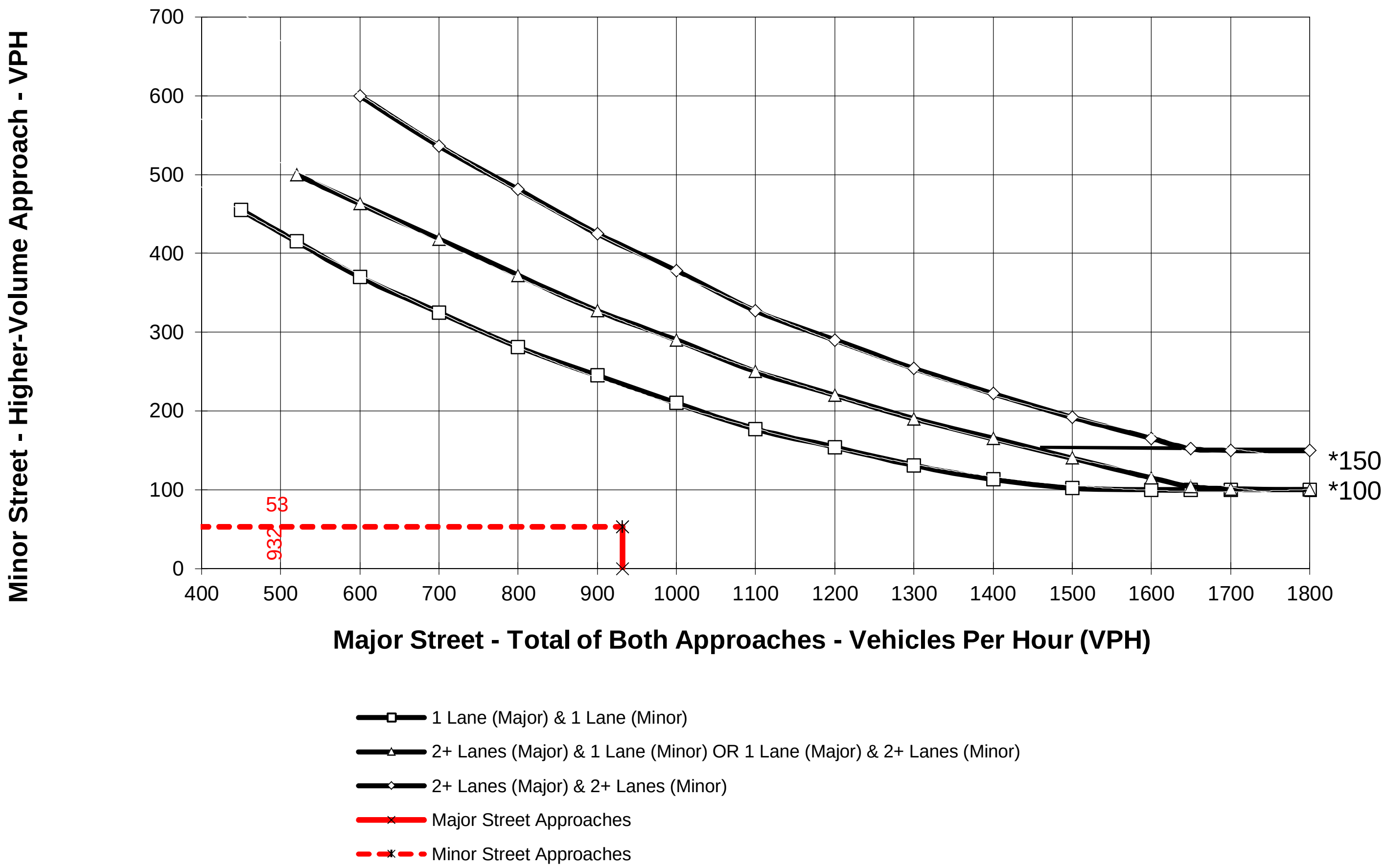
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Hayes Avenue**

High Volume Approach (VPH) = **53**

Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT 3, PEAK HOUR
(Urban Areas)

Traffic Conditions = **Buildout Year With Cuml. Plus Project - AM**

Major Street Name = **Vineyard Parkway**

Total of Both Approaches (VPH) = **1217**

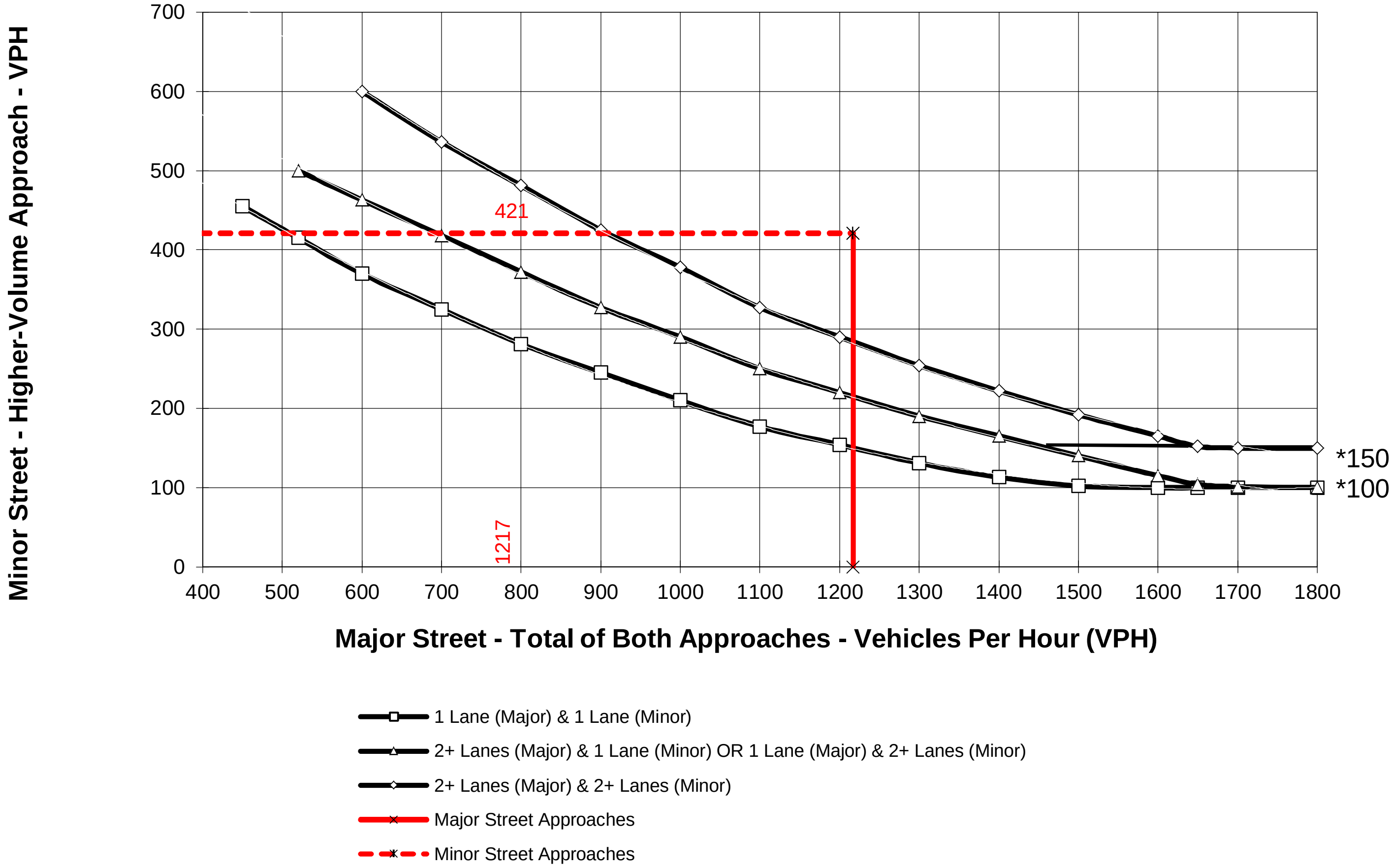
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Hayes Avenue**

High Volume Approach (VPH) = **421**

Number of Approach Lanes On Minor Street = **1**

WARRANTED FOR A SIGNAL



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT 3, PEAK HOUR
(Urban Areas)

Traffic Conditions = **Buildout Year With Cuml. Plus Project - PM**

Major Street Name = **Vineyard Parkway**

Total of Both Approaches (VPH) = **966**

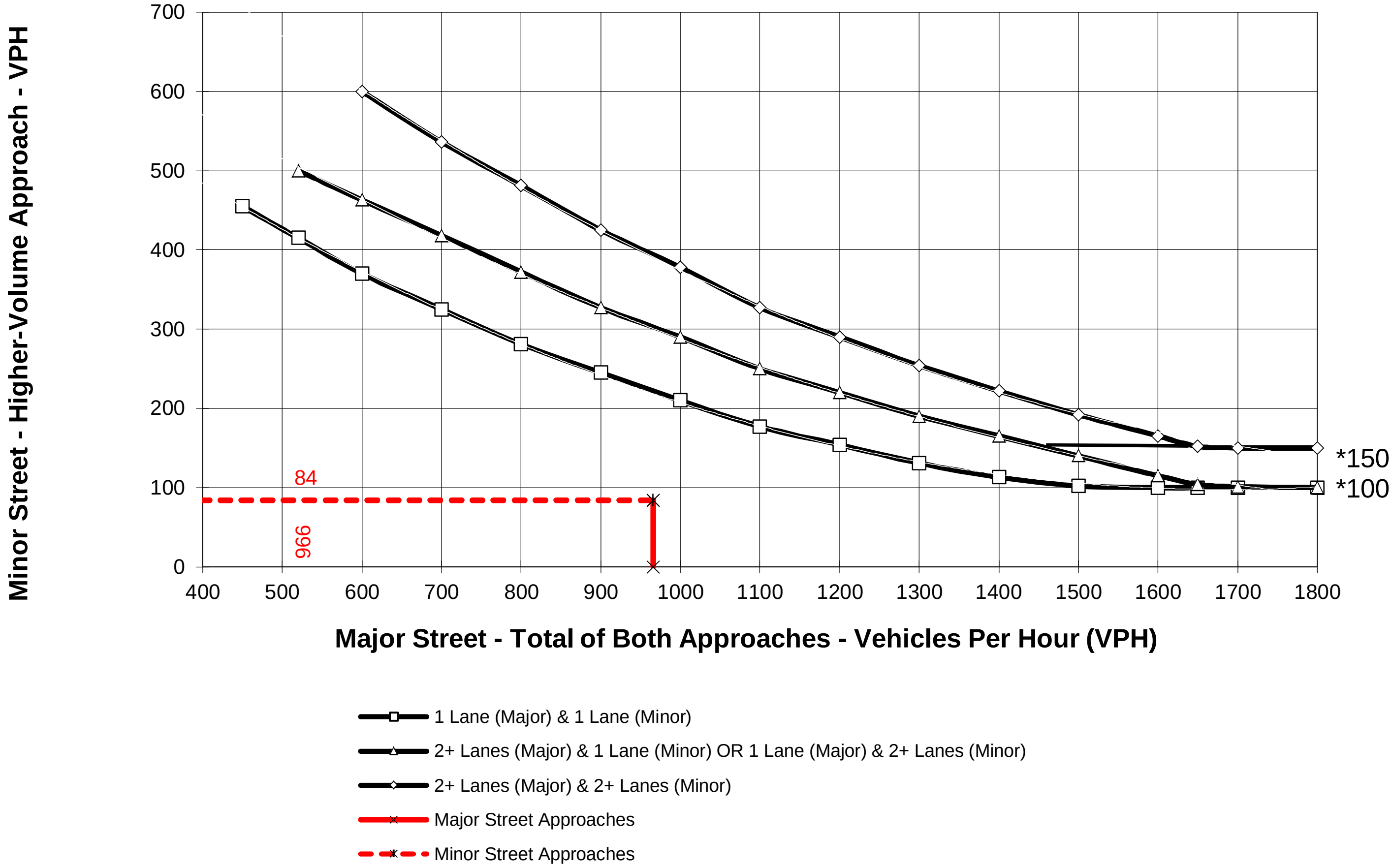
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Hayes Avenue**

High Volume Approach (VPH) = **84**

Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



* Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Appendix F

Project Buildout Year With Ambient Growth
Plus Project Conditions
Intersection Analysis

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			1	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.865		
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	0	1611	1770	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	0	1611	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		340	1045		2657	
Travel Time (s)		7.7	23.8		60.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	0	0	0	290	321	0
Future Volume (vph)	0	0	0	290	321	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	0	0	420	465	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	420	465	0

Intersection Summary

Intersection	
Intersection Delay, s/veh	15.3
Intersection LOS	C

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	290	321	0
Future Vol, veh/h	0	0	0	290	321	0
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	420	465	0
Number of Lanes	0	1	0	1	1	0

Approach	SE	NW	SW
Opposing Approach	NW	SE	
Opposing Lanes	1	1	0
Conflicting Approach Left	SW		NW
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SW	SE
Conflicting Lanes Right	0	1	1
HCM Control Delay	0	12.8	17.5
HCM LOS	-	B	C

Lane	NWLn1	SELn1	SWLn1
Vol Left, %	0%	0%	100%
Vol Thru, %	0%	100%	0%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	290	0	321
LT Vol	0	0	321
Through Vol	0	0	0
RT Vol	290	0	0
Lane Flow Rate	420	0	465
Geometry Grp	1	1	1
Degree of Util (X)	0.533	0	0.657
Departure Headway (Hd)	4.564	5.824	5.087
Convergence, Y/N	Yes	Yes	Yes
Cap	786	0	702
Service Time	2.619	3.824	3.184
HCM Lane V/C Ratio	0.534	0	0.662
HCM Control Delay	12.8	8.8	17.5
HCM Lane LOS	B	N	C
HCM 95th-tile Q	3.2	0	4.9

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	60			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.908		0.936	
Flt Protected	0.950				0.974	
Satd. Flow (prot)	1770	1863	1691	0	1698	0
Flt Permitted	0.950				0.974	
Satd. Flow (perm)	1770	1863	1691	0	1698	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		237	1361		181	
Travel Time (s)		5.4	30.9		4.1	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	84	231	181	391	27	25
Future Volume (vph)	84	231	181	391	27	25
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	129	355	278	602	42	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	129	355	880	0	80	0

Intersection Summary

Intersection						
Int Delay, s/veh	2.4					

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	84	231	181	391	27	25
Future Vol, veh/h	84	231	181	391	27	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	60	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	65	65	65	65	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	129	355	278	602	42	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	880	0	-	0	1192	579
Stage 1	-	-	-	-	579	-
Stage 2	-	-	-	-	613	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	768	-	-	-	207	515
Stage 1	-	-	-	-	560	-
Stage 2	-	-	-	-	541	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	768	-	-	-	172	515
Mov Cap-2 Maneuver	-	-	-	-	172	-
Stage 1	-	-	-	-	466	-
Stage 2	-	-	-	-	541	-

Approach	SE	NW	SW
HCM Control Delay, s	2.8	0	25.7
HCM LOS			D

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	768	-	253
HCM Lane V/C Ratio	-	-	0.168	-	0.316
HCM Control Delay (s)	-	-	10.6	-	25.7
HCM Lane LOS	-	-	B	-	D
HCM 95th %tile Q(veh)	-	-	0.6	-	1.3

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	415	6	6	19	19	473
Future Volume (vph)	415	6	6	19	19	473
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	500	7	7	23	23	570
Shared Lane Traffic (%)						
Lane Group Flow (vph)	500	7	7	23	23	570

Intersection Summary

Intersection	
Intersection Delay, s/veh	44.3
Intersection LOS	E

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations	↰	↱	↰	↑	↑	↱
Traffic Vol, veh/h	415	6	6	19	19	473
Future Vol, veh/h	415	6	6	19	19	473
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	500	7	7	23	23	570
Number of Lanes	1	1	1	1	1	1

Approach	SE	NE	SW
Opposing Approach		SW	NE
Opposing Lanes	0	2	2
Conflicting Approach Left	SW	SE	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NE		SE
Conflicting Lanes Right	2	0	2
HCM Control Delay	52.9	10.7	38.6
HCM LOS	F	B	E

Lane	NELn1	NELn2	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	6	19	415	6	19	473
LT Vol	6	0	415	0	0	0
Through Vol	0	19	0	0	19	0
RT Vol	0	0	0	6	0	473
Lane Flow Rate	7	23	500	7	23	570
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.016	0.048	0.949	0.011	0.041	0.903
Departure Headway (Hd)	8.076	7.559	6.831	5.622	6.416	5.704
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	446	477	530	635	555	633
Service Time	5.776	5.259	4.581	3.372	4.193	3.48
HCM Lane V/C Ratio	0.016	0.048	0.943	0.011	0.041	0.9
HCM Control Delay	10.9	10.6	53.5	8.4	9.5	39.8
HCM Lane LOS	B	B	F	A	A	E
HCM 95th-tile Q	0	0.2	12.1	0	0.1	11.2

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	85		0	150		0	150		0	250		100
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.981				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3472	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18				143			122			205
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1461			2630			1510			1533	
Travel Time (s)		33.2			59.8			34.3			34.8	

Intersection Summary	
Area Type:	Other

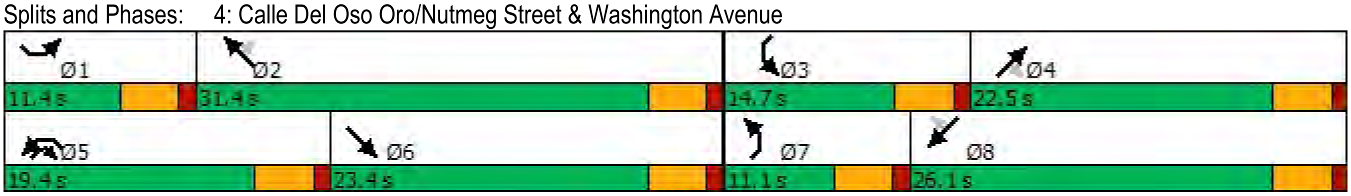
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	83	354	50	273	313	115	45	252	504	181	170	61
Future Volume (vph)	83	354	50	273	313	115	45	252	504	181	170	61
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	93	398	56	307	352	129	51	283	566	203	191	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	93	454	0	307	352	129	51	283	566	203	191	69

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	83	354	273	313	115	45	252	504	181	170	61
Future Volume (vph)	83	354	273	313	115	45	252	504	181	170	61
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	1	6	5	2		7	4	5	3	8	
Permitted Phases					2			4			8
Detector Phase	1	6	5	2	2	7	4	5	3	8	8
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	9.5	22.5	22.5
Total Split (s)	11.4	23.4	19.4	31.4	31.4	11.1	22.5	19.4	14.7	26.1	26.1
Total Split (%)	14.3%	29.3%	24.3%	39.3%	39.3%	13.9%	28.1%	24.3%	18.4%	32.6%	32.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	6.7	18.9	14.9	29.4	29.4	6.4	15.5	35.0	10.2	23.8	23.8
Actuated g/C Ratio	0.09	0.24	0.19	0.38	0.38	0.08	0.20	0.45	0.13	0.31	0.31
v/c Ratio	0.61	0.53	0.90	0.50	0.19	0.35	0.76	0.73	0.88	0.34	0.11
Control Delay	53.3	27.5	63.6	23.4	3.8	41.7	43.2	19.6	70.5	24.4	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.3	27.5	63.6	23.4	3.8	41.7	43.2	19.6	70.5	24.4	0.4
LOS	D	C	E	C	A	D	D	B	E	C	A
Approach Delay		31.9		35.8			28.3			41.0	
Approach LOS		C		D			C			D	

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 77.6	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 33.4	Intersection LOS: C
Intersection Capacity Utilization 64.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 4: Calle Del Oso Oro/Nutmeg Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group Flow (vph)	93	454	307	352	129	51	283	566	203	191	69
v/c Ratio	0.61	0.53	0.90	0.50	0.19	0.35	0.76	0.73	0.88	0.34	0.11
Control Delay	53.3	27.5	63.6	23.4	3.8	41.7	43.2	19.6	70.5	24.4	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.3	27.5	63.6	23.4	3.8	41.7	43.2	19.6	70.5	24.4	0.4
Queue Length 50th (ft)	45	98	150	139	0	24	130	168	100	77	0
Queue Length 95th (ft)	#106	145	#296	222	29	58	209	284	#219	133	0
Internal Link Dist (ft)		1381		2550			1430			1453	
Turn Bay Length (ft)	85		150			150			250		100
Base Capacity (vph)	157	860	340	704	687	150	432	780	232	575	630
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.53	0.90	0.50	0.19	0.34	0.66	0.73	0.88	0.33	0.11

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	83	354	50	273	313	115	45	252	504	181	170	61
Future Volume (veh/h)	83	354	50	273	313	115	45	252	504	181	170	61
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	93	398	56	307	352	129	51	283	566	203	191	69
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	119	737	103	330	662	563	75	419	651	226	578	491
Arrive On Green	0.07	0.24	0.24	0.19	0.36	0.36	0.04	0.22	0.22	0.13	0.31	0.31
Sat Flow, veh/h	1774	3119	436	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	93	225	229	307	352	129	51	283	566	203	191	69
Grp Sat Flow(s),veh/h/ln	1774	1770	1786	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	4.1	8.9	9.0	13.6	12.0	4.6	2.3	11.1	18.0	9.0	6.3	2.5
Cycle Q Clear(g_c), s	4.1	8.9	9.0	13.6	12.0	4.6	2.3	11.1	18.0	9.0	6.3	2.5
Prop In Lane	1.00		0.24	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	119	418	422	330	662	563	75	419	651	226	578	491
V/C Ratio(X)	0.78	0.54	0.54	0.93	0.53	0.23	0.68	0.68	0.87	0.90	0.33	0.14
Avail Cap(c_a), veh/h	153	418	422	330	662	563	146	419	651	226	578	491
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.7	26.7	26.8	32.0	20.5	18.1	37.8	28.3	21.6	34.4	21.2	19.9
Incr Delay (d2), s/veh	17.7	4.9	5.0	31.8	3.0	0.9	10.2	4.3	12.1	33.8	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	4.9	5.0	9.6	6.7	2.1	1.3	6.2	13.5	6.5	3.3	1.1
LnGrp Delay(d),s/veh	54.4	31.6	31.7	63.8	23.5	19.0	48.0	32.6	33.7	68.1	21.5	20.0
LnGrp LOS	D	C	C	E	C	B	D	C	C	E	C	C
Approach Vol, veh/h		547			788			900			463	
Approach Delay, s/veh		35.5			38.5			34.2			41.8	
Approach LOS		D			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.9	32.9	14.7	22.5	19.4	23.4	7.9	29.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.9	26.9	10.2	18.0	14.9	18.9	6.6	21.6
Max Q Clear Time (g_c+I1), s	6.1	14.0	11.0	20.0	15.6	11.0	4.3	8.3
Green Ext Time (p_c), s	0.0	2.1	0.0	0.0	0.0	1.7	0.0	1.0

Intersection Summary	
HCM 2010 Ctrl Delay	37.0
HCM 2010 LOS	D

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		280	300		0	350		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.979			0.939			0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3465	0	1770	1749	0	1770	3514	0
Flt Permitted	0.950			0.950			0.177			0.467		
Satd. Flow (perm)	1770	3539	1583	1770	3465	0	330	1749	0	870	3514	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73		18			49			5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2630			1335			2657			1296	
Travel Time (s)		59.8			30.3			60.4			29.5	

Intersection Summary	
Area Type:	Other

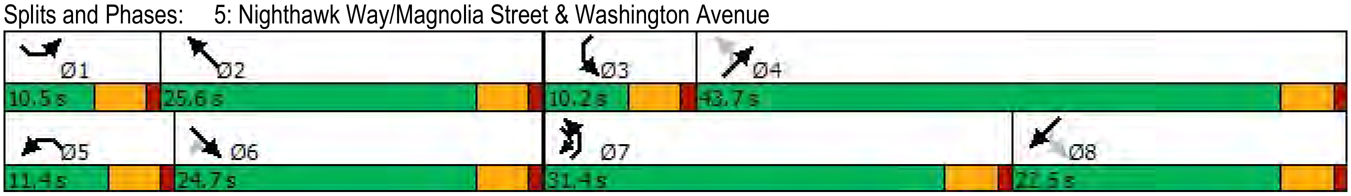
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	24	509	592	82	227	36	375	213	147	55	366	19
Future Volume (vph)	24	509	592	82	227	36	375	213	147	55	366	19
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	35	749	871	121	334	53	551	313	216	81	538	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	749	871	121	387	0	551	529	0	81	566	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	24	509	592	82	227	375	213	55	366
Future Volume (vph)	24	509	592	82	227	375	213	55	366
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+pt	NA	pm+pt	NA
Protected Phases	1	6	7	5	2	7	4	3	8
Permitted Phases			6			4		8	
Detector Phase	1	6	7	5	2	7	4	3	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	10.5	24.7	31.4	11.4	25.6	31.4	43.7	10.2	22.5
Total Split (%)	11.7%	27.4%	34.9%	12.7%	28.4%	34.9%	48.6%	11.3%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	None	Max	None	None	None	None
Act Effct Green (s)	5.9	20.2	51.5	6.9	25.4	48.5	40.4	22.8	17.2
Actuated g/C Ratio	0.07	0.23	0.58	0.08	0.29	0.54	0.45	0.26	0.19
v/c Ratio	0.30	0.93	0.92	0.89	0.39	0.90	0.65	0.29	0.83
Control Delay	47.0	54.4	32.9	95.5	27.3	40.8	22.1	16.6	46.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.0	54.4	32.9	95.5	27.3	40.8	22.1	16.6	46.2
LOS	D	D	C	F	C	D	C	B	D
Approach Delay		42.9			43.5		31.6		42.5
Approach LOS		D			D		C		D

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 89.1	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 39.8	Intersection LOS: D
Intersection Capacity Utilization 65.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Nighthawk Way/Magnolia Street & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	35	749	871	121	387	551	529	81	566
v/c Ratio	0.30	0.93	0.92	0.89	0.39	0.90	0.65	0.29	0.83
Control Delay	47.0	54.4	32.9	95.5	27.3	40.8	22.1	16.6	46.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.0	54.4	32.9	95.5	27.3	40.8	22.1	16.6	46.2
Queue Length 50th (ft)	19	221	393	70	95	243	211	20	161
Queue Length 95th (ft)	37	204	326	#110	99	235	207	31	157
Internal Link Dist (ft)		2550			1255		2577		1216
Turn Bay Length (ft)	150		280	300		350		150	
Base Capacity (vph)	119	802	947	136	999	614	819	281	713
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.93	0.92	0.89	0.39	0.90	0.65	0.29	0.79

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	24	509	592	82	227	36	375	213	147	55	366	19
Future Volume (veh/h)	24	509	592	82	227	36	375	213	147	55	366	19
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	35	749	871	121	334	53	551	313	216	81	538	28
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	2	0
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	59	859	811	147	896	141	596	418	289	306	647	34
Arrive On Green	0.03	0.24	0.24	0.08	0.29	0.29	0.27	0.41	0.41	0.05	0.19	0.19
Sat Flow, veh/h	1774	3539	1583	1774	3066	482	1774	1028	709	1774	3423	178
Grp Volume(v), veh/h	35	749	871	121	191	196	551	0	529	81	278	288
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1778	1774	0	1738	1774	1770	1831
Q Serve(g_s), s	1.6	16.9	20.2	5.6	7.1	7.3	19.4	0.0	21.6	3.0	12.6	12.6
Cycle Q Clear(g_c), s	1.6	16.9	20.2	5.6	7.1	7.3	19.4	0.0	21.6	3.0	12.6	12.6
Prop In Lane	1.00		1.00	1.00		0.27	1.00		0.41	1.00		0.10
Lane Grp Cap(c), veh/h	59	859	811	147	517	519	596	0	707	306	334	346
V/C Ratio(X)	0.59	0.87	1.07	0.82	0.37	0.38	0.92	0.00	0.75	0.26	0.83	0.83
Avail Cap(c_a), veh/h	128	859	811	147	517	519	691	0	818	336	383	396
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.7	30.3	20.3	37.6	23.4	23.4	18.0	0.0	21.0	25.3	32.5	32.5
Incr Delay (d2), s/veh	9.1	11.9	53.5	29.9	2.0	2.1	16.9	0.0	3.3	0.5	12.9	12.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	9.6	30.4	3.9	3.8	3.9	12.1	0.0	10.9	1.5	7.3	7.6
LnGrp Delay(d),s/veh	48.8	42.1	73.8	67.5	25.4	25.5	34.9	0.0	24.3	25.7	45.4	45.3
LnGrp LOS	D	D	F	E	C	C	C		C	C	D	D
Approach Vol, veh/h		1655			508			1080			647	
Approach Delay, s/veh		59.0			35.5			29.7			42.9	
Approach LOS		E			D			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.3	28.8	8.8	38.4	11.4	24.7	26.9	20.2				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	6.0	21.1	5.7	39.2	6.9	20.2	26.9	18.0				
Max Q Clear Time (g_c+I1), s	3.6	9.3	5.0	23.6	7.6	22.2	21.4	14.6				
Green Ext Time (p_c), s	0.0	1.7	0.0	3.2	0.0	0.0	1.0	1.1				
Intersection Summary												
HCM 2010 Ctrl Delay			45.1									
HCM 2010 LOS			D									
Notes												

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		170	150		0	80		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	1583	0	1770	1583	0
Flt Permitted	0.950			0.950			0.744			0.679		
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1386	1583	0	1265	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			366			109		299			483	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1335			1310			2481			639	
Travel Time (s)		30.3			29.8			56.4			14.5	

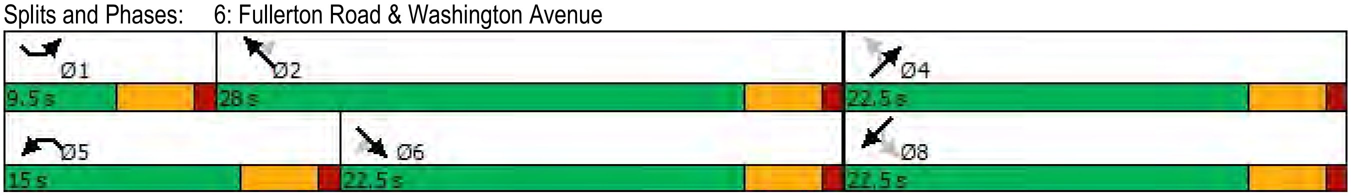
Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	13	467	223	148	224	1	104	0	74	2	0	12
Future Volume (vph)	13	467	223	148	224	1	104	0	74	2	0	12
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	21	766	366	243	367	2	170	0	121	3	0	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	766	366	243	367	2	170	121	0	3	20	0
Intersection Summary												

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Configurations										
Traffic Volume (vph)	13	467	223	148	224	1	104	0	2	0
Future Volume (vph)	13	467	223	148	224	1	104	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	1	6		5	2			4		8
Permitted Phases			6			2	4		8	
Detector Phase	1	6	6	5	2	2	4	4	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	22.5	22.5	15.0	28.0	28.0	22.5	22.5	22.5	22.5
Total Split (%)	15.8%	37.5%	37.5%	25.0%	46.7%	46.7%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	5.1	19.2	19.2	10.1	33.5	33.5	11.7	11.7	11.4	11.4
Actuated g/C Ratio	0.10	0.37	0.37	0.19	0.65	0.65	0.23	0.23	0.22	0.22
v/c Ratio	0.12	0.59	0.45	0.70	0.30	0.00	0.54	0.21	0.01	0.03
Control Delay	26.2	17.6	4.3	35.6	8.8	0.0	25.3	0.8	15.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	17.6	4.3	35.6	8.8	0.0	25.3	0.8	15.5	0.1
LOS	C	B	A	D	A	A	C	A	B	A
Approach Delay		13.5			19.4			15.1		2.1
Approach LOS		B			B			B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 51.8	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 15.3	Intersection LOS: B
Intersection Capacity Utilization 44.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Fullerton Road & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	21	766	366	243	367	2	170	121	3	20
v/c Ratio	0.12	0.59	0.45	0.70	0.30	0.00	0.54	0.21	0.01	0.03
Control Delay	26.2	17.6	4.3	35.6	8.8	0.0	25.3	0.8	15.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	17.6	4.3	35.6	8.8	0.0	25.3	0.8	15.5	0.1
Queue Length 50th (ft)	6	106	0	73	47	0	49	0	1	0
Queue Length 95th (ft)	17	111	2	96	99	0	60	0	4	0
Internal Link Dist (ft)		1255			1230			2401		559
Turn Bay Length (ft)			170	150			80			
Base Capacity (vph)	175	1309	816	368	1205	1062	494	757	451	875
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.59	0.45	0.66	0.30	0.00	0.34	0.16	0.01	0.02

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	13	467	223	148	224	1	104	0	74	2	0	12
Future Volume (veh/h)	13	467	223	148	224	1	104	0	74	2	0	12
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	21	766	366	243	367	2	170	0	121	3	0	20
Adj No. of Lanes	1	2	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	45	1311	587	301	959	815	386	0	288	293	0	288
Arrive On Green	0.03	0.37	0.37	0.17	0.51	0.51	0.18	0.00	0.18	0.18	0.00	0.18
Sat Flow, veh/h	1774	3539	1583	1774	1863	1583	1386	0	1583	1265	0	1583
Grp Volume(v), veh/h	21	766	366	243	367	2	170	0	121	3	0	20
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1863	1583	1386	0	1583	1265	0	1583
Q Serve(g_s), s	0.6	8.4	9.2	6.4	5.8	0.0	5.6	0.0	3.3	0.1	0.0	0.5
Cycle Q Clear(g_c), s	0.6	8.4	9.2	6.4	5.8	0.0	6.1	0.0	3.3	3.4	0.0	0.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	45	1311	587	301	959	815	386	0	288	293	0	288
V/C Ratio(X)	0.47	0.58	0.62	0.81	0.38	0.00	0.44	0.00	0.42	0.01	0.00	0.07
Avail Cap(c_a), veh/h	183	1311	587	383	959	815	647	0	587	531	0	587
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.3	12.3	12.5	19.4	7.1	5.7	19.0	0.0	17.6	19.1	0.0	16.5
Incr Delay (d2), s/veh	7.3	1.9	4.9	9.7	1.2	0.0	0.8	0.0	1.0	0.0	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	4.4	4.8	3.9	3.3	0.0	2.2	0.0	1.5	0.0	0.0	0.2
LnGrp Delay(d),s/veh	30.7	14.2	17.5	29.1	8.3	5.7	19.8	0.0	18.6	19.1	0.0	16.6
LnGrp LOS	C	B	B	C	A	A	B		B	B		B
Approach Vol, veh/h		1153			612			291			23	
Approach Delay, s/veh		15.5			16.5			19.3			16.9	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.7	29.5		13.3	12.7	22.5		13.3
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	10.5	18.0		18.0
Max Q Clear Time (g_c+I1), s	2.6	7.8		8.1	8.4	11.2		5.4
Green Ext Time (p_c), s	0.0	2.0		0.8	0.2	3.6		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	16.4
HCM 2010 LOS	B

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.990			0.995			0.876			0.967	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3504	0	1770	3522	0	1770	1632	0	1770	1801	0
Flt Permitted	0.950			0.950			0.679			0.345		
Satd. Flow (perm)	1770	3504	0	1770	3522	0	1265	1632	0	643	1801	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			7			329			20	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	13	610	44	379	297	11	43	74	350	14	87	25
Future Volume (vph)	13	610	44	379	297	11	43	74	350	14	87	25
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	14	663	48	412	323	12	47	80	380	15	95	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	711	0	412	335	0	47	460	0	15	122	0

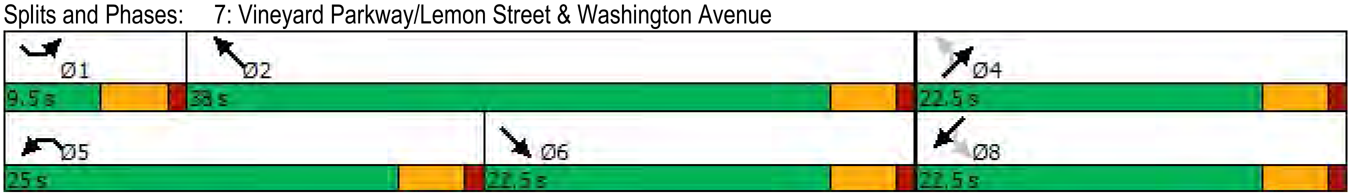
Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	13	610	379	297	43	74	14	87
Future Volume (vph)	13	610	379	297	43	74	14	87
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases					4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	22.5	25.0	38.0	22.5	22.5	22.5	22.5
Total Split (%)	13.6%	32.1%	35.7%	54.3%	32.1%	32.1%	32.1%	32.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	5.1	18.4	17.8	39.1	11.6	11.6	11.6	11.6
Actuated g/C Ratio	0.08	0.30	0.29	0.63	0.19	0.19	0.19	0.19
v/c Ratio	0.10	0.68	0.80	0.15	0.20	0.80	0.12	0.34
Control Delay	31.5	24.6	35.3	6.2	23.0	18.8	23.0	21.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	24.6	35.3	6.2	23.0	18.8	23.0	21.3
LOS	C	C	D	A	C	B	C	C
Approach Delay		24.8		22.3		19.2		21.5
Approach LOS		C		C		B		C

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 61.6
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 22.3 Intersection LOS: C
Intersection Capacity Utilization 76.0% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	14	711	412	335	47	460	15	122
v/c Ratio	0.10	0.68	0.80	0.15	0.20	0.80	0.12	0.34
Control Delay	31.5	24.6	35.3	6.2	23.0	18.8	23.0	21.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	24.6	35.3	6.2	23.0	18.8	23.0	21.3
Queue Length 50th (ft)	5	130	142	20	16	46	5	35
Queue Length 95th (ft)	22	#213	#300	63	40	142	19	75
Internal Link Dist (ft)		1230		2572		2575		1085
Turn Bay Length (ft)	150		255		160		150	
Base Capacity (vph)	146	1051	600	2238	377	717	191	550
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.68	0.69	0.15	0.12	0.64	0.08	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	13	610	44	379	297	11	43	74	350	14	87	25
Future Volume (veh/h)	13	610	44	379	297	11	43	74	350	14	87	25
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	14	663	48	412	323	12	47	80	380	15	95	27
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	30	900	65	463	1784	66	380	76	361	108	375	107
Arrive On Green	0.02	0.27	0.27	0.26	0.51	0.51	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	1774	3347	242	1774	3481	129	1264	283	1343	928	1396	397
Grp Volume(v), veh/h	14	350	361	412	164	171	47	0	460	15	0	122
Grp Sat Flow(s),veh/h/ln	1774	1770	1820	1774	1770	1840	1264	0	1626	928	0	1793
Q Serve(g_s), s	0.5	12.1	12.1	15.0	3.3	3.3	2.0	0.0	18.0	0.0	0.0	3.6
Cycle Q Clear(g_c), s	0.5	12.1	12.1	15.0	3.3	3.3	5.6	0.0	18.0	18.0	0.0	3.6
Prop In Lane	1.00		0.13	1.00		0.07	1.00		0.83	1.00		0.22
Lane Grp Cap(c), veh/h	30	476	489	463	907	943	380	0	437	108	0	482
V/C Ratio(X)	0.46	0.74	0.74	0.89	0.18	0.18	0.12	0.00	1.05	0.14	0.00	0.25
Avail Cap(c_a), veh/h	132	476	489	543	907	943	380	0	437	108	0	482
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.6	22.3	22.3	23.8	8.8	8.8	21.4	0.0	24.5	33.5	0.0	19.2
Incr Delay (d2), s/veh	10.5	9.8	9.6	15.1	0.4	0.4	0.1	0.0	57.5	0.6	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	7.1	7.3	9.3	1.7	1.8	0.7	0.0	15.0	0.3	0.0	1.8
LnGrp Delay(d),s/veh	43.1	32.1	31.9	38.9	9.2	9.2	21.5	0.0	82.0	34.1	0.0	19.5
LnGrp LOS	D	C	C	D	A	A	C		F	C		B
Approach Vol, veh/h		725			747			507			137	
Approach Delay, s/veh		32.2			25.6			76.4			21.1	
Approach LOS		C			C			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.6	38.8		22.5	22.0	22.5		22.5
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	33.5		18.0	20.5	18.0		18.0
Max Q Clear Time (g_c+I1), s	2.5	5.3		20.0	17.0	14.1		20.0
Green Ext Time (p_c), s	0.0	2.0		0.0	0.5	1.6		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	39.7
HCM 2010 LOS	D

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.980				0.850		0.985				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1825	0	1770	1863	1583	1770	1835	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1825	0	1770	1863	1583	1770	1835	0	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				182		5				187
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	776	267	40	3	287	70	63	55	6	64	51	409
Future Volume (vph)	776	267	40	3	287	70	63	55	6	64	51	409
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	913	314	47	4	338	82	74	65	7	75	60	481
Shared Lane Traffic (%)												
Lane Group Flow (vph)	913	361	0	4	338	82	74	72	0	75	60	481

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	776	267	3	287	70	63	55	64	51	409
Future Volume (vph)	776	267	3	287	70	63	55	64	51	409
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	31.0	48.0	9.5	26.5	26.5	10.0	22.5	10.0	22.5	31.0
Total Split (%)	34.4%	53.3%	10.6%	29.4%	29.4%	11.1%	25.0%	11.1%	25.0%	34.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	24.5	52.2	5.2	23.3	23.3	5.8	8.4	5.8	8.4	34.5
Actuated g/C Ratio	0.33	0.70	0.07	0.31	0.31	0.08	0.11	0.08	0.11	0.46
v/c Ratio	0.81	0.28	0.03	0.58	0.13	0.54	0.34	0.55	0.29	0.58
Control Delay	30.9	7.9	37.3	30.2	0.4	54.0	36.1	54.5	36.8	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	7.9	37.3	30.2	0.4	54.0	36.1	54.5	36.8	11.3
LOS	C	A	D	C	A	D	D	D	D	B
Approach Delay		24.4		24.5			45.1		19.1	
Approach LOS		C		C			D		B	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 74.5	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 24.3	Intersection LOS: C
Intersection Capacity Utilization 58.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 8: Kalmia Street & Washington Avenue

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	913	361	4	338	82	74	72	75	60	481
v/c Ratio	0.81	0.28	0.03	0.58	0.13	0.54	0.34	0.55	0.29	0.58
Control Delay	30.9	7.9	37.3	30.2	0.4	54.0	36.1	54.5	36.8	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	7.9	37.3	30.2	0.4	54.0	36.1	54.5	36.8	11.3
Queue Length 50th (ft)	212	64	2	150	0	37	32	37	28	92
Queue Length 95th (ft)	277	150	11	232	0	#92	66	#95	60	155
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	1277	1281	124	581	619	136	467	136	470	892
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.28	0.03	0.58	0.13	0.54	0.15	0.55	0.13	0.54

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	776	267	40	3	287	70	63	55	6	64	51	409
Future Volume (veh/h)	776	267	40	3	287	70	63	55	6	64	51	409
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	913	314	47	4	338	82	74	65	7	75	60	481
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	1
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	993	844	126	9	465	395	95	336	36	96	380	780
Arrive On Green	0.29	0.53	0.53	0.01	0.25	0.25	0.05	0.20	0.20	0.05	0.20	0.20
Sat Flow, veh/h	3442	1584	237	1774	1863	1583	1774	1653	178	1774	1863	1583
Grp Volume(v), veh/h	913	0	361	4	338	82	74	0	72	75	60	481
Grp Sat Flow(s),veh/h/ln	1721	0	1821	1774	1863	1583	1774	0	1831	1774	1863	1583
Q Serve(g_s), s	22.6	0.0	10.2	0.2	14.7	3.6	3.6	0.0	2.9	3.7	2.3	18.0
Cycle Q Clear(g_c), s	22.6	0.0	10.2	0.2	14.7	3.6	3.6	0.0	2.9	3.7	2.3	18.0
Prop In Lane	1.00		0.13	1.00		1.00	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	993	0	970	9	465	395	95	0	373	96	380	780
V/C Ratio(X)	0.92	0.00	0.37	0.43	0.73	0.21	0.78	0.00	0.19	0.78	0.16	0.62
Avail Cap(c_a), veh/h	1035	0	970	101	465	395	111	0	374	111	380	780
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.4	0.0	12.0	43.7	30.3	26.2	41.2	0.0	29.1	41.2	28.8	16.3
Incr Delay (d2), s/veh	12.5	0.0	1.1	27.8	9.6	1.2	25.7	0.0	0.2	26.1	0.2	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.5	0.0	5.4	0.2	8.7	1.7	2.5	0.0	1.5	2.5	1.2	8.8
LnGrp Delay(d),s/veh	42.9	0.0	13.1	71.5	39.9	27.4	66.9	0.0	29.4	67.2	29.0	17.8
LnGrp LOS	D		B	E	D	C	E		C	E	C	B
Approach Vol, veh/h		1274			424			146			616	
Approach Delay, s/veh		34.4			37.8			48.4			24.9	
Approach LOS		C			D			D			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	29.9	26.5	9.3	22.4	5.0	51.5	9.2	22.5				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	26.5	22.0	5.5	18.0	5.0	43.5	5.5	18.0				
Max Q Clear Time (g_c+I1), s	24.6	16.7	5.7	4.9	2.2	12.2	5.6	20.0				
Green Ext Time (p_c), s	0.8	1.1	0.0	0.2	0.0	2.4	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			33.4									
HCM 2010 LOS			C									
Notes												

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	60		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.997						0.913				0.850
Flt Protected				0.950				0.982			0.950	
Satd. Flow (prot)	0	1857	0	1770	1863	0	0	1670	0	0	1770	1583
Flt Permitted				0.950				0.982			0.950	
Satd. Flow (perm)	0	1857	0	1770	1863	0	0	1670	0	0	1770	1583
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1045			237			351			183	
Travel Time (s)		23.8			5.4			8.0			4.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	0	302	6	6	265	0	8	0	14	124	0	62
Future Volume (vph)	0	302	6	6	265	0	8	0	14	124	0	62
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	392	8	8	344	0	10	0	18	161	0	81
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	400	0	8	344	0	0	28	0	0	161	81

Intersection Summary

Intersection	
Int Delay, s/veh	5.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	302	6	6	265	0	8	0	14	124	0	62
Future Vol, veh/h	0	302	6	6	265	0	8	0	14	124	0	62
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	60	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	392	8	8	344	0	10	0	18	161	0	81

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	400	0	0	797	756	396	765	760	344
Stage 1	-	-	-	-	-	-	396	396	-	360	360	-
Stage 2	-	-	-	-	-	-	401	360	-	405	400	-
Critical Hdwy	-	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1159	-	0	305	337	653	320	336	699
Stage 1	0	-	-	-	-	0	629	604	-	658	626	-
Stage 2	0	-	-	-	-	0	626	626	-	622	602	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1159	-	-	268	335	653	309	334	699
Mov Cap-2 Maneuver	-	-	-	-	-	-	268	335	-	309	334	-
Stage 1	-	-	-	-	-	-	629	604	-	658	622	-
Stage 2	-	-	-	-	-	-	550	622	-	605	602	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	0.2	14	22.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	429	1159	-	-	-	309	699
HCM Lane V/C Ratio	0.067	0.007	-	-	-	0.521	0.115
HCM Control Delay (s)	14	8.1	-	-	-	28.7	10.8
HCM Lane LOS	B	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0.2	0	-	-	-	2.8	0.4

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.993	
Flt Protected				0.972		
Satd. Flow (prot)	1863	0	0	1811	1850	0
Flt Permitted				0.972		
Satd. Flow (perm)	1863	0	0	1811	1850	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	112			181	2481	
Travel Time (s)	2.5			4.1	56.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	0	0	277	198	52	3
Future Volume (vph)	0	0	277	198	52	3
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.48	0.48	0.48	0.48	0.48	0.48
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	0	0	577	413	108	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	990	114	0

Intersection Summary

Intersection	
Int Delay, s/veh	4.7

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	0	0	277	198	52	3
Future Vol, veh/h	0	0	277	198	52	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	48	48	48	48	48	48
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	577	413	108	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1678	111	114	0	-	0
Stage 1	111	-	-	-	-	-
Stage 2	1567	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	104	942	1475	-	-	-
Stage 1	914	-	-	-	-	-
Stage 2	189	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	51	942	1475	-	-	-
Mov Cap-2 Maneuver	51	-	-	-	-	-
Stage 1	451	-	-	-	-	-
Stage 2	189	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	0	5.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	1475	-	-	-	-
HCM Lane V/C Ratio	0.391	-	-	-	-
HCM Control Delay (s)	9	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	1.9	-	-	-	-

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			1	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.865		
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	0	1611	1770	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	0	1611	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		340	1045		2657	
Travel Time (s)		7.7	23.8		60.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	0	0	0	65	52	0
Future Volume (vph)	0	0	0	65	52	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	0	0	79	63	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	79	63	0

Intersection Summary

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	65	52	0
Future Vol, veh/h	0	0	0	65	52	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	79	63	0
Number of Lanes	0	1	0	1	1	0

Approach	SE	NW	SW
Opposing Approach	NW	SE	
Opposing Lanes	1	1	0
Conflicting Approach Left	SW		NW
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SW	SE
Conflicting Lanes Right	0	1	1
HCM Control Delay	0	6.8	7.6
HCM LOS	-	A	A

Lane	NWLn1	SELn1	SWLn1
Vol Left, %	0%	0%	100%
Vol Thru, %	0%	100%	0%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	65	0	52
LT Vol	0	0	52
Through Vol	0	0	0
RT Vol	65	0	0
Lane Flow Rate	79	0	63
Geometry Grp	1	1	1
Degree of Util (X)	0.076	0	0.075
Departure Headway (Hd)	3.444	4.104	4.272
Convergence, Y/N	Yes	Yes	Yes
Cap	1035	0	842
Service Time	1.481	2.148	2.284
HCM Lane V/C Ratio	0.076	0	0.075
HCM Control Delay	6.8	7.1	7.6
HCM Lane LOS	A	N	A
HCM 95th-tile Q	0.2	0	0.2

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	60			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.922			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1717	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1717	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		237	1361		181	
Travel Time (s)		5.4	30.9		4.1	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	23	76	36	49	2	0
Future Volume (vph)	23	76	36	49	2	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	28	93	44	60	2	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	93	104	0	2	0

Intersection Summary

Intersection						
Int Delay, s/veh	1					

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	23	76	36	49	2	0
Future Vol, veh/h	23	76	36	49	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	60	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	28	93	44	60	2	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	104	0	-	0	223	74
Stage 1	-	-	-	-	74	-
Stage 2	-	-	-	-	149	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1488	-	-	-	765	988
Stage 1	-	-	-	-	949	-
Stage 2	-	-	-	-	879	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1488	-	-	-	750	988
Mov Cap-2 Maneuver	-	-	-	-	750	-
Stage 1	-	-	-	-	931	-
Stage 2	-	-	-	-	879	-

Approach	SE	NW	SW
HCM Control Delay, s	1.7	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1488	-	750
HCM Lane V/C Ratio	-	-	0.019	-	0.003
HCM Control Delay (s)	-	-	7.5	-	9.8
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	81	3	2	23	23	117
Future Volume (vph)	81	3	2	23	23	117
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	105	4	3	30	30	152
Shared Lane Traffic (%)						
Lane Group Flow (vph)	105	4	3	30	30	152

Intersection Summary

Intersection	
Intersection Delay, s/veh	8.3
Intersection LOS	A

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	81	3	2	23	23	117
Future Vol, veh/h	81	3	2	23	23	117
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	105	4	3	30	30	152
Number of Lanes	1	1	1	1	1	1

Approach	SE	NE	SW
Opposing Approach		SW	NE
Opposing Lanes	0	2	2
Conflicting Approach Left	SW	SE	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NE		SE
Conflicting Lanes Right	2	0	2
HCM Control Delay	9.2	7.9	7.8
HCM LOS	A	A	A

Lane	NELn1	NELn2	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	2	23	81	3	23	117
LT Vol	2	0	81	0	0	0
Through Vol	0	23	0	0	23	0
RT Vol	0	0	0	3	0	117
Lane Flow Rate	3	30	105	4	30	152
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.004	0.041	0.161	0.005	0.041	0.176
Departure Headway (Hd)	5.495	4.993	5.506	4.304	4.883	4.181
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	654	720	653	834	737	862
Service Time	3.206	2.704	3.22	2.018	2.59	1.887
HCM Lane V/C Ratio	0.005	0.042	0.161	0.005	0.041	0.176
HCM Control Delay	8.2	7.9	9.3	7	7.8	7.8
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0	0.1	0.6	0	0.1	0.6

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	85		0	150		0	150		0	250		100
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.992				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3511	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3511	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				143			229			205
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1461			2630			1510			1533	
Travel Time (s)		33.2			59.8			34.3			34.8	

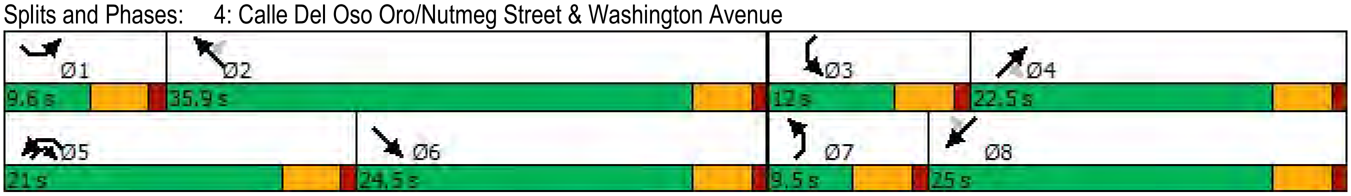
Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	62	242	13	308	535	127	17	94	218	133	267	193
Future Volume (vph)	62	242	13	308	535	127	17	94	218	133	267	193
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	65	255	14	324	563	134	18	99	229	140	281	203
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	269	0	324	563	134	18	99	229	140	281	203
Intersection Summary												

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	62	242	308	535	127	17	94	218	133	267	193
Future Volume (vph)	62	242	308	535	127	17	94	218	133	267	193
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	1	6	5	2		7	4	5	3	8	
Permitted Phases					2			4			8
Detector Phase	1	6	5	2	2	7	4	5	3	8	8
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	9.5	22.5	22.5
Total Split (s)	9.6	24.5	21.0	35.9	35.9	9.5	22.5	21.0	12.0	25.0	25.0
Total Split (%)	12.0%	30.6%	26.3%	44.9%	44.9%	11.9%	28.1%	26.3%	15.0%	31.3%	31.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	5.2	20.4	15.8	33.5	33.5	5.1	11.3	15.8	8.1	18.0	18.0
Actuated g/C Ratio	0.07	0.29	0.22	0.47	0.47	0.07	0.16	0.22	0.11	0.25	0.25
v/c Ratio	0.51	0.27	0.83	0.64	0.16	0.14	0.34	0.43	0.69	0.60	0.37
Control Delay	50.5	22.1	48.1	22.1	3.4	37.5	30.1	7.1	54.9	30.2	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	22.1	48.1	22.1	3.4	37.5	30.1	7.1	54.9	30.2	6.0
LOS	D	C	D	C	A	D	C	A	D	C	A
Approach Delay		27.6		27.9			15.2			27.9	
Approach LOS		C		C			B			C	

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 71.3	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 26.0	Intersection LOS: C
Intersection Capacity Utilization 57.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 4: Calle Del Oso Oro/Nutmeg Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group Flow (vph)	65	269	324	563	134	18	99	229	140	281	203
v/c Ratio	0.51	0.27	0.83	0.64	0.16	0.14	0.34	0.43	0.69	0.60	0.37
Control Delay	50.5	22.1	48.1	22.1	3.4	37.5	30.1	7.1	54.9	30.2	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	22.1	48.1	22.1	3.4	37.5	30.1	7.1	54.9	30.2	6.0
Queue Length 50th (ft)	28	46	134	189	0	8	41	0	61	101	0
Queue Length 95th (ft)	#87	88	#305	#376	29	29	81	55	#170	201	48
Internal Link Dist (ft)		1381		2550			1430			1453	
Turn Bay Length (ft)	85		150			150			250		100
Base Capacity (vph)	128	1007	417	874	818	126	479	548	202	548	610
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.27	0.78	0.64	0.16	0.14	0.21	0.42	0.69	0.51	0.33

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	62	242	13	308	535	127	17	94	218	133	267	193
Future Volume (veh/h)	62	242	13	308	535	127	17	94	218	133	267	193
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	65	255	14	324	563	134	18	99	229	140	281	203
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	91	985	54	369	830	706	37	278	566	175	422	359
Arrive On Green	0.05	0.29	0.29	0.21	0.45	0.45	0.02	0.15	0.15	0.10	0.23	0.23
Sat Flow, veh/h	1774	3413	186	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	65	132	137	324	563	134	18	99	229	140	281	203
Grp Sat Flow(s),veh/h/ln	1774	1770	1830	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	2.5	4.0	4.1	12.5	16.9	3.6	0.7	3.4	7.7	5.4	9.7	8.0
Cycle Q Clear(g_c), s	2.5	4.0	4.1	12.5	16.9	3.6	0.7	3.4	7.7	5.4	9.7	8.0
Prop In Lane	1.00		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	91	511	528	369	830	706	37	278	566	175	422	359
V/C Ratio(X)	0.72	0.26	0.26	0.88	0.68	0.19	0.48	0.36	0.40	0.80	0.67	0.57
Avail Cap(c_a), veh/h	128	511	528	415	830	706	126	476	734	189	542	461
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.9	19.3	19.3	27.0	15.5	11.8	34.1	26.9	17.0	31.1	24.8	24.2
Incr Delay (d2), s/veh	10.5	1.2	1.2	17.4	4.4	0.6	9.3	0.8	0.5	19.9	2.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	2.1	2.2	7.9	9.6	1.7	0.4	1.8	3.4	3.6	5.2	3.6
LnGrp Delay(d),s/veh	43.4	20.5	20.5	44.4	20.0	12.4	43.4	27.7	17.5	50.9	26.9	25.6
LnGrp LOS	D	C	C	D	B	B	D	C	B	D	C	C
Approach Vol, veh/h		334			1021			346			624	
Approach Delay, s/veh		24.9			26.7			21.8			31.8	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.1	35.9	11.5	15.0	19.2	24.8	6.0	20.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.1	31.4	7.5	18.0	16.5	20.0	5.0	20.5
Max Q Clear Time (g_c+I1), s	4.5	18.9	7.4	9.7	14.5	6.1	2.7	11.7
Green Ext Time (p_c), s	0.0	3.4	0.0	0.8	0.2	1.2	0.0	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	27.1
HCM 2010 LOS	C

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↰	↑↑	↱	↰	↑↱		↰	↱		↰	↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		280	300		0	350		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.998			0.933			0.912	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3532	0	1770	1738	0	1770	3228	0
Flt Permitted	0.950			0.950			0.488			0.689		
Satd. Flow (perm)	1770	3539	1583	1770	3532	0	909	1738	0	1283	3228	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			121		2			47			81	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2630			1335			2657			1296	
Travel Time (s)		59.8			30.3			60.4			29.5	

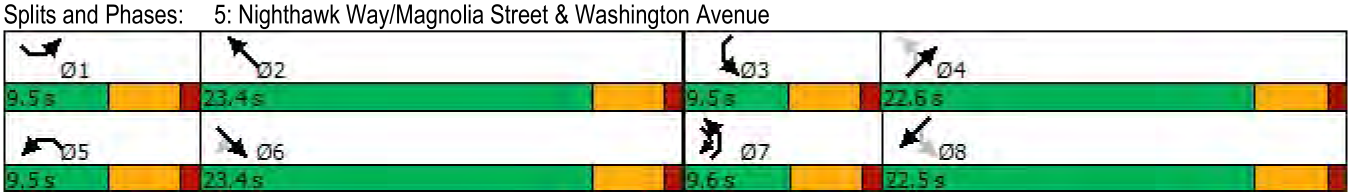
Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	39	457	115	58	577	9	112	55	45	10	54	77
Future Volume (vph)	39	457	115	58	577	9	112	55	45	10	54	77
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	41	481	121	61	607	9	118	58	47	11	57	81
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	481	121	61	616	0	118	105	0	11	138	0
Intersection Summary												

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	39	457	115	58	577	112	55	10	54
Future Volume (vph)	39	457	115	58	577	112	55	10	54
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+pt	NA	pm+pt	NA
Protected Phases	1	6	7	5	2	7	4	3	8
Permitted Phases			6			4		8	
Detector Phase	1	6	7	5	2	7	4	3	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	9.5	23.4	9.6	9.5	23.4	9.6	22.6	9.5	22.5
Total Split (%)	14.6%	36.0%	14.8%	14.6%	36.0%	14.8%	34.8%	14.6%	34.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	None	Max	None	None	None	None
Act Effct Green (s)	5.1	24.4	31.7	5.1	26.1	13.5	12.7	10.7	7.0
Actuated g/C Ratio	0.10	0.49	0.64	0.10	0.53	0.27	0.26	0.22	0.14
v/c Ratio	0.22	0.28	0.11	0.33	0.33	0.35	0.22	0.03	0.26
Control Delay	26.6	12.4	2.2	28.8	11.5	16.6	12.0	13.1	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	12.4	2.2	28.8	11.5	16.6	12.0	13.1	11.8
LOS	C	B	A	C	B	B	B	B	B
Approach Delay		11.4			13.1		14.4		11.9
Approach LOS		B			B		B		B

Intersection Summary	
Cycle Length: 65	
Actuated Cycle Length: 49.3	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.35	
Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 45.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Nighthawk Way/Magnolia Street & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	41	481	121	61	616	118	105	11	138
v/c Ratio	0.22	0.28	0.11	0.33	0.33	0.35	0.22	0.03	0.26
Control Delay	26.6	12.4	2.2	28.8	11.5	16.6	12.0	13.1	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	12.4	2.2	28.8	11.5	16.6	12.0	13.1	11.8
Queue Length 50th (ft)	12	57	0	19	51	28	13	2	8
Queue Length 95th (ft)	39	102	20	52	131	59	53	11	28
Internal Link Dist (ft)		2550			1255		2577		1216
Turn Bay Length (ft)	150		280	300		350		150	
Base Capacity (vph)	183	1749	1062	183	1872	339	683	328	1257
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.28	0.11	0.33	0.33	0.35	0.15	0.03	0.11

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	39	457	115	58	577	9	112	55	45	10	54	77
Future Volume (veh/h)	39	457	115	58	577	9	112	55	45	10	54	77
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	41	481	121	61	607	9	118	58	47	11	57	81
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	78	1379	747	102	1441	21	358	160	129	302	176	158
Arrive On Green	0.04	0.39	0.39	0.06	0.40	0.40	0.08	0.17	0.17	0.01	0.10	0.10
Sat Flow, veh/h	1774	3539	1583	1774	3570	53	1774	954	773	1774	1770	1583
Grp Volume(v), veh/h	41	481	121	61	301	315	118	0	105	11	57	81
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1853	1774	0	1726	1774	1770	1583
Q Serve(g_s), s	1.1	4.7	2.1	1.6	5.9	5.9	2.8	0.0	2.6	0.3	1.5	2.4
Cycle Q Clear(g_c), s	1.1	4.7	2.1	1.6	5.9	5.9	2.8	0.0	2.6	0.3	1.5	2.4
Prop In Lane	1.00		1.00	1.00		0.03	1.00		0.45	1.00		1.00
Lane Grp Cap(c), veh/h	78	1379	747	102	714	748	358	0	289	302	176	158
V/C Ratio(X)	0.53	0.35	0.16	0.60	0.42	0.42	0.33	0.00	0.36	0.04	0.32	0.51
Avail Cap(c_a), veh/h	183	1379	747	183	714	748	399	0	644	459	656	587
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.7	10.5	7.3	22.3	10.4	10.4	16.8	0.0	17.9	19.2	20.3	20.7
Incr Delay (d2), s/veh	5.5	0.7	0.5	5.4	1.8	1.7	0.5	0.0	0.8	0.0	1.0	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	2.4	1.0	1.0	3.2	3.3	1.4	0.0	1.3	0.1	0.8	1.1
LnGrp Delay(d),s/veh	28.2	11.2	7.8	27.7	12.2	12.1	17.4	0.0	18.7	19.2	21.4	23.3
LnGrp LOS	C	B	A	C	B	B	B		B	B	C	C
Approach Vol, veh/h		643			677			223			149	
Approach Delay, s/veh		11.6			13.6			18.0			22.3	
Approach LOS		B			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.6	24.1	5.2	12.6	7.3	23.4	8.5	9.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.0	18.9	5.0	18.1	5.0	18.9	5.1	18.0
Max Q Clear Time (g_c+I1), s	3.1	7.9	2.3	4.6	3.6	6.7	4.8	4.4
Green Ext Time (p_c), s	0.0	2.8	0.0	0.4	0.0	2.9	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.2
HCM 2010 LOS	B

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		170	150		0	80		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	1583	0	1770	1583	0
Flt Permitted	0.950			0.950								
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1863	1583	0	1863	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			109		341			289	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1335			1310			2481			639	
Travel Time (s)		30.3			29.8			56.4			14.5	

Intersection Summary

Area Type: Other

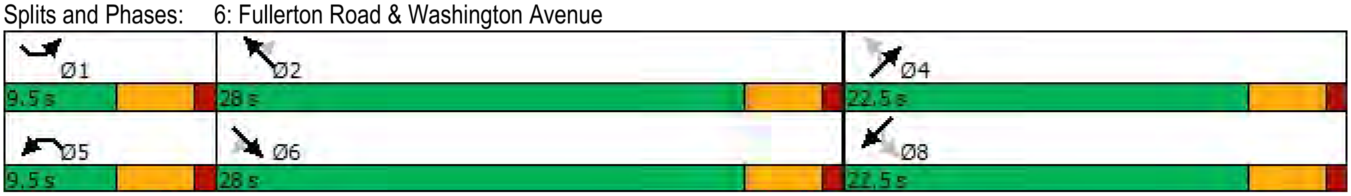
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	3	515	11	6	633	1	11	0	3	1	0	4
Future Volume (vph)	3	515	11	6	633	1	11	0	3	1	0	4
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	536	11	6	659	1	11	0	3	1	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	536	11	6	659	1	11	3	0	1	4	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Configurations										
Traffic Volume (vph)	3	515	11	6	633	1	11	0	1	0
Future Volume (vph)	3	515	11	6	633	1	11	0	1	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	1	6		5	2			4		8
Permitted Phases			6			2	4		8	
Detector Phase	1	6	6	5	2	2	4	4	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	28.0	28.0	9.5	28.0	28.0	22.5	22.5	22.5	22.5
Total Split (%)	15.8%	46.7%	46.7%	15.8%	46.7%	46.7%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	5.0	39.6	39.6	5.0	39.6	39.6	6.0	6.0	5.8	5.8
Actuated g/C Ratio	0.11	0.90	0.90	0.11	0.90	0.90	0.14	0.14	0.13	0.13
v/c Ratio	0.01	0.17	0.01	0.03	0.39	0.00	0.04	0.01	0.00	0.01
Control Delay	19.0	2.6	0.0	19.0	5.0	0.0	17.7	0.0	17.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	2.6	0.0	19.0	5.0	0.0	17.7	0.0	17.0	0.0
LOS	B	A	A	B	A	A	B	A	B	A
Approach Delay		2.7			5.1			13.9		3.4
Approach LOS		A			A			B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 44.2	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.39	
Intersection Signal Delay: 4.1	Intersection LOS: A
Intersection Capacity Utilization 48.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Fullerton Road & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	3	536	11	6	659	1	11	3	1	4
v/c Ratio	0.01	0.17	0.01	0.03	0.39	0.00	0.04	0.01	0.00	0.01
Control Delay	19.0	2.6	0.0	19.0	5.0	0.0	17.7	0.0	17.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	2.6	0.0	19.0	5.0	0.0	17.7	0.0	17.0	0.0
Queue Length 50th (ft)	1	0	0	1	0	0	2	0	0	0
Queue Length 95th (ft)	6	70	0	10	#258	0	13	0	4	0
Internal Link Dist (ft)		1255			1230			2401		559
Turn Bay Length (ft)			170	150			80			
Base Capacity (vph)	200	3171	1430	200	1669	1430	760	848	760	817
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.17	0.01	0.03	0.39	0.00	0.01	0.00	0.00	0.00

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	3	515	11	6	633	1	11	0	3	1	0	4
Future Volume (veh/h)	3	515	11	6	633	1	11	0	3	1	0	4
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	3	536	11	6	659	1	11	0	3	1	0	4
Adj No. of Lanes	1	2	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	7	2176	973	14	1153	980	219	0	38	219	0	38
Arrive On Green	0.00	0.61	0.61	0.01	0.62	0.62	0.02	0.00	0.02	0.02	0.00	0.02
Sat Flow, veh/h	1774	3539	1583	1774	1863	1583	1407	0	1583	1408	0	1583
Grp Volume(v), veh/h	3	536	11	6	659	1	11	0	3	1	0	4
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1863	1583	1407	0	1583	1408	0	1583
Q Serve(g_s), s	0.1	2.6	0.1	0.1	8.0	0.0	0.3	0.0	0.1	0.0	0.0	0.1
Cycle Q Clear(g_c), s	0.1	2.6	0.1	0.1	8.0	0.0	0.4	0.0	0.1	0.1	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	7	2176	973	14	1153	980	219	0	38	219	0	38
V/C Ratio(X)	0.41	0.25	0.01	0.42	0.57	0.00	0.05	0.00	0.08	0.00	0.00	0.11
Avail Cap(c_a), veh/h	232	2176	973	232	1153	980	847	0	746	849	0	746
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.0	3.3	2.9	18.9	4.3	2.8	18.4	0.0	18.2	18.3	0.0	18.3
Incr Delay (d2), s/veh	33.3	0.3	0.0	18.3	2.1	0.0	0.1	0.0	0.9	0.0	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.3	0.0	0.1	4.7	0.0	0.1	0.0	0.0	0.0	0.0	0.1
LnGrp Delay(d),s/veh	52.3	3.6	2.9	37.2	6.4	2.8	18.5	0.0	19.1	18.3	0.0	19.5
LnGrp LOS	D	A	A	D	A	A	B		B	B		B
Approach Vol, veh/h		550			666			14			5	
Approach Delay, s/veh		3.9			6.6			18.7			19.2	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.7	28.2		5.4	4.8	28.0		5.4
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	5.0	23.5		18.0
Max Q Clear Time (g_c+I1), s	2.1	10.0		2.4	2.1	4.6		2.1
Green Ext Time (p_c), s	0.0	3.8		0.0	0.0	3.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	5.6
HCM 2010 LOS	A

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.990			0.997			0.873			0.936	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3504	0	1770	3529	0	1770	1626	0	1770	1744	0
Flt Permitted	0.950			0.950			0.711			0.702		
Satd. Flow (perm)	1770	3504	0	1770	3529	0	1324	1626	0	1308	1744	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			4			105			30	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

Intersection Summary	
Area Type:	Other

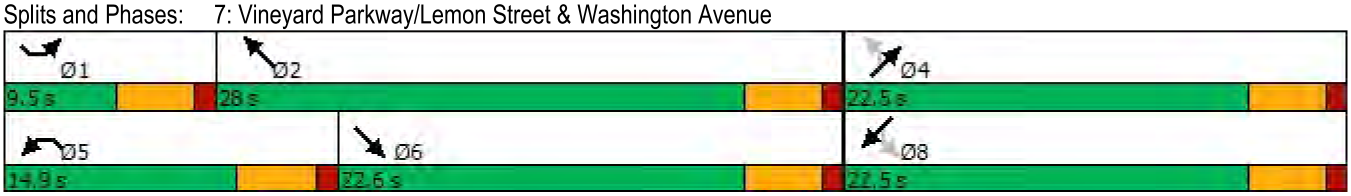
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	14	483	36	135	596	12	31	18	99	11	38	28
Future Volume (vph)	14	483	36	135	596	12	31	18	99	11	38	28
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	15	514	38	144	634	13	33	19	105	12	40	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	552	0	144	647	0	33	124	0	12	70	0

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	14	483	135	596	31	18	11	38
Future Volume (vph)	14	483	135	596	31	18	11	38
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases					4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	22.6	14.9	28.0	22.5	22.5	22.5	22.5
Total Split (%)	15.8%	37.7%	24.8%	46.7%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	5.0	23.7	8.6	32.8	6.9	6.9	6.9	6.9
Actuated g/C Ratio	0.11	0.50	0.18	0.69	0.15	0.15	0.15	0.15
v/c Ratio	0.08	0.31	0.45	0.26	0.17	0.38	0.06	0.25
Control Delay	21.7	11.0	22.3	5.1	20.3	10.2	18.5	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.7	11.0	22.3	5.1	20.3	10.2	18.5	14.5
LOS	C	B	C	A	C	B	B	B
Approach Delay		11.2		8.3		12.3		15.1
Approach LOS		B		A		B		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 47.3	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.45	
Intersection Signal Delay: 10.1	Intersection LOS: B
Intersection Capacity Utilization 41.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	15	552	144	647	33	124	12	70
v/c Ratio	0.08	0.31	0.45	0.26	0.17	0.38	0.06	0.25
Control Delay	21.7	11.0	22.3	5.1	20.3	10.2	18.5	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.7	11.0	22.3	5.1	20.3	10.2	18.5	14.5
Queue Length 50th (ft)	4	54	35	27	8	5	3	10
Queue Length 95th (ft)	18	100	81	96	27	40	14	37
Internal Link Dist (ft)		1230		2572		2575		1085
Turn Bay Length (ft)	150		255		160		150	
Base Capacity (vph)	187	1758	390	2446	505	686	499	685
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.31	0.37	0.26	0.07	0.18	0.02	0.10

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	14	483	36	135	596	12	31	18	99	11	38	28
Future Volume (veh/h)	14	483	36	135	596	12	31	18	99	11	38	28
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	15	514	38	144	634	13	33	19	105	12	40	30
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	34	1526	113	188	1927	39	284	31	172	234	124	93
Arrive On Green	0.02	0.46	0.46	0.11	0.54	0.54	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	1774	3342	247	1774	3547	73	1325	248	1372	1262	990	742
Grp Volume(v), veh/h	15	272	280	144	316	331	33	0	124	12	0	70
Grp Sat Flow(s),veh/h/ln	1774	1770	1819	1774	1770	1850	1325	0	1621	1262	0	1732
Q Serve(g_s), s	0.4	4.3	4.3	3.4	4.3	4.3	1.0	0.0	3.1	0.4	0.0	1.6
Cycle Q Clear(g_c), s	0.4	4.3	4.3	3.4	4.3	4.3	2.6	0.0	3.1	3.5	0.0	1.6
Prop In Lane	1.00		0.14	1.00		0.04	1.00		0.85	1.00		0.43
Lane Grp Cap(c), veh/h	34	808	830	188	961	1005	284	0	204	234	0	218
V/C Ratio(X)	0.44	0.34	0.34	0.77	0.33	0.33	0.12	0.00	0.61	0.05	0.00	0.32
Avail Cap(c_a), veh/h	205	808	830	426	961	1005	669	0	674	600	0	721
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.0	7.5	7.6	18.8	5.5	5.5	18.4	0.0	17.9	19.6	0.0	17.2
Incr Delay (d2), s/veh	8.9	1.1	1.1	6.4	0.9	0.9	0.2	0.0	2.9	0.1	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.3	2.4	2.0	2.3	2.4	0.4	0.0	1.5	0.1	0.0	0.8
LnGrp Delay(d),s/veh	29.8	8.7	8.7	25.3	6.4	6.4	18.6	0.0	20.8	19.7	0.0	18.1
LnGrp LOS	C	A	A	C	A	A	B		C	B		B
Approach Vol, veh/h		567			791			157			82	
Approach Delay, s/veh		9.2			9.8			20.4			18.3	
Approach LOS		A			A			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.3	28.0		9.9	9.1	24.2		9.9
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	10.4	18.1		18.0
Max Q Clear Time (g_c+I1), s	2.4	6.3		5.1	5.4	6.3		5.5
Green Ext Time (p_c), s	0.0	3.7		0.6	0.1	2.6		0.2

Intersection Summary		
HCM 2010 Ctrl Delay		11.1
HCM 2010 LOS		B

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.981				0.850		0.985				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1827	0	1770	1863	1583	1770	1835	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1827	0	1770	1863	1583	1770	1835	0	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				234		8				511
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary	
Area Type:	Other

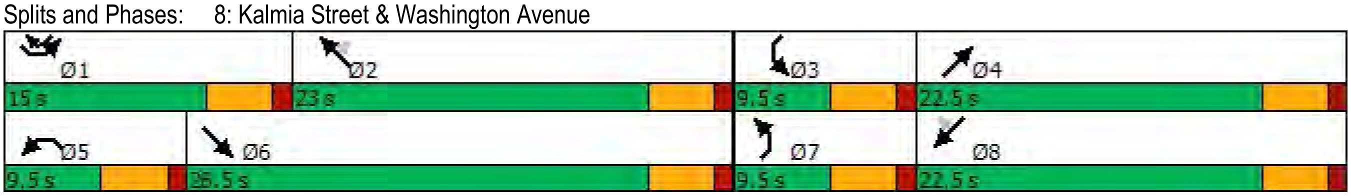
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	437	193	28	5	306	107	48	78	9	86	53	501
Future Volume (vph)	437	193	28	5	306	107	48	78	9	86	53	501
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	446	197	29	5	312	109	49	80	9	88	54	511
Shared Lane Traffic (%)												
Lane Group Flow (vph)	446	226	0	5	312	109	49	89	0	88	54	511

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	437	193	5	306	107	48	78	86	53	501
Future Volume (vph)	437	193	5	306	107	48	78	86	53	501
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	15.0	28.5	9.5	23.0	23.0	9.5	22.5	9.5	22.5	15.0
Total Split (%)	21.4%	40.7%	13.6%	32.9%	32.9%	13.6%	32.1%	13.6%	32.1%	21.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	10.4	34.2	5.2	19.3	19.3	5.2	8.1	5.2	9.9	10.4
Actuated g/C Ratio	0.19	0.61	0.09	0.35	0.35	0.09	0.14	0.09	0.18	0.19
v/c Ratio	0.70	0.20	0.03	0.48	0.16	0.30	0.33	0.53	0.16	0.72
Control Delay	30.7	9.3	26.8	20.4	0.5	31.9	25.1	42.3	23.5	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	9.3	26.8	20.4	0.5	31.9	25.1	42.3	23.5	9.9
LOS	C	A	C	C	A	C	C	D	C	A
Approach Delay		23.5		15.4			27.5		15.4	
Approach LOS		C		B			C		B	

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 55.9	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 19.2	Intersection LOS: B
Intersection Capacity Utilization 62.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 8: Kalmia Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	446	226	5	312	109	49	89	88	54	511
v/c Ratio	0.70	0.20	0.03	0.48	0.16	0.30	0.33	0.53	0.16	0.72
Control Delay	30.7	9.3	26.8	20.4	0.5	31.9	25.1	42.3	23.5	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	9.3	26.8	20.4	0.5	31.9	25.1	42.3	23.5	9.9
Queue Length 50th (ft)	79	35	2	92	0	17	27	32	18	0
Queue Length 95th (ft)	#148	103	11	173	0	47	63	#94	45	#99
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	673	1121	165	644	700	165	622	165	626	721
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.20	0.03	0.48	0.16	0.30	0.14	0.53	0.09	0.71

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	437	193	28	5	306	107	48	78	9	86	53	501
Future Volume (veh/h)	437	193	28	5	306	107	48	78	9	86	53	501
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	446	197	29	5	312	109	49	80	9	88	54	511
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	531	666	98	12	507	431	79	404	45	113	493	663
Arrive On Green	0.15	0.42	0.42	0.01	0.27	0.27	0.04	0.25	0.25	0.06	0.26	0.26
Sat Flow, veh/h	3442	1588	234	1774	1863	1583	1774	1645	185	1774	1863	1583
Grp Volume(v), veh/h	446	0	226	5	312	109	49	0	89	88	54	511
Grp Sat Flow(s),veh/h/ln	1721	0	1821	1774	1863	1583	1774	0	1830	1774	1863	1583
Q Serve(g_s), s	8.6	0.0	5.6	0.2	10.0	3.7	1.8	0.0	2.6	3.3	1.5	18.0
Cycle Q Clear(g_c), s	8.6	0.0	5.6	0.2	10.0	3.7	1.8	0.0	2.6	3.3	1.5	18.0
Prop In Lane	1.00		0.13	1.00		1.00	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	531	0	765	12	507	431	79	0	449	113	493	663
V/C Ratio(X)	0.84	0.00	0.30	0.43	0.62	0.25	0.62	0.00	0.20	0.78	0.11	0.77
Avail Cap(c_a), veh/h	531	0	765	130	507	431	130	0	484	130	493	663
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.9	0.0	13.1	33.7	21.7	19.4	31.9	0.0	20.3	31.4	18.9	17.0
Incr Delay (d2), s/veh	11.4	0.0	1.0	22.5	5.5	1.4	7.8	0.0	0.2	22.8	0.1	5.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	0.0	3.0	0.2	5.9	1.8	1.1	0.0	1.3	2.4	0.8	9.2
LnGrp Delay(d),s/veh	39.4	0.0	14.1	56.2	27.2	20.8	39.7	0.0	20.6	54.2	19.0	22.5
LnGrp LOS	D		B	E	C	C	D		C	D	B	C
Approach Vol, veh/h		672			426			138			653	
Approach Delay, s/veh		30.9			25.9			27.4			26.5	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	23.0	8.8	21.2	5.0	33.0	7.5	22.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	18.5	5.0	18.0	5.0	24.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	10.6	12.0	5.3	4.6	2.2	7.6	3.8	20.0
Green Ext Time (p_c), s	0.0	1.2	0.0	0.3	0.0	1.1	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	28.0
HCM 2010 LOS	C

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	60		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.986						0.932				0.850
Flt Protected				0.950				0.976			0.950	
Satd. Flow (prot)	0	1837	0	1770	1863	0	0	1694	0	0	1770	1583
Flt Permitted				0.950				0.976			0.950	
Satd. Flow (perm)	0	1837	0	1770	1863	0	0	1694	0	0	1770	1583
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1045			237			351			183	
Travel Time (s)		23.8			5.4			8.0			4.2	

Intersection Summary

Area Type: Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	0	43	5	9	26	0	5	0	5	49	0	30
Future Volume (vph)	0	43	5	9	26	0	5	0	5	49	0	30
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	54	6	11	33	0	6	0	6	62	0	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	60	0	11	33	0	0	12	0	0	62	38
Intersection Summary												

Intersection	
Int Delay, s/veh	5.1

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	43	5	9	26	0	5	0	5	49	0	30
Future Vol, veh/h	0	43	5	9	26	0	5	0	5	49	0	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	60	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	54	6	11	33	0	6	0	6	62	0	38

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	60	0	0	131	112	57	115	115	33
Stage 1	-	-	-	-	-	-	57	57	-	55	55	-
Stage 2	-	-	-	-	-	-	74	55	-	60	60	-
Critical Hdwy	-	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1544	-	0	841	778	1009	862	775	1041
Stage 1	0	-	-	-	-	0	955	847	-	957	849	-
Stage 2	0	-	-	-	-	0	935	849	-	951	845	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1544	-	-	806	773	1009	852	770	1041
Mov Cap-2 Maneuver	-	-	-	-	-	-	806	773	-	852	770	-
Stage 1	-	-	-	-	-	-	955	847	-	957	843	-
Stage 2	-	-	-	-	-	-	894	843	-	945	845	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	1.9	9.1	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	896	1544	-	-	-	852	1041
HCM Lane V/C Ratio	0.014	0.007	-	-	-	0.073	0.036
HCM Control Delay (s)	9.1	7.3	-	-	-	9.6	8.6
HCM Lane LOS	A	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	0	-	-	-	0.2	0.1

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected				0.950		
Satd. Flow (prot)	1863	0	0	1770	1863	0
Flt Permitted				0.950		
Satd. Flow (perm)	1863	0	0	1770	1863	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	112			181	2481	
Travel Time (s)	2.5			4.1	56.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	0	0	71	0	0	0
Future Volume (vph)	0	0	71	0	0	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	0	0	88	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	88	0	0
Intersection Summary						

Intersection						
Int Delay, s/veh	7.2					

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	0	0	71	0	0	0
Future Vol, veh/h	0	0	71	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	88	0	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	177	1	1	0	-	0
Stage 1	1	-	-	-	-	-
Stage 2	176	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	813	1084	1622	-	-	-
Stage 1	1022	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	769	1084	1622	-	-	-
Mov Cap-2 Maneuver	769	-	-	-	-	-
Stage 1	967	-	-	-	-	-
Stage 2	855	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	0	7.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	1622	-	-	-	-
HCM Lane V/C Ratio	0.054	-	-	-	-
HCM Control Delay (s)	7.3	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-	-

Appendix G

Project Buildout Year With Ambient Growth
With Cumulative Projects Conditions
Intersection Analysis

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			1	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.865		
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	0	1611	1770	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	0	1611	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		340	1045		2657	
Travel Time (s)		7.7	23.8		60.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	0	0	0	246	284	0
Future Volume (vph)	0	0	0	246	284	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	0	0	357	412	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	357	412	0

Intersection Summary

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↰		↱	↰	
Traffic Vol, veh/h	0	0	0	246	284	0
Future Vol, veh/h	0	0	0	246	284	0
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	357	412	0
Number of Lanes	0	1	0	1	1	0

Approach	SE	NW	SW
Opposing Approach	NW	SE	
Opposing Lanes	1	1	0
Conflicting Approach Left	SW		NW
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SW	SE
Conflicting Lanes Right	0	1	1
HCM Control Delay	0	10.8	14.2
HCM LOS	-	B	B

Lane	NWLn1	SELn1	SWLn1
Vol Left, %	0%	0%	100%
Vol Thru, %	0%	100%	0%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	246	0	284
LT Vol	0	0	284
Through Vol	0	0	0
RT Vol	246	0	0
Lane Flow Rate	357	0	412
Geometry Grp	1	1	1
Degree of Util (X)	0.436	0	0.563
Departure Headway (Hd)	4.398	5.434	4.924
Convergence, Y/N	Yes	Yes	Yes
Cap	816	0	729
Service Time	2.435	3.513	2.993
HCM Lane V/C Ratio	0.438	0	0.565
HCM Control Delay	10.8	8.5	14.2
HCM Lane LOS	B	N	B
HCM 95th-tile Q	2.2	0	3.5

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	60			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.923		0.936	
Flt Protected	0.950				0.974	
Satd. Flow (prot)	1770	1863	1719	0	1698	0
Flt Permitted	0.950				0.974	
Satd. Flow (perm)	1770	1863	1719	0	1698	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		237	1361		181	
Travel Time (s)		5.4	30.9		4.1	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	47	149	181	242	27	25
Future Volume (vph)	47	149	181	242	27	25
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	72	229	278	372	42	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	72	229	650	0	80	0

Intersection Summary

Intersection	
Int Delay, s/veh	1.9

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	47	149	181	242	27	25
Future Vol, veh/h	47	149	181	242	27	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	60	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	65	65	65	65	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	72	229	278	372	42	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	650	0	-	0	837	464
Stage 1	-	-	-	-	464	-
Stage 2	-	-	-	-	373	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	936	-	-	-	337	598
Stage 1	-	-	-	-	633	-
Stage 2	-	-	-	-	696	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	936	-	-	-	311	598
Mov Cap-2 Maneuver	-	-	-	-	311	-
Stage 1	-	-	-	-	584	-
Stage 2	-	-	-	-	696	-

Approach	SE	NW	SW
HCM Control Delay, s	2.2	0	16.1
HCM LOS			C

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	936	-	404
HCM Lane V/C Ratio	-	-	0.077	-	0.198
HCM Control Delay (s)	-	-	9.2	-	16.1
HCM Lane LOS	-	-	A	-	C
HCM 95th %tile Q(veh)	-	-	0.3	-	0.7

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	333	6	6	500	238	324
Future Volume (vph)	333	6	6	500	238	324
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	401	7	7	602	287	390
Shared Lane Traffic (%)						
Lane Group Flow (vph)	401	7	7	602	287	390

Intersection Summary

Intersection	
Intersection Delay, s/veh	75.8
Intersection LOS	F

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	333	6	6	500	238	324
Future Vol, veh/h	333	6	6	500	238	324
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	401	7	7	602	287	390
Number of Lanes	1	1	1	1	1	1

Approach	SE	NE	SW
Opposing Approach		SW	NE
Opposing Lanes	0	2	2
Conflicting Approach Left	SW	SE	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NE		SE
Conflicting Lanes Right	2	0	2
HCM Control Delay	50.5	150.4	23.9
HCM LOS	F	F	C

Lane	NELn1	NELn2	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	6	500	333	6	238	324
LT Vol	6	0	333	0	0	0
Through Vol	0	500	0	0	238	0
RT Vol	0	0	0	6	0	324
Lane Flow Rate	7	602	401	7	287	390
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.016	1.249	0.898	0.014	0.586	0.722
Departure Headway (Hd)	7.982	7.467	8.512	7.272	7.831	7.105
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	448	488	429	495	465	511
Service Time	5.737	5.221	6.212	4.972	5.531	4.805
HCM Lane V/C Ratio	0.016	1.234	0.935	0.014	0.617	0.763
HCM Control Delay	10.9	152.1	51.2	10.1	21	26.1
HCM Lane LOS	B	F	F	B	C	D
HCM 95th-tile Q	0	24.2	9.5	0	3.7	5.8

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	85		0	150		0	150		0	250		100
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.957				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3387	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3387	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		61				182			94			236
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1461			2630			1510			1533	
Travel Time (s)		33.2			59.8			34.3			34.8	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	98	400	160	263	408	135	285	337	501	188	208	95
Future Volume (vph)	98	400	160	263	408	135	285	337	501	188	208	95
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	110	449	180	296	458	152	320	379	563	211	234	107
Shared Lane Traffic (%)												
Lane Group Flow (vph)	110	629	0	296	458	152	320	379	563	211	234	107

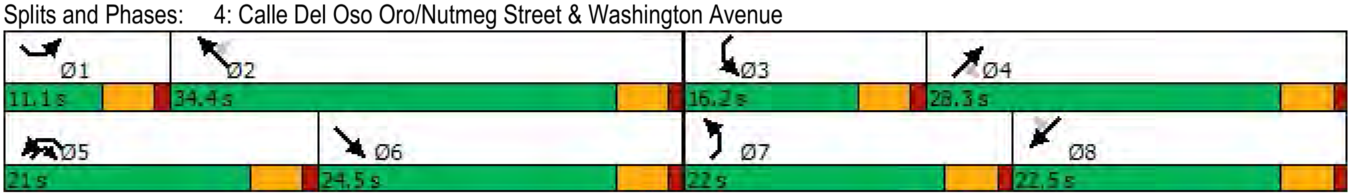
Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	98	400	263	408	135	285	337	501	188	208	95
Future Volume (vph)	98	400	263	408	135	285	337	501	188	208	95
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	1	6	5	2		7	4	5	3	8	
Permitted Phases					2			4			8
Detector Phase	1	6	5	2	2	7	4	5	3	8	8
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	9.5	22.5	22.5
Total Split (s)	11.1	24.5	21.0	34.4	34.4	22.0	28.3	21.0	16.2	22.5	22.5
Total Split (%)	12.3%	27.2%	23.3%	38.2%	38.2%	24.4%	31.4%	23.3%	18.0%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	6.6	20.3	16.2	29.9	29.9	17.3	21.2	42.0	11.7	15.6	15.6
Actuated g/C Ratio	0.08	0.23	0.19	0.34	0.34	0.20	0.24	0.48	0.13	0.18	0.18
v/c Ratio	0.83	0.76	0.90	0.72	0.23	0.91	0.84	0.70	0.89	0.70	0.22
Control Delay	85.6	35.5	67.5	33.4	3.1	67.6	49.2	19.8	76.2	46.0	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.6	35.5	67.5	33.4	3.1	67.6	49.2	19.8	76.2	46.0	1.1
LOS	F	D	E	C	A	E	D	B	E	D	A
Approach Delay		43.0		39.5			40.7			48.8	
Approach LOS		D		D			D			D	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 87.5
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 42.2 Intersection LOS: D
Intersection Capacity Utilization 73.9% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 4: Calle Del Oso Oro/Nutmeg Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group Flow (vph)	110	629	296	458	152	320	379	563	211	234	107
v/c Ratio	0.83	0.76	0.90	0.72	0.23	0.91	0.84	0.70	0.89	0.70	0.22
Control Delay	85.6	35.5	67.5	33.4	3.1	67.6	49.2	19.8	76.2	46.0	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.6	35.5	67.5	33.4	3.1	67.6	49.2	19.8	76.2	46.0	1.1
Queue Length 50th (ft)	63	161	166	228	0	180	199	192	120	123	0
Queue Length 95th (ft)	#156	221	#312	337	26	#332	#325	306	#247	198	0
Internal Link Dist (ft)		1381		2550			1430			1453	
Turn Bay Length (ft)	85		150			150			250		100
Base Capacity (vph)	133	832	334	637	661	354	507	813	237	383	513
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.76	0.89	0.72	0.23	0.90	0.75	0.69	0.89	0.61	0.21

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	98	400	160	263	408	135	285	337	501	188	208	95
Future Volume (veh/h)	98	400	160	263	408	135	285	337	501	188	208	95
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	110	449	180	296	458	152	320	379	563	211	234	107
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	130	550	219	325	619	526	345	493	709	231	373	317
Arrive On Green	0.07	0.22	0.22	0.18	0.33	0.33	0.19	0.26	0.26	0.13	0.20	0.20
Sat Flow, veh/h	1774	2475	984	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	110	320	309	296	458	152	320	379	563	211	234	107
Grp Sat Flow(s),veh/h/ln	1774	1770	1689	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	5.5	15.5	15.7	14.7	19.6	6.4	16.0	16.9	23.8	10.6	10.3	5.2
Cycle Q Clear(g_c), s	5.5	15.5	15.7	14.7	19.6	6.4	16.0	16.9	23.8	10.6	10.3	5.2
Prop In Lane	1.00		0.58	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	130	393	375	325	619	526	345	493	709	231	373	317
V/C Ratio(X)	0.85	0.81	0.82	0.91	0.74	0.29	0.93	0.77	0.79	0.91	0.63	0.34
Avail Cap(c_a), veh/h	130	393	375	325	619	526	345	493	709	231	373	317
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.2	33.2	33.3	36.0	26.6	22.2	35.6	30.6	21.3	38.7	32.9	30.9
Incr Delay (d2), s/veh	37.3	16.7	18.2	28.3	7.8	1.4	30.6	7.3	6.2	37.0	3.3	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	9.4	9.2	9.8	11.4	3.0	10.8	9.6	13.1	7.5	5.7	2.3
LnGrp Delay(d),s/veh	78.5	49.9	51.5	64.3	34.4	23.6	66.2	37.8	27.5	75.6	36.3	31.5
LnGrp LOS	E	D	D	E	C	C	E	D	C	E	D	C
Approach Vol, veh/h		739			906			1262			552	
Approach Delay, s/veh		54.8			42.4			40.4			50.4	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	34.4	16.2	28.3	21.0	24.5	22.0	22.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.6	29.9	11.7	23.8	16.5	20.0	17.5	18.0
Max Q Clear Time (g_c+I1), s	7.5	21.6	12.6	25.8	16.7	17.7	18.0	12.3
Green Ext Time (p_c), s	0.0	2.2	0.0	0.0	0.0	0.9	0.0	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	45.6
HCM 2010 LOS	D

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↰	↑↑	↱	↰	↑↱		↰	↱		↰	↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		280	300		0	350		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.987			0.937			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3493	0	1770	1745	0	1770	3511	0
Flt Permitted	0.950			0.950			0.177			0.471		
Satd. Flow (perm)	1770	3539	1583	1770	3493	0	330	1745	0	877	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73		11			47			5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2630			1335			2657			1296	
Travel Time (s)		59.8			30.3			60.4			29.5	

Intersection Summary	
Area Type:	Other

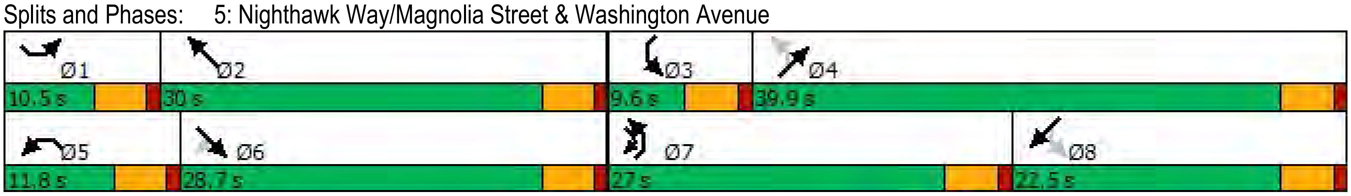
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	24	589	564	86	372	36	337	207	148	55	357	19
Future Volume (vph)	24	589	564	86	372	36	337	207	148	55	357	19
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	35	866	829	126	547	53	496	304	218	81	525	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	866	829	126	600	0	496	522	0	81	553	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	24	589	564	86	372	337	207	55	357
Future Volume (vph)	24	589	564	86	372	337	207	55	357
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+pt	NA	pm+pt	NA
Protected Phases	1	6	7	5	2	7	4	3	8
Permitted Phases			6			4		8	
Detector Phase	1	6	7	5	2	7	4	3	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	10.5	28.7	27.0	11.8	30.0	27.0	39.9	9.6	22.5
Total Split (%)	11.7%	31.9%	30.0%	13.1%	33.3%	30.0%	44.3%	10.7%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	None	Max	None	None	None	None
Act Effct Green (s)	5.9	24.2	51.2	7.3	29.8	44.2	36.6	22.3	17.2
Actuated g/C Ratio	0.07	0.27	0.57	0.08	0.33	0.50	0.41	0.25	0.19
v/c Ratio	0.30	0.90	0.88	0.88	0.51	0.94	0.70	0.30	0.81
Control Delay	47.0	45.8	28.4	90.5	26.6	51.0	26.6	17.9	44.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.0	45.8	28.4	90.5	26.6	51.0	26.6	17.9	44.9
LOS	D	D	C	F	C	D	C	B	D
Approach Delay		37.4			37.7		38.5		41.5
Approach LOS		D			D		D		D

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 89.2	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 38.4	Intersection LOS: D
Intersection Capacity Utilization 65.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Nighthawk Way/Magnolia Street & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	35	866	829	126	600	496	522	81	553
v/c Ratio	0.30	0.90	0.88	0.88	0.51	0.94	0.70	0.30	0.81
Control Delay	47.0	45.8	28.4	90.5	26.6	51.0	26.6	17.9	44.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.0	45.8	28.4	90.5	26.6	51.0	26.6	17.9	44.9
Queue Length 50th (ft)	19	251	355	72	152	223	226	23	156
Queue Length 95th (ft)	37	225	302	#111	145	222	223	35	153
Internal Link Dist (ft)		2550			1255		2577		1216
Turn Bay Length (ft)	150		280	300		350		150	
Base Capacity (vph)	119	960	940	144	1172	527	742	269	712
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.90	0.88	0.88	0.51	0.94	0.70	0.30	0.78

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	24	589	564	86	372	36	337	207	148	55	357	19
Future Volume (veh/h)	24	589	564	86	372	36	337	207	148	55	357	19
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	35	866	829	126	547	53	496	304	218	81	525	28
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	2	0
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	58	994	828	150	1085	105	543	378	271	266	628	33
Arrive On Green	0.03	0.28	0.28	0.08	0.33	0.33	0.24	0.37	0.37	0.05	0.18	0.18
Sat Flow, veh/h	1774	3539	1583	1774	3261	315	1774	1010	725	1774	3418	182
Grp Volume(v), veh/h	35	866	829	126	296	304	496	0	522	81	271	282
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1807	1774	0	1735	1774	1770	1831
Q Serve(g_s), s	1.7	20.1	24.2	6.0	11.6	11.6	18.4	0.0	23.2	3.2	12.7	12.8
Cycle Q Clear(g_c), s	1.7	20.1	24.2	6.0	11.6	11.6	18.4	0.0	23.2	3.2	12.7	12.8
Prop In Lane	1.00		1.00	1.00		0.17	1.00		0.42	1.00		0.10
Lane Grp Cap(c), veh/h	58	994	828	150	589	601	543	0	649	266	325	336
V/C Ratio(X)	0.60	0.87	1.00	0.84	0.50	0.51	0.91	0.00	0.80	0.30	0.84	0.84
Avail Cap(c_a), veh/h	124	994	828	150	589	601	577	0	713	281	370	382
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.1	29.5	20.6	38.9	23.0	23.1	19.9	0.0	24.1	26.7	33.9	33.9
Incr Delay (d2), s/veh	9.5	10.4	31.7	32.1	3.1	3.0	18.6	0.0	6.2	0.6	13.8	13.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	11.2	26.6	4.3	6.1	6.2	11.8	0.0	12.1	1.6	7.4	7.8
LnGrp Delay(d),s/veh	50.6	39.9	52.2	71.0	26.1	26.1	38.5	0.0	30.3	27.4	47.7	47.6
LnGrp LOS	D	D	F	E	C	C	D		C	C	D	D
Approach Vol, veh/h		1730			726			1018			634	
Approach Delay, s/veh		46.0			33.9			34.3			45.1	
Approach LOS		D			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.3	33.2	8.9	36.8	11.8	28.7	25.3	20.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.0	25.5	5.1	35.4	7.3	24.2	22.5	18.0
Max Q Clear Time (g_c+I1), s	3.7	13.6	5.2	25.2	8.0	26.2	20.4	14.8
Green Ext Time (p_c), s	0.0	2.9	0.0	2.5	0.0	0.0	0.4	1.0

Intersection Summary	
HCM 2010 Ctrl Delay	40.8
HCM 2010 LOS	D

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		170	150		0	80		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	1583	0	1770	1583	0
Flt Permitted	0.950			0.950			0.744			0.679		
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1386	1583	0	1265	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			372			109		241			355	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1335			1310			2481			639	
Travel Time (s)		30.3			29.8			56.4			14.5	

Intersection Summary	
Area Type:	Other

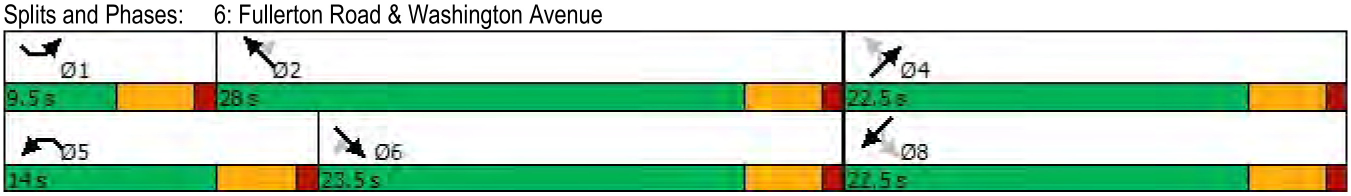
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	13	589	227	148	348	1	105	0	74	2	0	12
Future Volume (vph)	13	589	227	148	348	1	105	0	74	2	0	12
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	21	966	372	243	570	2	172	0	121	3	0	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	966	372	243	570	2	172	121	0	3	20	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Configurations										
Traffic Volume (vph)	13	589	227	148	348	1	105	0	2	0
Future Volume (vph)	13	589	227	148	348	1	105	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	1	6		5	2			4		8
Permitted Phases			6			2	4		8	
Detector Phase	1	6	6	5	2	2	4	4	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	23.5	23.5	14.0	28.0	28.0	22.5	22.5	22.5	22.5
Total Split (%)	15.8%	39.2%	39.2%	23.3%	46.7%	46.7%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	5.1	19.9	19.9	9.6	33.7	33.7	11.7	11.7	11.4	11.4
Actuated g/C Ratio	0.10	0.38	0.38	0.18	0.65	0.65	0.22	0.22	0.22	0.22
v/c Ratio	0.12	0.71	0.45	0.75	0.47	0.00	0.55	0.22	0.01	0.03
Control Delay	26.2	20.2	4.1	40.7	11.5	0.0	25.6	0.9	15.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	20.2	4.1	40.7	11.5	0.0	25.6	0.9	15.5	0.1
LOS	C	C	A	D	B	A	C	A	B	A
Approach Delay		15.9			20.2			15.4		2.1
Approach LOS		B			C			B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 52.1	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 17.1	Intersection LOS: B
Intersection Capacity Utilization 48.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Fullerton Road & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	21	966	372	243	570	2	172	121	3	20
v/c Ratio	0.12	0.71	0.45	0.75	0.47	0.00	0.55	0.22	0.01	0.03
Control Delay	26.2	20.2	4.1	40.7	11.5	0.0	25.6	0.9	15.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	20.2	4.1	40.7	11.5	0.0	25.6	0.9	15.5	0.1
Queue Length 50th (ft)	6	140	0	75	85	0	49	0	1	0
Queue Length 95th (ft)	17	138	1	98	158	0	61	0	4	0
Internal Link Dist (ft)		1255			1230			2401		559
Turn Bay Length (ft)			170	150			80			
Base Capacity (vph)	173	1354	835	330	1204	1062	489	715	447	789
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.71	0.45	0.74	0.47	0.00	0.35	0.17	0.01	0.03

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	13	589	227	148	348	1	105	0	74	2	0	12
Future Volume (veh/h)	13	589	227	148	348	1	105	0	74	2	0	12
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	21	966	372	243	570	2	172	0	121	3	0	20
Adj No. of Lanes	1	2	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	45	1345	602	297	973	827	382	0	289	289	0	289
Arrive On Green	0.03	0.38	0.38	0.17	0.52	0.52	0.18	0.00	0.18	0.18	0.00	0.18
Sat Flow, veh/h	1774	3539	1583	1774	1863	1583	1386	0	1583	1265	0	1583
Grp Volume(v), veh/h	21	966	372	243	570	2	172	0	121	3	0	20
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1863	1583	1386	0	1583	1265	0	1583
Q Serve(g_s), s	0.6	11.6	9.5	6.6	10.5	0.0	5.9	0.0	3.4	0.1	0.0	0.5
Cycle Q Clear(g_c), s	0.6	11.6	9.5	6.6	10.5	0.0	6.4	0.0	3.4	3.5	0.0	0.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	45	1345	602	297	973	827	382	0	289	289	0	289
V/C Ratio(X)	0.47	0.72	0.62	0.82	0.59	0.00	0.45	0.00	0.42	0.01	0.00	0.07
Avail Cap(c_a), veh/h	177	1345	602	337	973	827	629	0	570	514	0	570
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.0	13.2	12.6	20.1	8.2	5.7	19.6	0.0	18.1	19.6	0.0	16.9
Incr Delay (d2), s/veh	7.4	3.3	4.7	13.1	2.6	0.0	0.8	0.0	1.0	0.0	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	6.3	4.9	4.3	5.9	0.0	2.3	0.0	1.6	0.0	0.0	0.2
LnGrp Delay(d),s/veh	31.4	16.5	17.3	33.2	10.8	5.7	20.4	0.0	19.1	19.7	0.0	17.0
LnGrp LOS	C	B	B	C	B	A	C		B	B		B
Approach Vol, veh/h		1359			815			293			23	
Approach Delay, s/veh		17.0			17.5			19.9			17.4	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.8	30.6		13.6	12.9	23.5		13.6
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	9.5	19.0		18.0
Max Q Clear Time (g_c+I1), s	2.6	12.5		8.4	8.6	13.6		5.5
Green Ext Time (p_c), s	0.0	2.8		0.8	0.1	3.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.5
HCM 2010 LOS	B

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.991			0.996			0.870			0.944	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3507	0	1770	3525	0	1770	1621	0	1770	1758	0
Flt Permitted	0.950			0.950			0.625			0.169		
Satd. Flow (perm)	1770	3507	0	1770	3525	0	1164	1621	0	315	1758	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			5			466			42	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	28	717	44	440	388	11	43	108	715	14	96	57
Future Volume (vph)	28	717	44	440	388	11	43	108	715	14	96	57
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	30	779	48	478	422	12	47	117	777	15	104	62
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	827	0	478	434	0	47	894	0	15	166	0

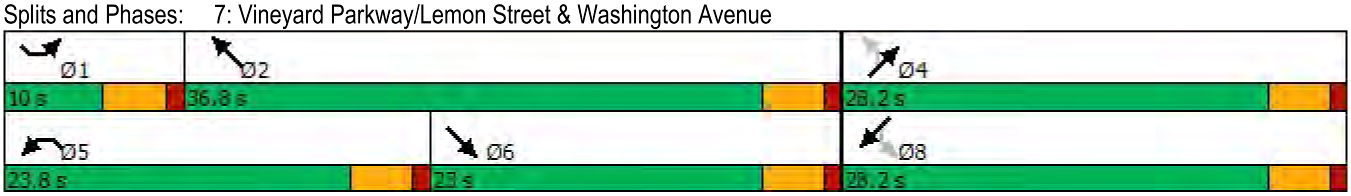
Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	28	717	440	388	43	108	14	96
Future Volume (vph)	28	717	440	388	43	108	14	96
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases					4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	10.0	23.0	23.8	36.8	28.2	28.2	28.2	28.2
Total Split (%)	13.3%	30.7%	31.7%	49.1%	37.6%	37.6%	37.6%	37.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	5.5	18.5	19.3	38.3	23.7	23.7	23.7	23.7
Actuated g/C Ratio	0.07	0.25	0.26	0.51	0.32	0.32	0.32	0.32
v/c Ratio	0.23	0.95	1.05	0.24	0.13	1.08	0.15	0.28
Control Delay	37.4	49.7	86.4	11.5	19.5	69.3	23.1	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.4	49.7	86.4	11.5	19.5	69.3	23.1	15.8
LOS	D	D	F	B	B	E	C	B
Approach Delay		49.3		50.8		66.8		16.4
Approach LOS		D		D		E		B

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 75
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 53.4 — Intersection LOS: D
Intersection Capacity Utilization 106.7% — ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	30	827	478	434	47	894	15	166
v/c Ratio	0.23	0.95	1.05	0.24	0.13	1.08	0.15	0.28
Control Delay	37.4	49.7	86.4	11.5	19.5	69.3	23.1	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.4	49.7	86.4	11.5	19.5	69.3	23.1	15.8
Queue Length 50th (ft)	13	197	~247	47	15	~308	5	42
Queue Length 95th (ft)	38	#314	#421	96	39	#529	20	88
Internal Link Dist (ft)		1230		2572		2575		1085
Turn Bay Length (ft)	150		255		160		150	
Base Capacity (vph)	129	871	455	1802	367	830	99	584
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.95	1.05	0.24	0.13	1.08	0.15	0.28

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	28	717	44	440	388	11	43	108	715	14	96	57
Future Volume (veh/h)	28	717	44	440	388	11	43	108	715	14	96	57
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	30	779	48	478	422	12	47	117	777	15	104	62
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	55	835	51	457	1663	47	393	67	444	96	346	206
Arrive On Green	0.03	0.25	0.25	0.26	0.47	0.47	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	1774	3387	209	1774	3515	100	1215	211	1404	620	1095	653
Grp Volume(v), veh/h	30	407	420	478	212	222	47	0	894	15	0	166
Grp Sat Flow(s),veh/h/ln	1774	1770	1826	1774	1770	1845	1215	0	1615	620	0	1748
Q Serve(g_s), s	1.3	16.9	16.9	19.3	5.4	5.4	2.3	0.0	23.7	0.0	0.0	5.4
Cycle Q Clear(g_c), s	1.3	16.9	16.9	19.3	5.4	5.4	7.7	0.0	23.7	23.7	0.0	5.4
Prop In Lane	1.00		0.11	1.00		0.05	1.00		0.87	1.00		0.37
Lane Grp Cap(c), veh/h	55	437	450	457	837	873	393	0	510	96	0	552
V/C Ratio(X)	0.55	0.93	0.93	1.05	0.25	0.25	0.12	0.00	1.75	0.16	0.00	0.30
Avail Cap(c_a), veh/h	130	437	450	457	837	873	393	0	510	96	0	552
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.8	27.6	27.6	27.8	11.8	11.8	22.3	0.0	25.7	37.5	0.0	19.4
Incr Delay (d2), s/veh	8.2	29.1	28.5	55.0	0.7	0.7	0.1	0.0	346.3	0.7	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	11.8	12.1	16.4	2.8	2.9	0.8	0.0	59.6	0.3	0.0	2.6
LnGrp Delay(d),s/veh	44.0	56.7	56.2	82.8	12.6	12.5	22.4	0.0	372.0	38.2	0.0	19.7
LnGrp LOS	D	E	E	F	B	B	C		F	D		B
Approach Vol, veh/h		857			912			941			181	
Approach Delay, s/veh		56.0			49.4			354.5			21.2	
Approach LOS		E			D			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.8	40.0		28.2	23.8	23.0		28.2
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.5	32.3		23.7	19.3	18.5		23.7
Max Q Clear Time (g_c+I1), s	3.3	7.4		25.7	21.3	18.9		25.7
Green Ext Time (p_c), s	0.0	2.6		0.0	0.0	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	148.9
HCM 2010 LOS	F

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.985				0.850		0.991				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1835	0	1770	1863	1583	1770	1846	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1835	0	1770	1863	1583	1770	1846	0	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				149		2				131
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary	
Area Type:	Other

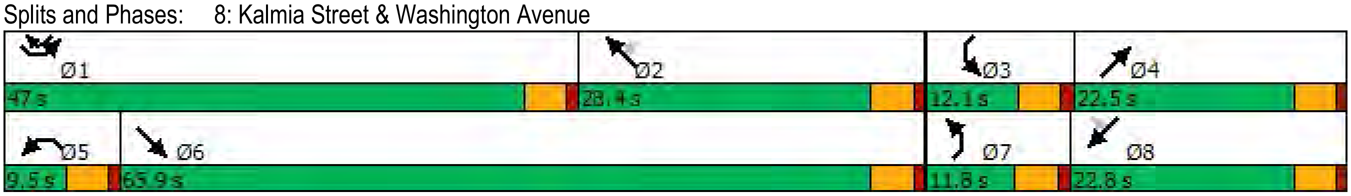
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	1155	367	40	3	339	125	64	111	7	94	69	511
Future Volume (vph)	1155	367	40	3	339	125	64	111	7	94	69	511
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	1359	432	47	4	399	147	75	131	8	111	81	601
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1359	479	0	4	399	147	75	139	0	111	81	601

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	1155	367	3	339	125	64	111	94	69	511
Future Volume (vph)	1155	367	3	339	125	64	111	94	69	511
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	47.0	65.9	9.5	28.4	28.4	11.8	22.5	12.1	22.8	47.0
Total Split (%)	42.7%	59.9%	8.6%	25.8%	25.8%	10.7%	20.5%	11.0%	20.7%	42.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	42.6	69.2	5.0	23.9	23.9	7.1	13.0	7.6	15.7	62.8
Actuated g/C Ratio	0.41	0.66	0.05	0.23	0.23	0.07	0.12	0.07	0.15	0.60
v/c Ratio	0.98	0.40	0.05	0.94	0.31	0.62	0.61	0.87	0.29	0.60
Control Delay	51.3	10.5	51.0	72.7	7.6	72.0	54.3	100.8	44.0	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	10.5	51.0	72.7	7.6	72.0	54.3	100.8	44.0	13.6
LOS	D	B	D	E	A	E	D	F	D	B
Approach Delay		40.6		55.1			60.5		28.9	
Approach LOS		D		E			E		C	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 105.1	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 41.5	Intersection LOS: D
Intersection Capacity Utilization 73.9%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 8: Kalmia Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	1359	479	4	399	147	75	139	111	81	601
v/c Ratio	0.98	0.40	0.05	0.94	0.31	0.62	0.61	0.87	0.29	0.60
Control Delay	51.3	10.5	51.0	72.7	7.6	72.0	54.3	100.8	44.0	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	10.5	51.0	72.7	7.6	72.0	54.3	100.8	44.0	13.6
Queue Length 50th (ft)	455	124	3	265	0	50	88	75	50	195
Queue Length 95th (ft)	#597	249	14	#437	43	#109	142	#174	91	270
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	1390	1210	84	424	475	123	318	128	331	998
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.40	0.05	0.94	0.31	0.61	0.44	0.87	0.24	0.60

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	1155	367	40	3	339	125	64	111	7	94	69	511
Future Volume (veh/h)	1155	367	40	3	339	125	64	111	7	94	69	511
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	1359	432	47	4	399	147	75	131	8	111	81	601
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	1
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	1347	1001	109	9	410	349	96	265	16	124	314	887
Arrive On Green	0.39	0.61	0.61	0.01	0.22	0.22	0.05	0.15	0.15	0.07	0.17	0.17
Sat Flow, veh/h	3442	1651	180	1774	1863	1583	1774	1738	106	1774	1863	1583
Grp Volume(v), veh/h	1359	0	479	4	399	147	75	0	139	111	81	601
Grp Sat Flow(s),veh/h/ln	1721	0	1831	1774	1863	1583	1774	0	1844	1774	1863	1583
Q Serve(g_s), s	42.5	0.0	15.1	0.2	23.1	8.7	4.5	0.0	7.5	6.7	4.1	18.3
Cycle Q Clear(g_c), s	42.5	0.0	15.1	0.2	23.1	8.7	4.5	0.0	7.5	6.7	4.1	18.3
Prop In Lane	1.00		0.10	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	1347	0	1110	9	410	349	96	0	281	124	314	887
V/C Ratio(X)	1.01	0.00	0.43	0.43	0.97	0.42	0.78	0.00	0.49	0.89	0.26	0.68
Avail Cap(c_a), veh/h	1347	0	1110	82	410	349	119	0	306	124	314	887
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.0	0.0	11.4	53.8	42.0	36.4	50.7	0.0	42.2	50.1	39.2	16.9
Incr Delay (d2), s/veh	26.6	0.0	1.2	28.5	38.2	3.7	22.9	0.0	1.3	49.8	0.4	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	25.0	0.0	8.0	0.2	16.2	4.1	2.8	0.0	3.9	5.0	2.2	13.2
LnGrp Delay(d),s/veh	59.7	0.0	12.6	82.4	80.2	40.1	73.7	0.0	43.5	99.9	39.7	19.0
LnGrp LOS	F		B	F	F	D	E		D	F	D	B
Approach Vol, veh/h		1838			550			214			793	
Approach Delay, s/veh		47.4			69.5			54.1			32.4	
Approach LOS		D			E			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	47.0	28.4	12.1	21.1	5.1	70.3	10.4	22.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	42.5	23.9	7.6	18.0	5.0	61.4	7.3	18.3
Max Q Clear Time (g_c+I1), s	44.5	25.1	8.7	9.5	2.2	17.1	6.5	20.3
Green Ext Time (p_c), s	0.0	0.0	0.0	0.4	0.0	3.5	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	47.9
HCM 2010 LOS	D

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	60		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.997						0.913				0.850
Flt Protected				0.950				0.982			0.950	
Satd. Flow (prot)	0	1857	0	1770	1863	0	0	1670	0	0	1770	1583
Flt Permitted				0.950				0.982			0.950	
Satd. Flow (perm)	0	1857	0	1770	1863	0	0	1670	0	0	1770	1583
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1045			237			351			183	
Travel Time (s)		23.8			5.4			8.0			4.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	0	265	6	6	265	0	8	0	14	42	0	18
Future Volume (vph)	0	265	6	6	265	0	8	0	14	42	0	18
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	344	8	8	344	0	10	0	18	55	0	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	352	0	8	344	0	0	28	0	0	55	23

Intersection Summary

Intersection	
Int Delay, s/veh	2

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	265	6	6	265	0	8	0	14	42	0	18
Future Vol, veh/h	0	265	6	6	265	0	8	0	14	42	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	60	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	344	8	8	344	0	10	0	18	55	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	352	0	0	720	708	348	717	712	344
Stage 1	-	-	-	-	-	-	348	348	-	360	360	-
Stage 2	-	-	-	-	-	-	372	360	-	357	352	-
Critical Hdwy	-	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1207	-	0	343	360	695	345	358	699
Stage 1	0	-	-	-	-	0	668	634	-	658	626	-
Stage 2	0	-	-	-	-	0	648	626	-	661	632	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1207	-	-	330	357	695	334	355	699
Mov Cap-2 Maneuver	-	-	-	-	-	-	330	357	-	334	355	-
Stage 1	-	-	-	-	-	-	668	634	-	658	622	-
Stage 2	-	-	-	-	-	-	622	622	-	644	632	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	0.2	12.7	15.6
HCM LOS			B	C

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	496	1207	-	-	-	334	699
HCM Lane V/C Ratio	0.058	0.006	-	-	-	0.163	0.033
HCM Control Delay (s)	12.7	8	-	-	-	17.9	10.3
HCM Lane LOS	B	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.2	0	-	-	-	0.6	0.1

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.993	
Flt Protected				0.984		
Satd. Flow (prot)	1863	0	0	1833	1850	0
Flt Permitted				0.984		
Satd. Flow (perm)	1863	0	0	1833	1850	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	112			181	2481	
Travel Time (s)	2.5			4.1	56.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	0	0	91	198	52	3
Future Volume (vph)	0	0	91	198	52	3
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.48	0.48	0.48	0.48	0.48	0.48
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	0	0	190	413	108	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	603	114	0

Intersection Summary

Intersection						
Int Delay, s/veh	2.1					

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	0	0	91	198	52	3
Future Vol, veh/h	0	0	91	198	52	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	48	48	48	48	48	48
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	190	413	108	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	904	111	114	0	-	0
Stage 1	111	-	-	-	-	-
Stage 2	793	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	307	942	1475	-	-	-
Stage 1	914	-	-	-	-	-
Stage 2	446	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	256	942	1475	-	-	-
Mov Cap-2 Maneuver	256	-	-	-	-	-
Stage 1	761	-	-	-	-	-
Stage 2	446	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	0	2.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	1475	-	-	-	-
HCM Lane V/C Ratio	0.129	-	-	-	-
HCM Control Delay (s)	7.8	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	-	-

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			1	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.865		
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	0	1611	1770	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	0	1611	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		340	1045		2657	
Travel Time (s)		7.7	23.8		60.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	0	0	0	48	44	0
Future Volume (vph)	0	0	0	48	44	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	0	0	59	54	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	59	54	0

Intersection Summary

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	48	44	0
Future Vol, veh/h	0	0	0	48	44	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	59	54	0
Number of Lanes	0	1	0	1	1	0

Approach	SE	NW	SW
Opposing Approach	NW	SE	
Opposing Lanes	1	1	0
Conflicting Approach Left	SW		NW
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SW	SE
Conflicting Lanes Right	0	1	1
HCM Control Delay	0	6.7	7.5
HCM LOS	-	A	A

Lane	NWLn1	SELn1	SWLn1
Vol Left, %	0%	0%	100%
Vol Thru, %	0%	100%	0%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	48	0	44
LT Vol	0	0	44
Through Vol	0	0	0
RT Vol	48	0	0
Lane Flow Rate	59	0	54
Geometry Grp	1	1	1
Degree of Util (X)	0.056	0	0.063
Departure Headway (Hd)	3.428	4.073	4.236
Convergence, Y/N	Yes	Yes	Yes
Cap	1042	0	849
Service Time	1.457	2.106	2.244
HCM Lane V/C Ratio	0.057	0	0.064
HCM Control Delay	6.7	7.1	7.5
HCM Lane LOS	A	N	A
HCM 95th-tile Q	0.2	0	0.2

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	60			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.961			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1790	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1790	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		237	1361		181	
Travel Time (s)		5.4	30.9		4.1	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	15	45	36	15	2	0
Future Volume (vph)	15	45	36	15	2	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	18	55	44	18	2	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	18	55	62	0	2	0

Intersection Summary

Intersection	
Int Delay, s/veh	1.1

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	15	45	36	15	2	0
Future Vol, veh/h	15	45	36	15	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	60	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	55	44	18	2	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	62	0	-	0	144	53
Stage 1	-	-	-	-	53	-
Stage 2	-	-	-	-	91	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1541	-	-	-	849	1014
Stage 1	-	-	-	-	970	-
Stage 2	-	-	-	-	933	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1541	-	-	-	839	1014
Mov Cap-2 Maneuver	-	-	-	-	839	-
Stage 1	-	-	-	-	958	-
Stage 2	-	-	-	-	933	-

Approach	SE	NW	SW
HCM Control Delay, s	1.8	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1541	-	839
HCM Lane V/C Ratio	-	-	0.012	-	0.003
HCM Control Delay (s)	-	-	7.4	-	9.3
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	50	3	2	315	532	83
Future Volume (vph)	50	3	2	315	532	83
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	65	4	3	409	691	108
Shared Lane Traffic (%)						
Lane Group Flow (vph)	65	4	3	409	691	108

Intersection Summary

Intersection	
Intersection Delay, s/veh	35.8
Intersection LOS	E

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	50	3	2	315	532	83
Future Vol, veh/h	50	3	2	315	532	83
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	65	4	3	409	691	108
Number of Lanes	1	1	1	1	1	1

Approach	SE	NE	SW
Opposing Approach		SW	NE
Opposing Lanes	0	2	2
Conflicting Approach Left	SW	SE	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NE		SE
Conflicting Lanes Right	2	0	2
HCM Control Delay	11.7	17	47.5
HCM LOS	B	C	E

Lane	NELn1	NELn2	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	2	315	50	3	532	83
LT Vol	2	0	50	0	0	0
Through Vol	0	315	0	0	532	0
RT Vol	0	0	0	3	0	83
Lane Flow Rate	3	409	65	4	691	108
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.004	0.625	0.141	0.007	0.989	0.133
Departure Headway (Hd)	6.004	5.5	7.825	6.599	5.153	4.448
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	590	650	461	546	698	798
Service Time	3.798	3.293	5.525	4.299	2.925	2.22
HCM Lane V/C Ratio	0.005	0.629	0.141	0.007	0.99	0.135
HCM Control Delay	8.8	17.1	11.8	9.3	53.7	7.9
HCM Lane LOS	A	C	B	A	F	A
HCM 95th-tile Q	0	4.4	0.5	0	15.5	0.5

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	85		0	150		0	150		0	250		100
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.937				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3316	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3316	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		189				171			126			182
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1461			2630			1510			1533	
Travel Time (s)		33.2			59.8			34.3			34.8	

Intersection Summary	
Area Type:	Other

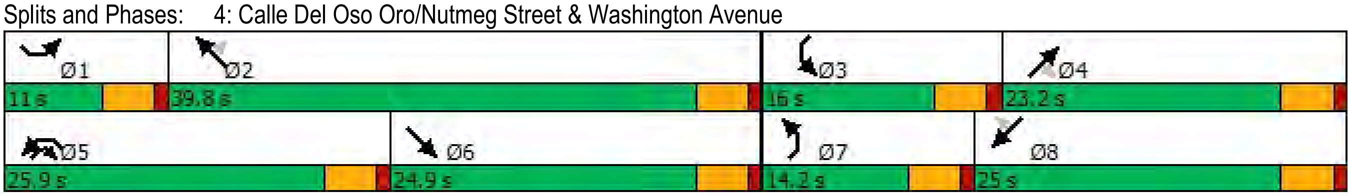
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	101	367	267	318	618	162	163	150	229	182	363	219
Future Volume (vph)	101	367	267	318	618	162	163	150	229	182	363	219
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	106	386	281	335	651	171	172	158	241	192	382	231
Shared Lane Traffic (%)												
Lane Group Flow (vph)	106	667	0	335	651	171	172	158	241	192	382	231

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	101	367	318	618	162	163	150	229	182	363	219
Future Volume (vph)	101	367	318	618	162	163	150	229	182	363	219
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	1	6	5	2		7	4	5	3	8	
Permitted Phases					2			4			8
Detector Phase	1	6	5	2	2	7	4	5	3	8	8
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	9.5	22.5	22.5
Total Split (s)	11.0	24.9	25.9	39.8	39.8	14.2	23.2	25.9	16.0	25.0	25.0
Total Split (%)	12.2%	27.7%	28.8%	44.2%	44.2%	15.8%	25.8%	28.8%	17.8%	27.8%	27.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	6.5	22.0	19.8	35.3	35.3	9.7	18.3	42.7	11.4	20.0	20.0
Actuated g/C Ratio	0.07	0.25	0.22	0.39	0.39	0.11	0.20	0.48	0.13	0.22	0.22
v/c Ratio	0.83	0.70	0.86	0.89	0.24	0.90	0.41	0.29	0.86	0.92	0.47
Control Delay	87.5	26.7	55.0	41.6	3.9	85.3	34.8	7.3	72.3	63.4	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.5	26.7	55.0	41.6	3.9	85.3	34.8	7.3	72.3	63.4	11.4
LOS	F	C	E	D	A	F	C	A	E	E	B
Approach Delay		35.1		39.9			38.4			50.6	
Approach LOS		D		D			D			D	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 89.5	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.92	
Intersection Signal Delay: 41.1	Intersection LOS: D
Intersection Capacity Utilization 81.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Calle Del Oso Oro/Nutmeg Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group Flow (vph)	106	667	335	651	171	172	158	241	192	382	231
v/c Ratio	0.83	0.70	0.86	0.89	0.24	0.90	0.41	0.29	0.86	0.92	0.47
Control Delay	87.5	26.7	55.0	41.6	3.9	85.3	34.8	7.3	72.3	63.4	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.5	26.7	55.0	41.6	3.9	85.3	34.8	7.3	72.3	63.4	11.4
Queue Length 50th (ft)	61	133	180	338	0	98	78	34	109	212	22
Queue Length 95th (ft)	#153	197	#314	#548	38	#217	137	77	#226	#376	85
Internal Link Dist (ft)		1381		2550			1430			1453	
Turn Bay Length (ft)	85		150			150			250		100
Base Capacity (vph)	128	957	422	734	727	191	389	846	227	426	503
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.70	0.79	0.89	0.24	0.90	0.41	0.28	0.85	0.90	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	101	367	267	318	618	162	163	150	229	182	363	219
Future Volume (veh/h)	101	367	267	318	618	162	163	150	229	182	363	219
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	106	386	281	335	651	171	172	158	241	192	382	231
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	129	505	363	372	734	624	192	383	658	226	418	356
Arrive On Green	0.07	0.26	0.26	0.21	0.39	0.39	0.11	0.21	0.21	0.13	0.22	0.22
Sat Flow, veh/h	1774	1967	1415	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	106	347	320	335	651	171	172	158	241	192	382	231
Grp Sat Flow(s),veh/h/ln	1774	1770	1613	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	5.3	16.2	16.5	16.5	29.2	6.6	8.6	6.6	9.4	9.5	17.9	11.9
Cycle Q Clear(g_c), s	5.3	16.2	16.5	16.5	29.2	6.6	8.6	6.6	9.4	9.5	17.9	11.9
Prop In Lane	1.00		0.88	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	129	454	414	372	734	624	192	383	658	226	418	356
V/C Ratio(X)	0.82	0.76	0.77	0.90	0.89	0.27	0.90	0.41	0.37	0.85	0.91	0.65
Avail Cap(c_a), veh/h	129	454	414	424	734	624	192	389	662	228	426	362
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.0	30.8	30.9	34.5	25.3	18.5	39.5	30.9	18.1	38.3	33.9	31.5
Incr Delay (d2), s/veh	33.4	11.6	13.2	20.2	14.9	1.1	37.5	0.7	0.3	25.0	23.6	4.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	9.4	8.8	10.2	18.1	3.1	6.2	3.5	4.2	6.2	12.0	5.6
LnGrp Delay(d),s/veh	74.4	42.4	44.1	54.7	40.3	19.6	77.0	31.6	18.4	63.3	57.5	35.5
LnGrp LOS	E	D	D	D	D	B	E	C	B	E	E	D
Approach Vol, veh/h		773			1157			571			805	
Approach Delay, s/veh		47.5			41.4			39.7			52.6	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	39.8	15.9	22.9	23.3	27.5	14.2	24.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.5	35.3	11.5	18.7	21.4	20.4	9.7	20.5
Max Q Clear Time (g_c+I1), s	7.3	31.2	11.5	11.4	18.5	18.5	10.6	19.9
Green Ext Time (p_c), s	0.0	1.9	0.0	1.0	0.3	0.8	0.0	0.2

Intersection Summary	
HCM 2010 Ctrl Delay	45.2
HCM 2010 LOS	D

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		280	300		0	350		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.998			0.928			0.911	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3532	0	1770	1729	0	1770	3224	0
Flt Permitted	0.950			0.950			0.493			0.687		
Satd. Flow (perm)	1770	3539	1583	1770	3532	0	918	1729	0	1280	3224	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			115		2			52			81	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2630			1335			2657			1296	
Travel Time (s)		59.8			30.3			60.4			29.5	

Intersection Summary	
Area Type:	Other

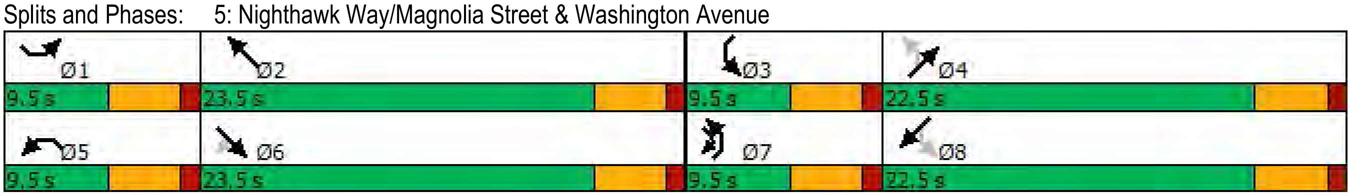
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	39	653	109	60	728	9	98	53	49	10	52	77
Future Volume (vph)	39	653	109	60	728	9	98	53	49	10	52	77
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	41	687	115	63	766	9	103	56	52	11	55	81
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	687	115	63	775	0	103	108	0	11	136	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	39	653	109	60	728	98	53	10	52
Future Volume (vph)	39	653	109	60	728	98	53	10	52
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+pt	NA	pm+pt	NA
Protected Phases	1	6	7	5	2	7	4	3	8
Permitted Phases			6			4		8	
Detector Phase	1	6	7	5	2	7	4	3	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	9.5	23.5	9.5	9.5	23.5	9.5	22.5	9.5	22.5
Total Split (%)	14.6%	36.2%	14.6%	14.6%	36.2%	14.6%	34.6%	14.6%	34.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	None	Max	None	None	None	None
Act Effct Green (s)	5.1	24.4	31.7	5.1	26.2	13.3	12.6	10.7	6.9
Actuated g/C Ratio	0.10	0.49	0.64	0.10	0.53	0.27	0.26	0.22	0.14
v/c Ratio	0.22	0.39	0.11	0.34	0.41	0.31	0.22	0.03	0.26
Control Delay	26.6	13.2	2.2	29.1	12.2	15.9	11.7	13.2	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	13.2	2.2	29.1	12.2	15.9	11.7	13.2	11.7
LOS	C	B	A	C	B	B	B	B	B
Approach Delay		12.4			13.5		13.7		11.8
Approach LOS		B			B		B		B

Intersection Summary	
Cycle Length: 65	
Actuated Cycle Length: 49.3	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 12.9	Intersection LOS: B
Intersection Capacity Utilization 49.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Nighthawk Way/Magnolia Street & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	41	687	115	63	775	103	108	11	136
v/c Ratio	0.22	0.39	0.11	0.34	0.41	0.31	0.22	0.03	0.26
Control Delay	26.6	13.2	2.2	29.1	12.2	15.9	11.7	13.2	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	13.2	2.2	29.1	12.2	15.9	11.7	13.2	11.7
Queue Length 50th (ft)	12	88	0	19	68	24	13	2	8
Queue Length 95th (ft)	39	148	20	53	170	53	53	11	28
Internal Link Dist (ft)		2550			1255		2577		1216
Turn Bay Length (ft)	150		280	300		350		150	
Base Capacity (vph)	183	1754	1059	183	1878	336	678	327	1255
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.39	0.11	0.34	0.41	0.31	0.16	0.03	0.11

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	39	653	109	60	728	9	98	53	49	10	52	77
Future Volume (veh/h)	39	653	109	60	728	9	98	53	49	10	52	77
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	41	687	115	63	766	9	103	56	52	11	55	81
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	78	1388	744	105	1460	17	350	145	135	302	177	158
Arrive On Green	0.04	0.39	0.39	0.06	0.41	0.41	0.08	0.16	0.16	0.01	0.10	0.10
Sat Flow, veh/h	1774	3539	1583	1774	3583	42	1774	890	827	1774	1770	1583
Grp Volume(v), veh/h	41	687	115	63	378	397	103	0	108	11	55	81
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1855	1774	0	1717	1774	1770	1583
Q Serve(g_s), s	1.1	7.1	2.0	1.7	7.8	7.8	2.4	0.0	2.7	0.3	1.4	2.4
Cycle Q Clear(g_c), s	1.1	7.1	2.0	1.7	7.8	7.8	2.4	0.0	2.7	0.3	1.4	2.4
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.48	1.00		1.00
Lane Grp Cap(c), veh/h	78	1388	744	105	721	756	350	0	280	302	177	158
V/C Ratio(X)	0.53	0.49	0.15	0.60	0.52	0.52	0.29	0.00	0.39	0.04	0.31	0.51
Avail Cap(c_a), veh/h	183	1388	744	183	721	756	396	0	638	460	657	588
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.7	11.1	7.3	22.2	10.8	10.8	17.0	0.0	18.1	19.1	20.3	20.7
Incr Delay (d2), s/veh	5.5	1.3	0.4	5.5	2.7	2.6	0.5	0.0	0.9	0.0	1.0	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	3.7	0.9	1.0	4.3	4.5	1.2	0.0	1.4	0.1	0.7	1.1
LnGrp Delay(d),s/veh	28.1	12.4	7.8	27.7	13.5	13.4	17.5	0.0	19.0	19.2	21.2	23.2
LnGrp LOS	C	B	A	C	B	B	B		B	B	C	C
Approach Vol, veh/h		843			838			211			147	
Approach Delay, s/veh		12.5			14.5			18.2			22.2	
Approach LOS		B			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.6	24.2	5.2	12.4	7.4	23.5	8.2	9.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.0	19.0	5.0	18.0	5.0	19.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	3.1	9.8	2.3	4.7	3.7	9.1	4.4	4.4
Green Ext Time (p_c), s	0.0	3.3	0.0	0.4	0.0	3.6	0.0	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	14.6
HCM 2010 LOS	B

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		170	150		0	80		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	1583	0	1770	1583	0
Flt Permitted	0.950			0.950								
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1863	1583	0	1863	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			87			87		273			234	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1335			1310			2481			639	
Travel Time (s)		30.3			29.8			56.4			14.5	

Intersection Summary	
Area Type:	Other

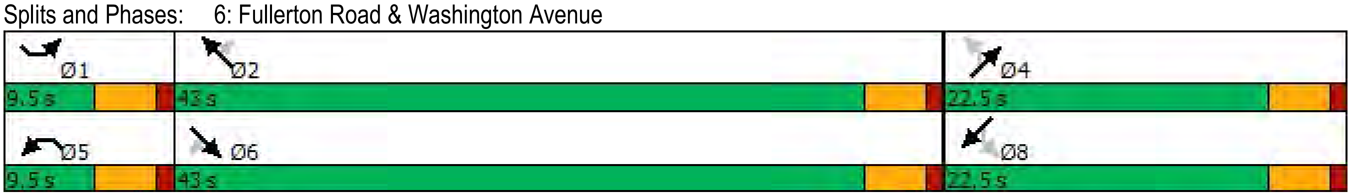
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	3	705	13	6	815	1	15	0	3	1	0	4
Future Volume (vph)	3	705	13	6	815	1	15	0	3	1	0	4
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	734	14	6	849	1	16	0	3	1	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	734	14	6	849	1	16	3	0	1	4	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Configurations										
Traffic Volume (vph)	3	705	13	6	815	1	15	0	1	0
Future Volume (vph)	3	705	13	6	815	1	15	0	1	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	1	6		5	2			4		8
Permitted Phases			6			2	4		8	
Detector Phase	1	6	6	5	2	2	4	4	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	43.0	43.0	9.5	43.0	43.0	22.5	22.5	22.5	22.5
Total Split (%)	12.7%	57.3%	57.3%	12.7%	57.3%	57.3%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	5.0	54.5	54.5	5.0	54.5	54.5	6.3	6.3	5.9	5.9
Actuated g/C Ratio	0.08	0.92	0.92	0.08	0.92	0.92	0.11	0.11	0.10	0.10
v/c Ratio	0.02	0.23	0.01	0.04	0.50	0.00	0.08	0.01	0.01	0.01
Control Delay	26.7	2.2	0.0	27.0	4.7	0.0	25.4	0.0	25.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	2.2	0.0	27.0	4.7	0.0	25.4	0.0	25.0	0.0
LOS	C	A	A	C	A	A	C	A	C	A
Approach Delay		2.2			4.9			21.4		5.0
Approach LOS		A			A			C		A

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 59.3	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 3.9	Intersection LOS: A
Intersection Capacity Utilization 57.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 6: Fullerton Road & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	3	734	14	6	849	1	16	3	1	4
v/c Ratio	0.02	0.23	0.01	0.04	0.50	0.00	0.08	0.01	0.01	0.01
Control Delay	26.7	2.2	0.0	27.0	4.7	0.0	25.4	0.0	25.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	2.2	0.0	27.0	4.7	0.0	25.4	0.0	25.0	0.0
Queue Length 50th (ft)	1	0	0	2	0	0	5	0	0	0
Queue Length 95th (ft)	8	97	0	12	366	0	22	0	4	0
Internal Link Dist (ft)		1255			1230			2401		559
Turn Bay Length (ft)			170	150			80			
Base Capacity (vph)	149	3252	1462	149	1712	1462	566	671	566	643
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.23	0.01	0.04	0.50	0.00	0.03	0.00	0.00	0.01

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	3	705	13	6	815	1	15	0	3	1	0	4
Future Volume (veh/h)	3	705	13	6	815	1	15	0	3	1	0	4
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	3	734	14	6	849	1	16	0	3	1	0	4
Adj No. of Lanes	1	2	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	7	2526	1130	14	1337	1136	169	0	44	170	0	44
Arrive On Green	0.00	0.71	0.71	0.01	0.72	0.72	0.03	0.00	0.03	0.03	0.00	0.03
Sat Flow, veh/h	1774	3539	1583	1774	1863	1583	1407	0	1583	1408	0	1583
Grp Volume(v), veh/h	3	734	14	6	849	1	16	0	3	1	0	4
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1863	1583	1407	0	1583	1408	0	1583
Q Serve(g_s), s	0.1	4.0	0.1	0.2	12.8	0.0	0.6	0.0	0.1	0.0	0.0	0.1
Cycle Q Clear(g_c), s	0.1	4.0	0.1	0.2	12.8	0.0	0.7	0.0	0.1	0.1	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	7	2526	1130	14	1337	1136	169	0	44	170	0	44
V/C Ratio(X)	0.42	0.29	0.01	0.42	0.64	0.00	0.09	0.00	0.07	0.01	0.00	0.09
Avail Cap(c_a), veh/h	164	2526	1130	164	1337	1136	599	0	528	601	0	528
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.8	2.8	2.2	26.6	4.0	2.2	25.9	0.0	25.5	25.6	0.0	25.5
Incr Delay (d2), s/veh	33.8	0.3	0.0	18.9	2.3	0.0	0.2	0.0	0.6	0.0	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	2.0	0.1	0.2	7.2	0.0	0.2	0.0	0.1	0.0	0.0	0.1
LnGrp Delay(d),s/veh	60.6	3.1	2.2	45.5	6.3	2.2	26.1	0.0	26.2	25.6	0.0	26.4
LnGrp LOS	E	A	A	D	A	A	C		C	C		C
Approach Vol, veh/h		751			856			19			5	
Approach Delay, s/veh		3.3			6.5			26.1			26.3	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.7	43.2		6.0	4.9	43.0		6.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	38.5		18.0	5.0	38.5		18.0
Max Q Clear Time (g_c+I1), s	2.1	14.8		2.7	2.2	6.0		2.1
Green Ext Time (p_c), s	0.0	7.0		0.0	0.0	5.9		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	5.3
HCM 2010 LOS	A

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.992			0.998			0.866			0.940	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3511	0	1770	3532	0	1770	1613	0	1770	1751	0
Flt Permitted	0.950			0.950			0.622			0.385		
Satd. Flow (perm)	1770	3511	0	1770	3532	0	1159	1613	0	717	1751	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			3			360			39	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

Intersection Summary	
Area Type:	Other

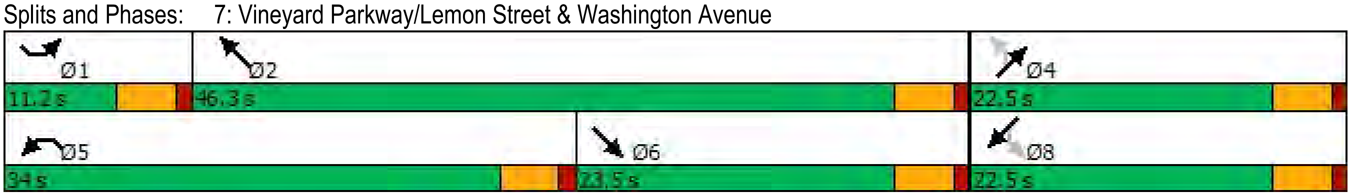
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	51	635	36	569	753	12	31	40	338	11	78	53
Future Volume (vph)	51	635	36	569	753	12	31	40	338	11	78	53
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	54	676	38	605	801	13	33	43	360	12	83	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	714	0	605	814	0	33	403	0	12	139	0

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	51	635	569	753	31	40	11	78
Future Volume (vph)	51	635	569	753	31	40	11	78
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases					4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	11.2	23.5	34.0	46.3	22.5	22.5	22.5	22.5
Total Split (%)	14.0%	29.4%	42.5%	57.9%	28.1%	28.1%	28.1%	28.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	6.4	19.2	27.6	45.1	10.4	10.4	10.4	10.4
Actuated g/C Ratio	0.09	0.27	0.39	0.64	0.15	0.15	0.15	0.15
v/c Ratio	0.34	0.75	0.88	0.36	0.19	0.74	0.11	0.48
Control Delay	38.7	31.0	37.3	8.4	29.1	14.2	28.3	26.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.7	31.0	37.3	8.4	29.1	14.2	28.3	26.0
LOS	D	C	D	A	C	B	C	C
Approach Delay		31.5		20.7		15.4		26.2
Approach LOS		C		C		B		C

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 70.9	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 23.2	Intersection LOS: C
Intersection Capacity Utilization 87.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	54	714	605	814	33	403	12	139
v/c Ratio	0.34	0.75	0.88	0.36	0.19	0.74	0.11	0.48
Control Delay	38.7	31.0	37.3	8.4	29.1	14.2	28.3	26.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.7	31.0	37.3	8.4	29.1	14.2	28.3	26.0
Queue Length 50th (ft)	23	150	230	91	13	17	5	41
Queue Length 95th (ft)	61	#271	#488	167	36	99	19	90
Internal Link Dist (ft)		1230		2572		2575		1085
Turn Bay Length (ft)	150		255		160		150	
Base Capacity (vph)	168	955	744	2245	297	681	183	478
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.75	0.81	0.36	0.11	0.59	0.07	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↰	↑↑↱		↰	↑↑↱		↰	↱		↰	↱	
Traffic Volume (veh/h)	51	635	36	569	753	12	31	40	338	11	78	53
Future Volume (veh/h)	51	635	36	569	753	12	31	40	338	11	78	53
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	54	676	38	605	801	13	33	43	360	12	83	56
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	78	819	46	640	1986	32	291	39	328	91	237	160
Arrive On Green	0.04	0.24	0.24	0.36	0.56	0.56	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1774	3407	191	1774	3564	58	1245	172	1437	978	1038	701
Grp Volume(v), veh/h	54	351	363	605	398	416	33	0	403	12	0	139
Grp Sat Flow(s),veh/h/ln	1774	1770	1829	1774	1770	1853	1245	0	1609	978	0	1739
Q Serve(g_s), s	2.4	14.8	14.9	26.1	10.1	10.1	1.8	0.0	18.0	0.0	0.0	5.3
Cycle Q Clear(g_c), s	2.4	14.8	14.9	26.1	10.1	10.1	7.1	0.0	18.0	18.0	0.0	5.3
Prop In Lane	1.00		0.10	1.00		0.03	1.00		0.89	1.00		0.40
Lane Grp Cap(c), veh/h	78	426	440	640	986	1032	291	0	367	91	0	396
V/C Ratio(X)	0.69	0.82	0.83	0.95	0.40	0.40	0.11	0.00	1.10	0.13	0.00	0.35
Avail Cap(c_a), veh/h	150	426	440	662	986	1032	291	0	367	91	0	396
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.2	28.4	28.4	24.5	10.0	10.0	28.6	0.0	30.5	39.5	0.0	25.6
Incr Delay (d2), s/veh	10.5	16.4	16.1	22.1	1.2	1.2	0.2	0.0	76.4	0.6	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	9.2	9.4	16.7	5.2	5.4	0.6	0.0	15.7	0.3	0.0	2.6
LnGrp Delay(d),s/veh	47.7	44.9	44.5	46.6	11.2	11.2	28.7	0.0	106.9	40.1	0.0	26.1
LnGrp LOS	D	D	D	D	B	B	C		F	D		C
Approach Vol, veh/h		768			1419			436			151	
Approach Delay, s/veh		44.9			26.3			101.0			27.2	
Approach LOS		D			C			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.0	48.5		22.5	33.0	23.5		22.5
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	6.7	41.8		18.0	29.5	19.0		18.0
Max Q Clear Time (g_c+I1), s	4.4	12.1		20.0	28.1	16.9		20.0
Green Ext Time (p_c), s	0.0	5.8		0.0	0.4	0.9		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	43.2
HCM 2010 LOS	D

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.988				0.850		0.989				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1840	0	1770	1863	1583	1770	1842	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1840	0	1770	1863	1583	1770	1842	0	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				149		3				181
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary

Area Type: Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	692	343	30	7	479	183	49	121	10	177	126	937
Future Volume (vph)	692	343	30	7	479	183	49	121	10	177	126	937
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	706	350	31	7	489	187	50	123	10	181	129	956
Shared Lane Traffic (%)												
Lane Group Flow (vph)	706	381	0	7	489	187	50	133	0	181	129	956

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	692	343	7	479	183	49	121	177	126	937
Future Volume (vph)	692	343	7	479	183	49	121	177	126	937
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	37.7	61.8	9.5	33.6	33.6	13.1	22.5	16.2	25.6	37.7
Total Split (%)	34.3%	56.2%	8.6%	30.5%	30.5%	11.9%	20.5%	14.7%	23.3%	34.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	33.2	65.1	5.0	29.1	29.1	7.6	12.7	11.7	18.9	56.6
Actuated g/C Ratio	0.32	0.62	0.05	0.28	0.28	0.07	0.12	0.11	0.18	0.54
v/c Ratio	0.65	0.33	0.08	0.94	0.34	0.39	0.59	0.92	0.39	1.02
Control Delay	34.6	11.5	51.7	66.6	10.3	56.3	53.5	93.7	42.9	55.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	11.5	51.7	66.6	10.3	56.3	53.5	93.7	42.9	55.9
LOS	C	B	D	E	B	E	D	F	D	E
Approach Delay		26.5		51.0			54.3		60.0	
Approach LOS		C		D			D		E	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 104.8	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.02	
Intersection Signal Delay: 46.5	Intersection LOS: D
Intersection Capacity Utilization 98.6%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 8: Kalmia Street & Washington Avenue

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	706	381	7	489	187	50	133	181	129	956
v/c Ratio	0.65	0.33	0.08	0.94	0.34	0.39	0.59	0.92	0.39	1.02
Control Delay	34.6	11.5	51.7	66.6	10.3	56.3	53.5	93.7	42.9	55.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	11.5	51.7	66.6	10.3	56.3	53.5	93.7	42.9	55.9
Queue Length 50th (ft)	208	104	5	320	19	32	84	122	80	~644
Queue Length 95th (ft)	290	225	20	#561	78	74	145	#269	138	#908
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	1089	1145	84	518	547	145	319	197	386	938
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.33	0.08	0.94	0.34	0.34	0.42	0.92	0.33	1.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	692	343	30	7	479	183	49	121	10	177	126	937
Future Volume (veh/h)	692	343	30	7	479	183	49	121	10	177	126	937
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	706	350	31	7	489	187	50	123	10	181	129	956
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	820	956	85	16	629	535	66	222	18	205	389	708
Arrive On Green	0.24	0.57	0.57	0.01	0.34	0.34	0.04	0.13	0.13	0.12	0.21	0.21
Sat Flow, veh/h	3442	1687	149	1774	1863	1583	1774	1700	138	1774	1863	1583
Grp Volume(v), veh/h	706	0	381	7	489	187	50	0	133	181	129	956
Grp Sat Flow(s),veh/h/ln	1721	0	1836	1774	1863	1583	1774	0	1838	1774	1863	1583
Q Serve(g_s), s	19.9	0.0	11.5	0.4	23.8	9.0	2.8	0.0	6.9	10.2	5.9	21.1
Cycle Q Clear(g_c), s	19.9	0.0	11.5	0.4	23.8	9.0	2.8	0.0	6.9	10.2	5.9	21.1
Prop In Lane	1.00		0.08	1.00		1.00	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	820	0	1041	16	629	535	66	0	240	205	389	708
V/C Ratio(X)	0.86	0.00	0.37	0.45	0.78	0.35	0.76	0.00	0.56	0.88	0.33	1.35
Avail Cap(c_a), veh/h	1131	0	1041	88	629	535	151	0	327	205	389	708
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.9	0.0	12.0	49.8	30.1	25.1	48.2	0.0	41.2	44.0	34.0	27.9
Incr Delay (d2), s/veh	5.2	0.0	1.0	18.7	9.2	1.8	15.8	0.0	2.0	32.8	0.5	167.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.0	0.0	6.1	0.3	13.8	4.2	1.7	0.0	3.6	6.8	3.1	52.5
LnGrp Delay(d),s/veh	42.1	0.0	13.0	68.5	39.2	26.9	64.0	0.0	43.2	76.8	34.5	195.1
LnGrp LOS	D		B	E	D	C	E		D	E	C	F
Approach Vol, veh/h		1087			683			183			1266	
Approach Delay, s/veh		31.9			36.2			48.9			161.8	
Approach LOS		C			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	28.6	38.6	16.2	17.7	5.4	61.8	8.3	25.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	33.2	29.1	11.7	18.0	5.0	57.3	8.6	21.1
Max Q Clear Time (g_c+I1), s	21.9	25.8	12.2	8.9	2.4	13.5	4.8	23.1
Green Ext Time (p_c), s	2.2	1.2	0.0	0.4	0.0	2.6	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	84.9
HCM 2010 LOS	F

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	60		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.984						0.932				0.850
Flt Protected				0.950				0.976			0.950	
Satd. Flow (prot)	0	1833	0	1770	1863	0	0	1694	0	0	1770	1583
Flt Permitted				0.950				0.976			0.950	
Satd. Flow (perm)	0	1833	0	1770	1863	0	0	1694	0	0	1770	1583
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1045			237			351			183	
Travel Time (s)		23.8			5.4			8.0			4.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	0	35	5	9	26	0	5	0	5	18	0	13
Future Volume (vph)	0	35	5	9	26	0	5	0	5	18	0	13
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	44	6	11	33	0	6	0	6	23	0	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	50	0	11	33	0	0	12	0	0	23	16

Intersection Summary

Intersection	
Int Delay, s/veh	3.7

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	35	5	9	26	0	5	0	5	18	0	13
Future Vol, veh/h	0	35	5	9	26	0	5	0	5	18	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	60	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	44	6	11	33	0	6	0	6	23	0	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	50	0	0	110	102	47	105	105	33
Stage 1	-	-	-	-	-	-	47	47	-	55	55	-
Stage 2	-	-	-	-	-	-	63	55	-	50	50	-
Critical Hdwy	-	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1557	-	0	868	788	1022	875	785	1041
Stage 1	0	-	-	-	-	0	967	856	-	957	849	-
Stage 2	0	-	-	-	-	0	948	849	-	963	853	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1557	-	-	850	782	1022	865	780	1041
Mov Cap-2 Maneuver	-	-	-	-	-	-	850	782	-	865	780	-
Stage 1	-	-	-	-	-	-	967	856	-	957	843	-
Stage 2	-	-	-	-	-	-	926	843	-	957	853	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	1.9	8.9	9
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	928	1557	-	-	-	865	1041
HCM Lane V/C Ratio	0.014	0.007	-	-	-	0.026	0.016
HCM Control Delay (s)	8.9	7.3	-	-	-	9.3	8.5
HCM Lane LOS	A	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	0	-	-	-	0.1	0

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected				0.950		
Satd. Flow (prot)	1863	0	0	1770	1863	0
Flt Permitted				0.950		
Satd. Flow (perm)	1863	0	0	1770	1863	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	112			181	2481	
Travel Time (s)	2.5			4.1	56.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	0	0	29	0	0	0
Future Volume (vph)	0	0	29	0	0	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	0	0	36	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	36	0	0

Intersection Summary

Intersection						
Int Delay, s/veh	7.1					

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations	Y			↰	↱	
Traffic Vol, veh/h	0	0	29	0	0	0
Future Vol, veh/h	0	0	29	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	36	0	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	73	1	1	0	-	0
Stage 1	1	-	-	-	-	-
Stage 2	72	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	931	1084	1622	-	-	-
Stage 1	1022	-	-	-	-	-
Stage 2	951	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	911	1084	1622	-	-	-
Mov Cap-2 Maneuver	911	-	-	-	-	-
Stage 1	1000	-	-	-	-	-
Stage 2	951	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	0	7.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	1622	-	-	-	-
HCM Lane V/C Ratio	0.022	-	-	-	-
HCM Control Delay (s)	7.3	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-	-

Appendix H

Project Buildout Year With Ambient Growth
With Cumulative Projects Plus Project Conditions
Intersection Analysis

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			1	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.865		
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	0	1611	1770	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	0	1611	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		340	1045		2657	
Travel Time (s)		7.7	23.8		60.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	0	0	0	290	321	0
Future Volume (vph)	0	0	0	290	321	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	0	0	420	465	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	420	465	0

Intersection Summary

Intersection	
Intersection Delay, s/veh	15.3
Intersection LOS	C

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↰		↱	↰	
Traffic Vol, veh/h	0	0	0	290	321	0
Future Vol, veh/h	0	0	0	290	321	0
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	420	465	0
Number of Lanes	0	1	0	1	1	0

Approach	SE	NW	SW
Opposing Approach	NW	SE	
Opposing Lanes	1	1	0
Conflicting Approach Left	SW		NW
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SW	SE
Conflicting Lanes Right	0	1	1
HCM Control Delay	0	12.8	17.5
HCM LOS	-	B	C

Lane	NWLn1	SELn1	SWLn1
Vol Left, %	0%	0%	100%
Vol Thru, %	0%	100%	0%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	290	0	321
LT Vol	0	0	321
Through Vol	0	0	0
RT Vol	290	0	0
Lane Flow Rate	420	0	465
Geometry Grp	1	1	1
Degree of Util (X)	0.533	0	0.657
Departure Headway (Hd)	4.564	5.824	5.087
Convergence, Y/N	Yes	Yes	Yes
Cap	786	0	702
Service Time	2.619	3.824	3.184
HCM Lane V/C Ratio	0.534	0	0.662
HCM Control Delay	12.8	8.8	17.5
HCM Lane LOS	B	N	C
HCM 95th-tile Q	3.2	0	4.9

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	60			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.908		0.936	
Flt Protected	0.950				0.974	
Satd. Flow (prot)	1770	1863	1691	0	1698	0
Flt Permitted	0.950				0.974	
Satd. Flow (perm)	1770	1863	1691	0	1698	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		237	1361		181	
Travel Time (s)		5.4	30.9		4.1	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	84	231	181	391	27	25
Future Volume (vph)	84	231	181	391	27	25
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	129	355	278	602	42	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	129	355	880	0	80	0

Intersection Summary

Intersection						
Int Delay, s/veh	2.4					

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations	↰	↑	↱		Y	
Traffic Vol, veh/h	84	231	181	391	27	25
Future Vol, veh/h	84	231	181	391	27	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	60	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	65	65	65	65	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	129	355	278	602	42	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	880	0	-	0	1192	579
Stage 1	-	-	-	-	579	-
Stage 2	-	-	-	-	613	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	768	-	-	-	207	515
Stage 1	-	-	-	-	560	-
Stage 2	-	-	-	-	541	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	768	-	-	-	172	515
Mov Cap-2 Maneuver	-	-	-	-	172	-
Stage 1	-	-	-	-	466	-
Stage 2	-	-	-	-	541	-

Approach	SE	NW	SW
HCM Control Delay, s	2.8	0	25.7
HCM LOS			D

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	768	-	253
HCM Lane V/C Ratio	-	-	0.168	-	0.316
HCM Control Delay (s)	-	-	10.6	-	25.7
HCM Lane LOS	-	-	B	-	D
HCM 95th %tile Q(veh)	-	-	0.6	-	1.3

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	415	6	6	500	238	473
Future Volume (vph)	415	6	6	500	238	473
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	500	7	7	602	287	570
Shared Lane Traffic (%)						
Lane Group Flow (vph)	500	7	7	602	287	570

Intersection Summary

Intersection	
Intersection Delay, s/veh	115.3
Intersection LOS	F

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	415	6	6	500	238	473
Future Vol, veh/h	415	6	6	500	238	473
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	500	7	7	602	287	570
Number of Lanes	1	1	1	1	1	1

Approach	SE	NE	SW
Opposing Approach		SW	NE
Opposing Lanes	0	2	2
Conflicting Approach Left	SW	SE	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NE		SE
Conflicting Lanes Right	2	0	2
HCM Control Delay	117.9	172	73.5
HCM LOS	F	F	F

Lane	NELn1	NELn2	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	6	500	415	6	238	473
LT Vol	6	0	415	0	0	0
Through Vol	0	500	0	0	238	0
RT Vol	0	0	0	6	0	473
Lane Flow Rate	7	602	500	7	287	570
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.017	1.296	1.147	0.014	0.608	1.097
Departure Headway (Hd)	8.825	8.304	8.756	7.51	8.612	7.879
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	408	440	420	479	422	467
Service Time	6.525	6.004	6.456	5.21	6.312	5.579
HCM Lane V/C Ratio	0.017	1.368	1.19	0.015	0.68	1.221
HCM Control Delay	11.7	173.9	119.5	10.3	23.8	98.5
HCM Lane LOS	B	F	F	B	C	F
HCM 95th-tile Q	0.1	24.6	17.6	0	3.9	16.8

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	85		0	150		0	150		0	250		100
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.958				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3391	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3391	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58				182			87			236
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1461			2630			1510			1533	
Travel Time (s)		33.2			59.8			34.3			34.8	

Intersection Summary	
Area Type:	Other

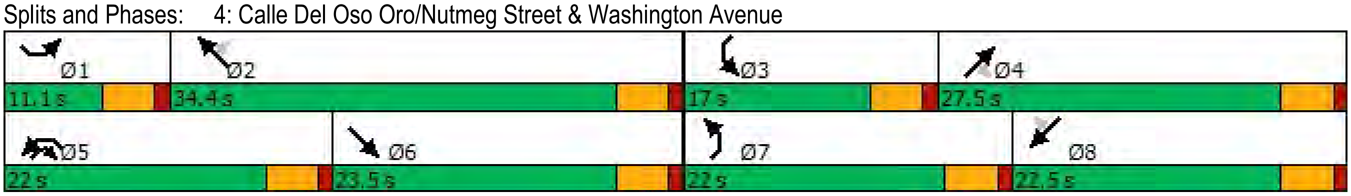
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	98	410	160	276	421	148	285	337	510	198	208	95
Future Volume (vph)	98	410	160	276	421	148	285	337	510	198	208	95
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	110	461	180	310	473	166	320	379	573	222	234	107
Shared Lane Traffic (%)												
Lane Group Flow (vph)	110	641	0	310	473	166	320	379	573	222	234	107

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	98	410	276	421	148	285	337	510	198	208	95
Future Volume (vph)	98	410	276	421	148	285	337	510	198	208	95
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	1	6	5	2		7	4	5	3	8	
Permitted Phases					2			4			8
Detector Phase	1	6	5	2	2	7	4	5	3	8	8
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	9.5	22.5	22.5
Total Split (s)	11.1	23.5	22.0	34.4	34.4	22.0	27.5	22.0	17.0	22.5	22.5
Total Split (%)	12.3%	26.1%	24.4%	38.2%	38.2%	24.4%	30.6%	24.4%	18.9%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	6.6	19.5	17.1	29.9	29.9	17.3	20.9	42.5	12.5	16.1	16.1
Actuated g/C Ratio	0.08	0.22	0.19	0.34	0.34	0.20	0.24	0.48	0.14	0.18	0.18
v/c Ratio	0.83	0.81	0.90	0.75	0.25	0.92	0.86	0.71	0.88	0.69	0.22
Control Delay	86.7	39.4	66.1	35.0	3.9	68.6	51.7	20.4	73.3	44.7	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.7	39.4	66.1	35.0	3.9	68.6	51.7	20.4	73.3	44.7	1.1
LOS	F	D	E	D	A	E	D	C	E	D	A
Approach Delay		46.3		39.7			41.9			47.7	
Approach LOS		D		D			D			D	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 88	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.92	
Intersection Signal Delay: 43.2	Intersection LOS: D
Intersection Capacity Utilization 75.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Calle Del Oso Oro/Nutmeg Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group Flow (vph)	110	641	310	473	166	320	379	573	222	234	107
v/c Ratio	0.83	0.81	0.90	0.75	0.25	0.92	0.86	0.71	0.88	0.69	0.22
Control Delay	86.7	39.4	66.1	35.0	3.9	68.6	51.7	20.4	73.3	44.7	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.7	39.4	66.1	35.0	3.9	68.6	51.7	20.4	73.3	44.7	1.1
Queue Length 50th (ft)	63	169	174	238	0	181	202	201	126	123	0
Queue Length 95th (ft)	#156	#252	#319	#354	34	#332	#335	319	#255	198	0
Internal Link Dist (ft)		1381		2550			1430			1453	
Turn Bay Length (ft)	85		150			150			250		100
Base Capacity (vph)	132	795	352	633	658	352	487	817	251	381	511
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.81	0.88	0.75	0.25	0.91	0.78	0.70	0.88	0.61	0.21

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	98	410	160	276	421	148	285	337	510	198	208	95
Future Volume (veh/h)	98	410	160	276	421	148	285	337	510	198	208	95
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	110	461	180	310	473	166	320	379	573	222	234	107
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	130	530	205	343	619	526	345	476	710	246	373	317
Arrive On Green	0.07	0.21	0.21	0.19	0.33	0.33	0.19	0.26	0.26	0.14	0.20	0.20
Sat Flow, veh/h	1774	2495	967	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	110	326	315	310	473	166	320	379	573	222	234	107
Grp Sat Flow(s),veh/h/ln	1774	1770	1692	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	5.5	16.0	16.2	15.4	20.5	7.0	16.0	17.1	23.0	11.1	10.3	5.2
Cycle Q Clear(g_c), s	5.5	16.0	16.2	15.4	20.5	7.0	16.0	17.1	23.0	11.1	10.3	5.2
Prop In Lane	1.00		0.57	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	130	376	359	343	619	526	345	476	710	246	373	317
V/C Ratio(X)	0.85	0.87	0.88	0.90	0.76	0.32	0.93	0.80	0.81	0.90	0.63	0.34
Avail Cap(c_a), veh/h	130	376	359	345	619	526	345	476	710	246	373	317
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.2	34.2	34.3	35.5	26.9	22.4	35.6	31.3	21.4	38.1	32.9	30.9
Incr Delay (d2), s/veh	37.3	22.7	24.6	26.1	8.7	1.6	30.6	9.1	6.8	32.5	3.3	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	10.2	10.0	10.0	12.0	3.3	10.8	9.9	13.5	7.6	5.7	2.3
LnGrp Delay(d),s/veh	78.5	56.9	58.9	61.6	35.6	24.0	66.2	40.4	28.3	70.6	36.3	31.5
LnGrp LOS	E	E	E	E	D	C	E	D	C	E	D	C
Approach Vol, veh/h		751			949			1272			563	
Approach Delay, s/veh		60.9			42.1			41.4			48.9	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	34.4	17.0	27.5	21.9	23.6	22.0	22.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.6	29.9	12.5	23.0	17.5	19.0	17.5	18.0
Max Q Clear Time (g_c+I1), s	7.5	22.5	13.1	25.0	17.4	18.2	18.0	12.3
Green Ext Time (p_c), s	0.0	2.2	0.0	0.0	0.0	0.3	0.0	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	46.9
HCM 2010 LOS	D

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		280	300		0	350		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.987			0.938			0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3493	0	1770	1747	0	1770	3514	0
Flt Permitted	0.950			0.950			0.176			0.467		
Satd. Flow (perm)	1770	3539	1583	1770	3493	0	328	1747	0	870	3514	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73		11			47			5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2630			1335			2657			1296	
Travel Time (s)		59.8			30.3			60.4			29.5	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	24	589	592	86	372	36	375	213	148	55	366	19
Future Volume (vph)	24	589	592	86	372	36	375	213	148	55	366	19
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	35	866	871	126	547	53	551	313	218	81	538	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	866	871	126	600	0	551	531	0	81	566	0

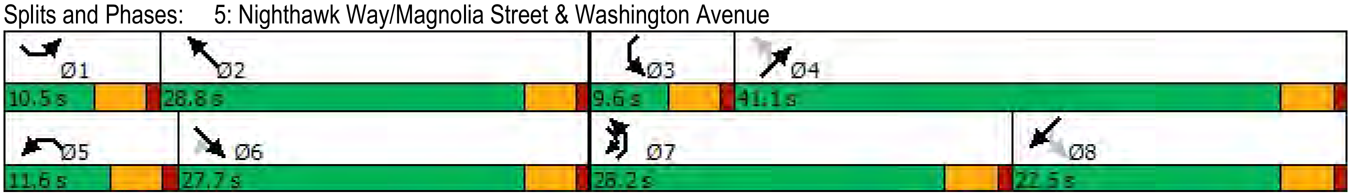
Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	24	589	592	86	372	375	213	55	366
Future Volume (vph)	24	589	592	86	372	375	213	55	366
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+pt	NA	pm+pt	NA
Protected Phases	1	6	7	5	2	7	4	3	8
Permitted Phases			6			4		8	
Detector Phase	1	6	7	5	2	7	4	3	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	10.5	27.7	28.2	11.6	28.8	28.2	41.1	9.6	22.5
Total Split (%)	11.7%	30.8%	31.3%	12.9%	32.0%	31.3%	45.7%	10.7%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	None	Max	None	None	None	None
Act Effct Green (s)	5.9	23.2	51.4	7.1	28.5	45.5	37.9	22.4	17.3
Actuated g/C Ratio	0.07	0.26	0.58	0.08	0.32	0.51	0.42	0.25	0.19
v/c Ratio	0.30	0.94	0.92	0.90	0.53	1.00	0.69	0.30	0.83
Control Delay	47.0	52.3	33.6	96.7	27.9	64.2	25.4	17.6	45.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.0	52.3	33.6	96.7	27.9	64.2	25.4	17.6	45.9
LOS	D	D	C	F	C	E	C	B	D
Approach Delay		43.0			39.8		45.2		42.3
Approach LOS		D			D		D		D

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 89.3
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 42.9 Intersection LOS: D
Intersection Capacity Utilization 67.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 5: Nighthawk Way/Magnolia Street & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	35	866	871	126	600	551	531	81	566
v/c Ratio	0.30	0.94	0.92	0.90	0.53	1.00	0.69	0.30	0.83
Control Delay	47.0	52.3	33.6	96.7	27.9	64.2	25.4	17.6	45.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.0	52.3	33.6	96.7	27.9	64.2	25.4	17.6	45.9
Queue Length 50th (ft)	19	254	395	72	154	~264	226	22	161
Queue Length 95th (ft)	37	228	328	#114	148	253	222	34	157
Internal Link Dist (ft)		2550			1255		2577		1216
Turn Bay Length (ft)	150		280	300		350		150	
Base Capacity (vph)	119	919	942	140	1124	550	768	269	712
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.94	0.92	0.90	0.53	1.00	0.69	0.30	0.79

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	24	589	592	86	372	36	375	213	148	55	366	19
Future Volume (veh/h)	24	589	592	86	372	36	375	213	148	55	366	19
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	35	866	871	126	547	53	551	313	218	81	538	28
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	2	0
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	58	934	838	143	1018	98	581	409	285	290	634	33
Arrive On Green	0.03	0.26	0.26	0.08	0.31	0.31	0.27	0.40	0.40	0.05	0.19	0.19
Sat Flow, veh/h	1774	3539	1583	1774	3261	315	1774	1024	713	1774	3423	178
Grp Volume(v), veh/h	35	866	871	126	296	304	551	0	531	81	278	288
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1807	1774	0	1737	1774	1770	1831
Q Serve(g_s), s	1.7	21.0	23.2	6.2	12.2	12.2	21.2	0.0	23.2	3.2	13.3	13.4
Cycle Q Clear(g_c), s	1.7	21.0	23.2	6.2	12.2	12.2	21.2	0.0	23.2	3.2	13.3	13.4
Prop In Lane	1.00		1.00	1.00		0.17	1.00		0.41	1.00		0.10
Lane Grp Cap(c), veh/h	58	934	838	143	552	564	581	0	694	290	328	339
V/C Ratio(X)	0.60	0.93	1.04	0.88	0.54	0.54	0.95	0.00	0.77	0.28	0.85	0.85
Avail Cap(c_a), veh/h	121	934	838	143	552	564	588	0	723	302	362	375
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.0	31.5	20.7	40.0	25.0	25.0	20.1	0.0	22.8	27.0	34.6	34.6
Incr Delay (d2), s/veh	9.7	16.4	41.7	41.9	3.7	3.7	25.0	0.0	4.7	0.5	15.8	15.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	12.3	29.8	4.7	6.5	6.7	17.0	0.0	12.0	1.6	7.9	8.2
LnGrp Delay(d),s/veh	51.6	47.9	62.4	81.9	28.7	28.7	45.1	0.0	27.6	27.5	50.4	50.3
LnGrp LOS	D	D	F	F	C	C	D		C	C	D	D
Approach Vol, veh/h		1772			726			1082			647	
Approach Delay, s/veh		55.1			37.9			36.5			47.5	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.4	31.9	9.0	39.6	11.6	27.7	27.8	20.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.0	24.3	5.1	36.6	7.1	23.2	23.7	18.0
Max Q Clear Time (g_c+I1), s	3.7	14.2	5.2	25.2	8.2	25.2	23.2	15.4
Green Ext Time (p_c), s	0.0	2.6	0.0	2.8	0.0	0.0	0.1	0.9

Intersection Summary	
HCM 2010 Ctrl Delay	46.2
HCM 2010 LOS	D

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		170	150		0	80		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	1583	0	1770	1583	0
Flt Permitted	0.950			0.950			0.744			0.679		
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1386	1583	0	1265	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			372			109		241			355	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1335			1310			2481			639	
Travel Time (s)		30.3			29.8			56.4			14.5	

Intersection Summary	
Area Type:	Other

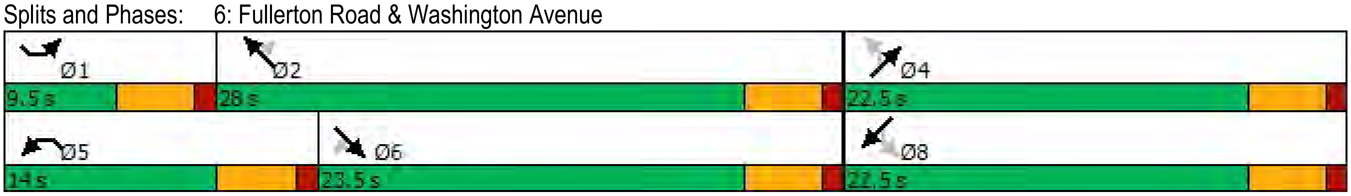
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	13	589	227	148	348	1	105	0	74	2	0	12
Future Volume (vph)	13	589	227	148	348	1	105	0	74	2	0	12
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	21	966	372	243	570	2	172	0	121	3	0	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	966	372	243	570	2	172	121	0	3	20	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Configurations										
Traffic Volume (vph)	13	589	227	148	348	1	105	0	2	0
Future Volume (vph)	13	589	227	148	348	1	105	0	2	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	1	6		5	2			4		8
Permitted Phases			6			2	4		8	
Detector Phase	1	6	6	5	2	2	4	4	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	23.5	23.5	14.0	28.0	28.0	22.5	22.5	22.5	22.5
Total Split (%)	15.8%	39.2%	39.2%	23.3%	46.7%	46.7%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	5.1	19.9	19.9	9.6	33.7	33.7	11.7	11.7	11.4	11.4
Actuated g/C Ratio	0.10	0.38	0.38	0.18	0.65	0.65	0.22	0.22	0.22	0.22
v/c Ratio	0.12	0.71	0.45	0.75	0.47	0.00	0.55	0.22	0.01	0.03
Control Delay	26.2	20.2	4.1	40.7	11.5	0.0	25.6	0.9	15.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	20.2	4.1	40.7	11.5	0.0	25.6	0.9	15.5	0.1
LOS	C	C	A	D	B	A	C	A	B	A
Approach Delay		15.9			20.2			15.4		2.1
Approach LOS		B			C			B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 52.1	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 17.1	Intersection LOS: B
Intersection Capacity Utilization 48.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Fullerton Road & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	21	966	372	243	570	2	172	121	3	20
v/c Ratio	0.12	0.71	0.45	0.75	0.47	0.00	0.55	0.22	0.01	0.03
Control Delay	26.2	20.2	4.1	40.7	11.5	0.0	25.6	0.9	15.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	20.2	4.1	40.7	11.5	0.0	25.6	0.9	15.5	0.1
Queue Length 50th (ft)	6	140	0	75	85	0	49	0	1	0
Queue Length 95th (ft)	17	138	1	98	158	0	61	0	4	0
Internal Link Dist (ft)		1255			1230			2401		559
Turn Bay Length (ft)			170	150			80			
Base Capacity (vph)	173	1354	835	330	1204	1062	489	715	447	789
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.71	0.45	0.74	0.47	0.00	0.35	0.17	0.01	0.03

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	13	589	227	148	348	1	105	0	74	2	0	12
Future Volume (veh/h)	13	589	227	148	348	1	105	0	74	2	0	12
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	21	966	372	243	570	2	172	0	121	3	0	20
Adj No. of Lanes	1	2	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	45	1345	602	297	973	827	382	0	289	289	0	289
Arrive On Green	0.03	0.38	0.38	0.17	0.52	0.52	0.18	0.00	0.18	0.18	0.00	0.18
Sat Flow, veh/h	1774	3539	1583	1774	1863	1583	1386	0	1583	1265	0	1583
Grp Volume(v), veh/h	21	966	372	243	570	2	172	0	121	3	0	20
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1863	1583	1386	0	1583	1265	0	1583
Q Serve(g_s), s	0.6	11.6	9.5	6.6	10.5	0.0	5.9	0.0	3.4	0.1	0.0	0.5
Cycle Q Clear(g_c), s	0.6	11.6	9.5	6.6	10.5	0.0	6.4	0.0	3.4	3.5	0.0	0.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	45	1345	602	297	973	827	382	0	289	289	0	289
V/C Ratio(X)	0.47	0.72	0.62	0.82	0.59	0.00	0.45	0.00	0.42	0.01	0.00	0.07
Avail Cap(c_a), veh/h	177	1345	602	337	973	827	629	0	570	514	0	570
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.0	13.2	12.6	20.1	8.2	5.7	19.6	0.0	18.1	19.6	0.0	16.9
Incr Delay (d2), s/veh	7.4	3.3	4.7	13.1	2.6	0.0	0.8	0.0	1.0	0.0	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	6.3	4.9	4.3	5.9	0.0	2.3	0.0	1.6	0.0	0.0	0.2
LnGrp Delay(d),s/veh	31.4	16.5	17.3	33.2	10.8	5.7	20.4	0.0	19.1	19.7	0.0	17.0
LnGrp LOS	C	B	B	C	B	A	C		B	B		B
Approach Vol, veh/h		1359			815			293			23	
Approach Delay, s/veh		17.0			17.5			19.9			17.4	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.8	30.6		13.6	12.9	23.5		13.6
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	9.5	19.0		18.0
Max Q Clear Time (g_c+I1), s	2.6	12.5		8.4	8.6	13.6		5.5
Green Ext Time (p_c), s	0.0	2.8		0.8	0.1	3.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.5
HCM 2010 LOS	B

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.991			0.996			0.869			0.947	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3507	0	1770	3525	0	1770	1619	0	1770	1764	0
Flt Permitted	0.950			0.950			0.597			0.163		
Satd. Flow (perm)	1770	3507	0	1770	3525	0	1112	1619	0	304	1764	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			5			449			35	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

Intersection Summary	
Area Type:	Other

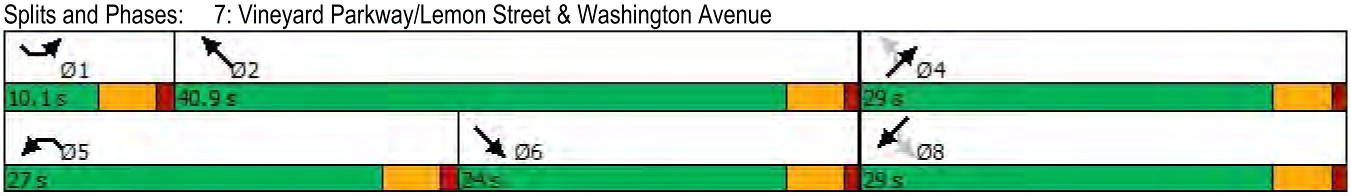
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	28	717	44	579	388	11	43	114	790	14	106	57
Future Volume (vph)	28	717	44	579	388	11	43	114	790	14	106	57
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	30	779	48	629	422	12	47	124	859	15	115	62
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	827	0	629	434	0	47	983	0	15	177	0

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	28	717	579	388	43	114	14	106
Future Volume (vph)	28	717	579	388	43	114	14	106
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases					4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	10.1	24.0	27.0	40.9	29.0	29.0	29.0	29.0
Total Split (%)	12.6%	30.0%	33.8%	51.1%	36.3%	36.3%	36.3%	36.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	5.6	19.5	22.5	42.5	24.5	24.5	24.5	24.5
Actuated g/C Ratio	0.07	0.24	0.28	0.53	0.31	0.31	0.31	0.31
v/c Ratio	0.24	0.96	1.27	0.23	0.14	1.22	0.16	0.31
Control Delay	40.4	53.9	163.2	11.2	21.5	126.8	25.6	18.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.4	53.9	163.2	11.2	21.5	126.8	25.6	18.8
LOS	D	D	F	B	C	F	C	B
Approach Delay		53.5		101.1		122.0		19.3
Approach LOS		D		F		F		B

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 80	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.27	
Intersection Signal Delay: 90.0	Intersection LOS: F
Intersection Capacity Utilization 119.3%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	30	827	629	434	47	983	15	177
v/c Ratio	0.24	0.96	1.27	0.23	0.14	1.22	0.16	0.31
Control Delay	40.4	53.9	163.2	11.2	21.5	126.8	25.6	18.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.4	53.9	163.2	11.2	21.5	126.8	25.6	18.8
Queue Length 50th (ft)	14	213	~401	48	17	~444	5	53
Queue Length 95th (ft)	40	#334	#598	97	42	#675	22	104
Internal Link Dist (ft)		1230		2572		2575		1085
Turn Bay Length (ft)	150		255		160		150	
Base Capacity (vph)	123	860	497	1873	340	807	93	564
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.96	1.27	0.23	0.14	1.22	0.16	0.31

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	28	717	44	579	388	11	43	114	790	14	106	57
Future Volume (veh/h)	28	717	44	579	388	11	43	114	790	14	106	57
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	30	779	48	629	422	12	47	124	859	15	115	62
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	54	826	51	499	1738	49	365	62	432	90	349	188
Arrive On Green	0.03	0.24	0.24	0.28	0.49	0.49	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	1774	3387	209	1774	3515	100	1203	204	1410	570	1140	615
Grp Volume(v), veh/h	30	407	420	629	212	222	47	0	983	15	0	177
Grp Sat Flow(s),veh/h/ln	1774	1770	1826	1774	1770	1845	1203	0	1614	570	0	1754
Q Serve(g_s), s	1.3	18.1	18.1	22.5	5.5	5.5	2.5	0.0	24.5	0.0	0.0	6.2
Cycle Q Clear(g_c), s	1.3	18.1	18.1	22.5	5.5	5.5	8.7	0.0	24.5	24.5	0.0	6.2
Prop In Lane	1.00		0.11	1.00		0.05	1.00		0.87	1.00		0.35
Lane Grp Cap(c), veh/h	54	431	445	499	875	913	365	0	494	90	0	537
V/C Ratio(X)	0.56	0.94	0.94	1.26	0.24	0.24	0.13	0.00	1.99	0.17	0.00	0.33
Avail Cap(c_a), veh/h	124	431	445	499	875	913	365	0	494	90	0	537
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.3	29.7	29.7	28.8	11.6	11.6	24.8	0.0	27.8	40.0	0.0	21.4
Incr Delay (d2), s/veh	8.7	31.2	30.7	132.7	0.7	0.6	0.2	0.0	452.2	0.9	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	12.6	12.9	29.3	2.8	2.9	0.9	0.0	72.9	0.4	0.0	3.1
LnGrp Delay(d),s/veh	46.9	60.9	60.4	161.5	12.3	12.2	24.9	0.0	480.0	40.9	0.0	21.8
LnGrp LOS	D	E	E	F	B	B	C		F	D		C
Approach Vol, veh/h		857			1063			1030			192	
Approach Delay, s/veh		60.2			100.5			459.2			23.3	
Approach LOS		E			F			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.9	44.1		29.0	27.0	24.0		29.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.6	36.4		24.5	22.5	19.5		24.5
Max Q Clear Time (g_c+I1), s	3.3	7.5		26.5	24.5	20.1		26.5
Green Ext Time (p_c), s	0.0	2.7		0.0	0.0	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	202.4
HCM 2010 LOS	F

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.986				0.850		0.991				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1837	0	1770	1863	1583	1770	1846	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1837	0	1770	1863	1583	1770	1846	0	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				136		2				99
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	1206	392	40	3	386	125	64	111	7	94	69	604
Future Volume (vph)	1206	392	40	3	386	125	64	111	7	94	69	604
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	1419	461	47	4	454	147	75	131	8	111	81	711
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1419	508	0	4	454	147	75	139	0	111	81	711

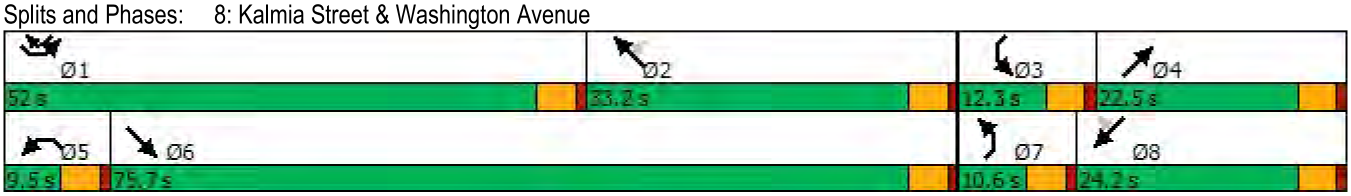
Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	1206	392	3	386	125	64	111	94	69	604
Future Volume (vph)	1206	392	3	386	125	64	111	94	69	604
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	52.0	75.7	9.5	33.2	33.2	10.6	22.5	12.3	24.2	52.0
Total Split (%)	43.3%	63.1%	7.9%	27.7%	27.7%	8.8%	18.8%	10.3%	20.2%	43.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	47.5	78.9	5.0	28.7	28.7	9.2	13.5	7.8	14.4	64.2
Actuated g/C Ratio	0.41	0.68	0.04	0.25	0.25	0.08	0.12	0.07	0.12	0.56
v/c Ratio	1.01	0.40	0.05	0.98	0.30	0.54	0.64	0.93	0.35	0.77
Control Delay	59.9	10.1	56.3	81.9	9.1	69.1	61.6	120.9	49.6	22.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.9	10.1	56.3	81.9	9.1	69.1	61.6	120.9	49.6	22.8
LOS	E	B	E	F	A	E	E	F	D	C
Approach Delay		46.8		64.0			64.2		37.3	
Approach LOS		D		E			E		D	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 115.6
Natural Cycle: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 48.3 Intersection LOS: D
Intersection Capacity Utilization 77.8% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 8: Kalmia Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	1419	508	4	454	147	75	139	111	81	711
v/c Ratio	1.01	0.40	0.05	0.98	0.30	0.54	0.64	0.93	0.35	0.77
Control Delay	59.9	10.1	56.3	81.9	9.1	69.1	61.6	120.9	49.6	22.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.9	10.1	56.3	81.9	9.1	69.1	61.6	120.9	49.6	22.8
Queue Length 50th (ft)	~546	139	3	338	6	56	99	84	55	319
Queue Length 95th (ft)	#676	263	15	#526	51	#137	155	#189	98	417
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	1411	1256	76	462	495	140	289	119	317	923
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.01	0.40	0.05	0.98	0.30	0.54	0.48	0.93	0.26	0.77

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	1206	392	40	3	386	125	64	111	7	94	69	604
Future Volume (veh/h)	1206	392	40	3	386	125	64	111	7	94	69	604
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	1419	461	47	4	454	147	75	131	8	111	81	711
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	1
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	1362	1048	107	9	446	379	90	261	16	115	306	887
Arrive On Green	0.40	0.63	0.63	0.01	0.24	0.24	0.05	0.15	0.15	0.07	0.16	0.16
Sat Flow, veh/h	3442	1663	170	1774	1863	1583	1774	1738	106	1774	1863	1583
Grp Volume(v), veh/h	1419	0	508	4	454	147	75	0	139	111	81	711
Grp Sat Flow(s),veh/h/ln	1721	0	1833	1774	1863	1583	1774	0	1844	1774	1863	1583
Q Serve(g_s), s	47.5	0.0	17.0	0.3	28.7	9.3	5.0	0.0	8.3	7.5	4.6	19.7
Cycle Q Clear(g_c), s	47.5	0.0	17.0	0.3	28.7	9.3	5.0	0.0	8.3	7.5	4.6	19.7
Prop In Lane	1.00		0.09	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	1362	0	1154	9	446	379	90	0	277	115	306	887
V/C Ratio(X)	1.04	0.00	0.44	0.43	1.02	0.39	0.83	0.00	0.50	0.96	0.26	0.80
Avail Cap(c_a), veh/h	1362	0	1154	74	446	379	90	0	277	115	306	887
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.3	0.0	11.4	59.5	45.7	38.3	56.4	0.0	46.9	56.0	43.8	21.1
Incr Delay (d2), s/veh	36.0	0.0	1.2	29.0	47.5	3.0	45.4	0.0	1.4	71.8	0.5	5.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	29.3	0.0	9.0	0.2	20.6	4.4	3.6	0.0	4.4	6.0	2.4	20.0
LnGrp Delay(d),s/veh	72.2	0.0	12.6	88.5	93.2	41.3	101.8	0.0	48.3	127.8	44.3	26.4
LnGrp LOS	F		B	F	F	D	F		D	F	D	C
Approach Vol, veh/h		1927			605			214			903	
Approach Delay, s/veh		56.5			80.6			67.1			40.5	
Approach LOS		E			F			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	52.0	33.2	12.3	22.5	5.1	80.1	10.6	24.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	47.5	28.7	7.8	18.0	5.0	71.2	6.1	19.7
Max Q Clear Time (g_c+I1), s	49.5	30.7	9.5	10.3	2.3	19.0	7.0	21.7
Green Ext Time (p_c), s	0.0	0.0	0.0	0.4	0.0	3.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	57.1
HCM 2010 LOS	E

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	60		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.997						0.913				0.850
Flt Protected				0.950				0.982			0.950	
Satd. Flow (prot)	0	1857	0	1770	1863	0	0	1670	0	0	1770	1583
Flt Permitted				0.950				0.982			0.950	
Satd. Flow (perm)	0	1857	0	1770	1863	0	0	1670	0	0	1770	1583
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1045			237			351			183	
Travel Time (s)		23.8			5.4			8.0			4.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	0	302	6	6	265	0	8	0	14	124	0	62
Future Volume (vph)	0	302	6	6	265	0	8	0	14	124	0	62
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	392	8	8	344	0	10	0	18	161	0	81
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	400	0	8	344	0	0	28	0	0	161	81

Intersection Summary

Intersection	
Int Delay, s/veh	5.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	302	6	6	265	0	8	0	14	124	0	62
Future Vol, veh/h	0	302	6	6	265	0	8	0	14	124	0	62
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	60	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	392	8	8	344	0	10	0	18	161	0	81

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	400	0	0	797	756	396	765	760	344
Stage 1	-	-	-	-	-	-	396	396	-	360	360	-
Stage 2	-	-	-	-	-	-	401	360	-	405	400	-
Critical Hdwy	-	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1159	-	0	305	337	653	320	336	699
Stage 1	0	-	-	-	-	0	629	604	-	658	626	-
Stage 2	0	-	-	-	-	0	626	626	-	622	602	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1159	-	-	268	335	653	309	334	699
Mov Cap-2 Maneuver	-	-	-	-	-	-	268	335	-	309	334	-
Stage 1	-	-	-	-	-	-	629	604	-	658	622	-
Stage 2	-	-	-	-	-	-	550	622	-	605	602	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	0.2	14	22.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	429	1159	-	-	-	309	699
HCM Lane V/C Ratio	0.067	0.007	-	-	-	0.521	0.115
HCM Control Delay (s)	14	8.1	-	-	-	28.7	10.8
HCM Lane LOS	B	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0.2	0	-	-	-	2.8	0.4

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.993	
Flt Protected				0.972		
Satd. Flow (prot)	1863	0	0	1811	1850	0
Flt Permitted				0.972		
Satd. Flow (perm)	1863	0	0	1811	1850	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	112			181	2481	
Travel Time (s)	2.5			4.1	56.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	0	0	277	198	52	3
Future Volume (vph)	0	0	277	198	52	3
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.48	0.48	0.48	0.48	0.48	0.48
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	0	0	577	413	108	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	990	114	0
Intersection Summary						

Intersection						
Int Delay, s/veh	4.7					

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations	Y			↰	↱	
Traffic Vol, veh/h	0	0	277	198	52	3
Future Vol, veh/h	0	0	277	198	52	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	48	48	48	48	48	48
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	577	413	108	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1678	111	114	0	-	0
Stage 1	111	-	-	-	-	-
Stage 2	1567	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	104	942	1475	-	-	-
Stage 1	914	-	-	-	-	-
Stage 2	189	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	51	942	1475	-	-	-
Mov Cap-2 Maneuver	51	-	-	-	-	-
Stage 1	451	-	-	-	-	-
Stage 2	189	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	0	5.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	1475	-	-	-	-
HCM Lane V/C Ratio	0.391	-	-	-	-
HCM Control Delay (s)	9	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	1.9	-	-	-	-

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			1	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.865		
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	0	1611	1770	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	0	1611	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		340	1045		2657	
Travel Time (s)		7.7	23.8		60.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	0	0	0	65	52	0
Future Volume (vph)	0	0	0	65	52	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	0	0	0	79	63	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	79	63	0

Intersection Summary

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	65	52	0
Future Vol, veh/h	0	0	0	65	52	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	79	63	0
Number of Lanes	0	1	0	1	1	0

Approach	SE	NW	SW
Opposing Approach	NW	SE	
Opposing Lanes	1	1	0
Conflicting Approach Left	SW		NW
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SW	SE
Conflicting Lanes Right	0	1	1
HCM Control Delay	0	6.8	7.6
HCM LOS	-	A	A

Lane	NWLn1	SELn1	SWLn1
Vol Left, %	0%	0%	100%
Vol Thru, %	0%	100%	0%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	65	0	52
LT Vol	0	0	52
Through Vol	0	0	0
RT Vol	65	0	0
Lane Flow Rate	79	0	63
Geometry Grp	1	1	1
Degree of Util (X)	0.076	0	0.075
Departure Headway (Hd)	3.444	4.104	4.272
Convergence, Y/N	Yes	Yes	Yes
Cap	1035	0	842
Service Time	1.481	2.148	2.284
HCM Lane V/C Ratio	0.076	0	0.075
HCM Control Delay	6.8	7.1	7.6
HCM Lane LOS	A	N	A
HCM 95th-tile Q	0.2	0	0.2

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	60			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.922			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1717	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1717	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		237	1361		181	
Travel Time (s)		5.4	30.9		4.1	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Traffic Volume (vph)	23	76	36	49	2	0
Future Volume (vph)	23	76	36	49	2	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	28	93	44	60	2	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	93	104	0	2	0

Intersection Summary

Intersection	
Int Delay, s/veh	1

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	23	76	36	49	2	0
Future Vol, veh/h	23	76	36	49	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	60	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	28	93	44	60	2	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	104	0	-	0	223	74
Stage 1	-	-	-	-	74	-
Stage 2	-	-	-	-	149	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1488	-	-	-	765	988
Stage 1	-	-	-	-	949	-
Stage 2	-	-	-	-	879	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1488	-	-	-	750	988
Mov Cap-2 Maneuver	-	-	-	-	750	-
Stage 1	-	-	-	-	931	-
Stage 2	-	-	-	-	879	-

Approach	SE	NW	SW
HCM Control Delay, s	1.7	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1488	-	750
HCM Lane V/C Ratio	-	-	0.019	-	0.003
HCM Control Delay (s)	-	-	7.5	-	9.8
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	81	3	2	315	532	117
Future Volume (vph)	81	3	2	315	532	117
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	105	4	3	409	691	152
Shared Lane Traffic (%)						
Lane Group Flow (vph)	105	4	3	409	691	152

Intersection Summary

Intersection	
Intersection Delay, s/veh	43.4
Intersection LOS	E

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations	↰	↱	↰	↑	↑	↱
Traffic Vol, veh/h	81	3	2	315	532	117
Future Vol, veh/h	81	3	2	315	532	117
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	105	4	3	409	691	152
Number of Lanes	1	1	1	1	1	1

Approach	SE	NE	SW
Opposing Approach		SW	NE
Opposing Lanes	0	2	2
Conflicting Approach Left	SW	SE	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NE		SE
Conflicting Lanes Right	2	0	2
HCM Control Delay	12.9	19	59.3
HCM LOS	B	C	F

Lane	NELn1	NELn2	SELn1	SELn2	SWLn1	SWLn2
Vol Left, %	100%	0%	100%	0%	0%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	2	315	81	3	532	117
LT Vol	2	0	81	0	0	0
Through Vol	0	315	0	0	532	0
RT Vol	0	0	0	3	0	117
Lane Flow Rate	3	409	105	4	691	152
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.005	0.655	0.226	0.007	1.047	0.2
Departure Headway (Hd)	6.428	5.921	7.968	6.74	5.455	4.748
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	560	614	453	534	670	760
Service Time	4.128	3.621	5.668	4.44	3.155	2.448
HCM Lane V/C Ratio	0.005	0.666	0.232	0.007	1.031	0.2
HCM Control Delay	9.2	19.1	13	9.5	70.5	8.6
HCM Lane LOS	A	C	B	A	F	A
HCM 95th-tile Q	0	4.8	0.9	0	18.2	0.7

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	85		0	150		0	150		0	250		100
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.937				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3316	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3316	0	1770	1863	1583	1770	1863	1583	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		197				176			149			182
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1461			2630			1510			1533	
Travel Time (s)		33.2			59.8			34.3			34.8	

Intersection Summary	
Area Type:	Other

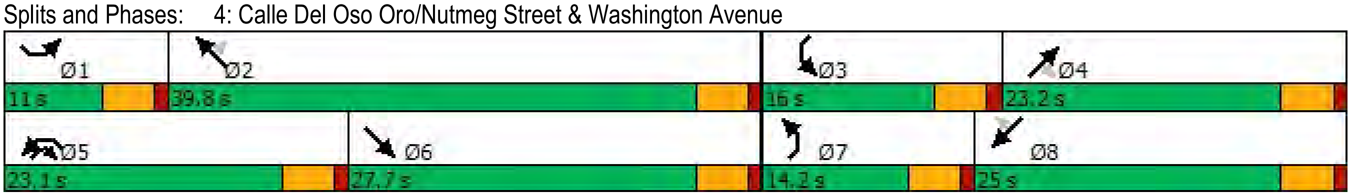
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	101	369	267	323	623	167	163	150	231	184	363	219
Future Volume (vph)	101	369	267	323	623	167	163	150	231	184	363	219
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	106	388	281	340	656	176	172	158	243	194	382	231
Shared Lane Traffic (%)												
Lane Group Flow (vph)	106	669	0	340	656	176	172	158	243	194	382	231

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	101	369	323	623	167	163	150	231	184	363	219
Future Volume (vph)	101	369	323	623	167	163	150	231	184	363	219
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	1	6	5	2		7	4	5	3	8	
Permitted Phases					2			4			8
Detector Phase	1	6	5	2	2	7	4	5	3	8	8
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	9.5	22.5	22.5
Total Split (s)	11.0	27.7	23.1	39.8	39.8	14.2	23.2	23.1	16.0	25.0	25.0
Total Split (%)	12.2%	30.8%	25.7%	44.2%	44.2%	15.8%	25.8%	25.7%	17.8%	27.8%	27.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	6.5	23.3	18.5	35.3	35.3	9.7	18.3	41.3	11.4	20.0	20.0
Actuated g/C Ratio	0.07	0.26	0.21	0.39	0.39	0.11	0.20	0.46	0.13	0.22	0.22
v/c Ratio	0.83	0.66	0.93	0.89	0.24	0.90	0.41	0.30	0.86	0.92	0.47
Control Delay	87.5	24.3	69.7	42.4	3.9	85.3	34.8	7.0	73.4	63.4	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.5	24.3	69.7	42.4	3.9	85.3	34.8	7.0	73.4	63.4	11.4
LOS	F	C	E	D	A	F	C	A	E	E	B
Approach Delay		32.9		44.5			38.1			50.9	
Approach LOS		C		D			D			D	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 89.5	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 42.3	Intersection LOS: D
Intersection Capacity Utilization 81.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Calle Del Oso Oro/Nutmeg Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group Flow (vph)	106	669	340	656	176	172	158	243	194	382	231
v/c Ratio	0.83	0.66	0.93	0.89	0.24	0.90	0.41	0.30	0.86	0.92	0.47
Control Delay	87.5	24.3	69.7	42.4	3.9	85.3	34.8	7.0	73.4	63.4	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.5	24.3	69.7	42.4	3.9	85.3	34.8	7.0	73.4	63.4	11.4
Queue Length 50th (ft)	61	126	191	343	0	98	78	29	110	212	22
Queue Length 95th (ft)	#153	187	#354	#555	39	#217	137	74	#229	#376	85
Internal Link Dist (ft)		1381		2550			1430			1453	
Turn Bay Length (ft)	85		150			150			250		100
Base Capacity (vph)	128	1010	367	734	730	191	389	812	227	426	503
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.66	0.93	0.89	0.24	0.90	0.41	0.30	0.85	0.90	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	101	369	267	323	623	167	163	150	231	184	363	219
Future Volume (veh/h)	101	369	267	323	623	167	163	150	231	184	363	219
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	106	388	281	340	656	176	172	158	243	194	382	231
Adj No. of Lanes	1	2	0	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	129	510	365	368	734	624	192	381	652	228	418	356
Arrive On Green	0.07	0.26	0.26	0.21	0.39	0.39	0.11	0.20	0.20	0.13	0.22	0.22
Sat Flow, veh/h	1774	1972	1411	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	106	348	321	340	656	176	172	158	243	194	382	231
Grp Sat Flow(s),veh/h/ln	1774	1770	1614	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	5.3	16.2	16.5	16.8	29.5	6.8	8.6	6.6	9.6	9.6	17.9	11.9
Cycle Q Clear(g_c), s	5.3	16.2	16.5	16.8	29.5	6.8	8.6	6.6	9.6	9.6	17.9	11.9
Prop In Lane	1.00		0.87	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	129	458	418	368	734	624	192	381	652	228	418	356
V/C Ratio(X)	0.82	0.76	0.77	0.92	0.89	0.28	0.90	0.41	0.37	0.85	0.91	0.65
Avail Cap(c_a), veh/h	129	458	418	368	734	624	192	389	659	228	426	362
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.0	30.6	30.7	34.8	25.4	18.5	39.5	31.0	18.3	38.2	33.9	31.5
Incr Delay (d2), s/veh	33.4	11.2	12.8	28.5	15.6	1.1	37.5	0.7	0.4	25.4	23.6	4.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	9.3	8.8	11.1	18.3	3.1	6.2	3.5	4.2	6.3	12.0	5.6
LnGrp Delay(d),s/veh	74.4	41.9	43.5	63.3	41.0	19.7	77.0	31.7	18.7	63.6	57.5	35.5
LnGrp LOS	E	D	D	E	D	B	E	C	B	E	E	D
Approach Vol, veh/h		775			1172			573			807	
Approach Delay, s/veh		47.0			44.3			39.8			52.7	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	39.8	16.0	22.8	23.1	27.7	14.2	24.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.5	35.3	11.5	18.7	18.6	23.2	9.7	20.5
Max Q Clear Time (g_c+I1), s	7.3	31.5	11.6	11.6	18.8	18.5	10.6	19.9
Green Ext Time (p_c), s	0.0	1.8	0.0	1.0	0.0	1.8	0.0	0.2

Intersection Summary			
HCM 2010 Ctrl Delay			46.2
HCM 2010 LOS			D

Notes

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		280	300		0	350		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor												
Frt			0.850		0.998			0.929			0.912	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3532	0	1770	1730	0	1770	3228	0
Flt Permitted	0.950			0.950			0.492			0.686		
Satd. Flow (perm)	1770	3539	1583	1770	3532	0	916	1730	0	1278	3228	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			121		2			52			81	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2630			1335			2657			1296	
Travel Time (s)		59.8			30.3			60.4			29.5	

Intersection Summary	
Area Type:	Other

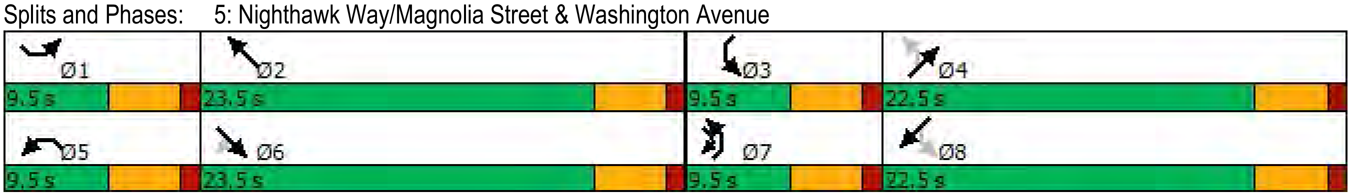
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	39	653	115	60	728	9	112	55	49	10	54	77
Future Volume (vph)	39	653	115	60	728	9	112	55	49	10	54	77
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	41	687	121	63	766	9	118	58	52	11	57	81
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	687	121	63	775	0	118	110	0	11	138	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	39	653	115	60	728	112	55	10	54
Future Volume (vph)	39	653	115	60	728	112	55	10	54
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+pt	NA	pm+pt	NA
Protected Phases	1	6	7	5	2	7	4	3	8
Permitted Phases			6			4		8	
Detector Phase	1	6	7	5	2	7	4	3	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	9.5	23.5	9.5	9.5	23.5	9.5	22.5	9.5	22.5
Total Split (%)	14.6%	36.2%	14.6%	14.6%	36.2%	14.6%	34.6%	14.6%	34.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	None	Max	None	None	None	None
Act Effct Green (s)	5.1	24.4	31.7	5.1	26.2	13.4	12.6	10.7	7.0
Actuated g/C Ratio	0.10	0.49	0.64	0.10	0.53	0.27	0.26	0.22	0.14
v/c Ratio	0.22	0.39	0.11	0.34	0.41	0.35	0.23	0.03	0.26
Control Delay	26.7	13.3	2.2	29.1	12.2	16.7	11.8	13.2	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	13.3	2.2	29.1	12.2	16.7	11.8	13.2	11.8
LOS	C	B	A	C	B	B	B	B	B
Approach Delay		12.4			13.5		14.3		11.9
Approach LOS		B			B		B		B

Intersection Summary	
Cycle Length: 65	
Actuated Cycle Length: 49.3	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 13.0	Intersection LOS: B
Intersection Capacity Utilization 49.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Nighthawk Way/Magnolia Street & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	41	687	121	63	775	118	110	11	138
v/c Ratio	0.22	0.39	0.11	0.34	0.41	0.35	0.23	0.03	0.26
Control Delay	26.7	13.3	2.2	29.1	12.2	16.7	11.8	13.2	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	13.3	2.2	29.1	12.2	16.7	11.8	13.2	11.8
Queue Length 50th (ft)	12	88	0	19	68	28	13	2	8
Queue Length 95th (ft)	39	149	20	53	171	59	53	11	28
Internal Link Dist (ft)		2550			1255		2577		1216
Turn Bay Length (ft)	150		280	300		350		150	
Base Capacity (vph)	183	1753	1061	183	1876	336	678	327	1256
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.39	0.11	0.34	0.41	0.35	0.16	0.03	0.11

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	39	653	115	60	728	9	112	55	49	10	54	77
Future Volume (veh/h)	39	653	115	60	728	9	112	55	49	10	54	77
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	41	687	121	63	766	9	118	58	52	11	57	81
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	78	1381	747	104	1452	17	357	152	136	300	176	158
Arrive On Green	0.04	0.39	0.39	0.06	0.41	0.41	0.08	0.17	0.17	0.01	0.10	0.10
Sat Flow, veh/h	1774	3539	1583	1774	3583	42	1774	907	813	1774	1770	1583
Grp Volume(v), veh/h	41	687	121	63	378	397	118	0	110	11	57	81
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1855	1774	0	1719	1774	1770	1583
Q Serve(g_s), s	1.1	7.2	2.1	1.7	7.9	7.9	2.8	0.0	2.8	0.3	1.5	2.4
Cycle Q Clear(g_c), s	1.1	7.2	2.1	1.7	7.9	7.9	2.8	0.0	2.8	0.3	1.5	2.4
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.47	1.00		1.00
Lane Grp Cap(c), veh/h	78	1381	747	104	717	752	357	0	288	300	176	158
V/C Ratio(X)	0.53	0.50	0.16	0.60	0.53	0.53	0.33	0.00	0.38	0.04	0.32	0.51
Avail Cap(c_a), veh/h	182	1381	747	182	717	752	394	0	635	457	654	585
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.8	11.2	7.4	22.4	11.0	11.0	16.9	0.0	18.0	19.2	20.4	20.8
Incr Delay (d2), s/veh	5.5	1.3	0.5	5.5	2.8	2.6	0.5	0.0	0.8	0.0	1.1	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	3.7	1.0	1.0	4.3	4.5	1.4	0.0	1.4	0.1	0.8	1.1
LnGrp Delay(d),s/veh	28.3	12.5	7.8	27.9	13.7	13.6	17.4	0.0	18.9	19.3	21.5	23.4
LnGrp LOS	C	B	A	C	B	B	B		B	B	C	C
Approach Vol, veh/h		849			838			228			149	
Approach Delay, s/veh		12.6			14.7			18.1			22.3	
Approach LOS		B			B			B			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.6	24.2	5.2	12.6	7.4	23.5	8.5	9.3				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.0	19.0	5.0	18.0	5.0	19.0	5.0	18.0				
Max Q Clear Time (g_c+I1), s	3.1	9.9	2.3	4.8	3.7	9.2	4.8	4.4				
Green Ext Time (p_c), s	0.0	3.3	0.0	0.4	0.0	3.6	0.0	0.6				
Intersection Summary												
HCM 2010 Ctrl Delay			14.8									
HCM 2010 LOS			B									
Notes												

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		170	150		0	80		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.850			0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	1583	0	1770	1583	0
Flt Permitted	0.950			0.950								
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1863	1583	0	1863	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			87			87		273			234	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1335			1310			2481			639	
Travel Time (s)		30.3			29.8			56.4			14.5	

Intersection Summary	
Area Type:	Other

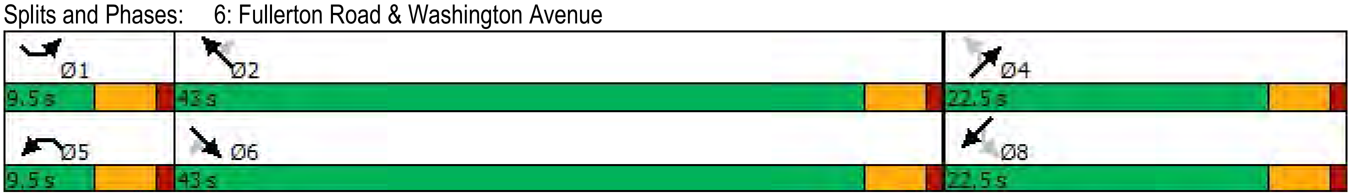
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	3	705	13	6	815	1	15	0	3	1	0	4
Future Volume (vph)	3	705	13	6	815	1	15	0	3	1	0	4
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	734	14	6	849	1	16	0	3	1	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	734	14	6	849	1	16	3	0	1	4	0

Intersection Summary

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Configurations										
Traffic Volume (vph)	3	705	13	6	815	1	15	0	1	0
Future Volume (vph)	3	705	13	6	815	1	15	0	1	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	NA
Protected Phases	1	6		5	2			4		8
Permitted Phases			6			2	4		8	
Detector Phase	1	6	6	5	2	2	4	4	8	8
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	43.0	43.0	9.5	43.0	43.0	22.5	22.5	22.5	22.5
Total Split (%)	12.7%	57.3%	57.3%	12.7%	57.3%	57.3%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	5.0	54.5	54.5	5.0	54.5	54.5	6.3	6.3	5.9	5.9
Actuated g/C Ratio	0.08	0.92	0.92	0.08	0.92	0.92	0.11	0.11	0.10	0.10
v/c Ratio	0.02	0.23	0.01	0.04	0.50	0.00	0.08	0.01	0.01	0.01
Control Delay	26.7	2.2	0.0	27.0	4.7	0.0	25.4	0.0	25.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	2.2	0.0	27.0	4.7	0.0	25.4	0.0	25.0	0.0
LOS	C	A	A	C	A	A	C	A	C	A
Approach Delay		2.2			4.9			21.4		5.0
Approach LOS		A			A			C		A

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 59.3	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 3.9	Intersection LOS: A
Intersection Capacity Utilization 57.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 6: Fullerton Road & Washington Avenue



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	3	734	14	6	849	1	16	3	1	4
v/c Ratio	0.02	0.23	0.01	0.04	0.50	0.00	0.08	0.01	0.01	0.01
Control Delay	26.7	2.2	0.0	27.0	4.7	0.0	25.4	0.0	25.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	2.2	0.0	27.0	4.7	0.0	25.4	0.0	25.0	0.0
Queue Length 50th (ft)	1	0	0	2	0	0	5	0	0	0
Queue Length 95th (ft)	8	97	0	12	366	0	22	0	4	0
Internal Link Dist (ft)		1255			1230			2401		559
Turn Bay Length (ft)			170	150			80			
Base Capacity (vph)	149	3252	1462	149	1712	1462	566	671	566	643
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.23	0.01	0.04	0.50	0.00	0.03	0.00	0.00	0.01

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	3	705	13	6	815	1	15	0	3	1	0	4
Future Volume (veh/h)	3	705	13	6	815	1	15	0	3	1	0	4
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	3	734	14	6	849	1	16	0	3	1	0	4
Adj No. of Lanes	1	2	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	7	2526	1130	14	1337	1136	169	0	44	170	0	44
Arrive On Green	0.00	0.71	0.71	0.01	0.72	0.72	0.03	0.00	0.03	0.03	0.00	0.03
Sat Flow, veh/h	1774	3539	1583	1774	1863	1583	1407	0	1583	1408	0	1583
Grp Volume(v), veh/h	3	734	14	6	849	1	16	0	3	1	0	4
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1863	1583	1407	0	1583	1408	0	1583
Q Serve(g_s), s	0.1	4.0	0.1	0.2	12.8	0.0	0.6	0.0	0.1	0.0	0.0	0.1
Cycle Q Clear(g_c), s	0.1	4.0	0.1	0.2	12.8	0.0	0.7	0.0	0.1	0.1	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	7	2526	1130	14	1337	1136	169	0	44	170	0	44
V/C Ratio(X)	0.42	0.29	0.01	0.42	0.64	0.00	0.09	0.00	0.07	0.01	0.00	0.09
Avail Cap(c_a), veh/h	164	2526	1130	164	1337	1136	599	0	528	601	0	528
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.8	2.8	2.2	26.6	4.0	2.2	25.9	0.0	25.5	25.6	0.0	25.5
Incr Delay (d2), s/veh	33.8	0.3	0.0	18.9	2.3	0.0	0.2	0.0	0.6	0.0	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	2.0	0.1	0.2	7.2	0.0	0.2	0.0	0.1	0.0	0.0	0.1
LnGrp Delay(d),s/veh	60.6	3.1	2.2	45.5	6.3	2.2	26.1	0.0	26.2	25.6	0.0	26.4
LnGrp LOS	E	A	A	D	A	A	C		C	C		C
Approach Vol, veh/h		751			856			19			5	
Approach Delay, s/veh		3.3			6.5			26.1			26.3	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.7	43.2		6.0	4.9	43.0		6.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	38.5		18.0	5.0	38.5		18.0
Max Q Clear Time (g_c+I1), s	2.1	14.8		2.7	2.2	6.0		2.1
Green Ext Time (p_c), s	0.0	7.0		0.0	0.0	5.9		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	5.3
HCM 2010 LOS	A

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.992			0.998			0.866			0.941	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3511	0	1770	3532	0	1770	1613	0	1770	1753	0
Flt Permitted	0.950			0.950			0.573			0.360		
Satd. Flow (perm)	1770	3511	0	1770	3532	0	1067	1613	0	671	1753	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			3			390			33	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

Intersection Summary	
Area Type:	Other

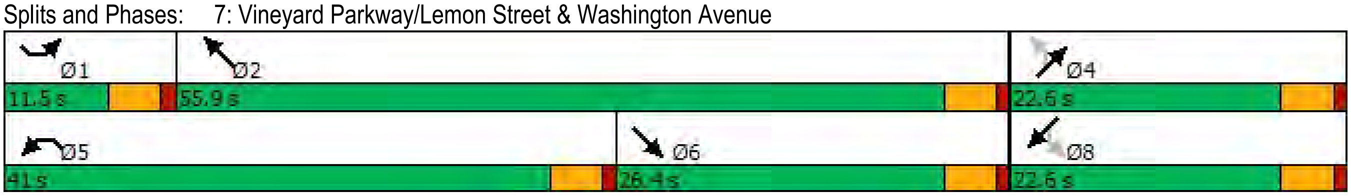
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	51	635	36	601	753	12	31	43	367	11	81	53
Future Volume (vph)	51	635	36	601	753	12	31	43	367	11	81	53
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	54	676	38	639	801	13	33	46	390	12	86	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	714	0	639	814	0	33	436	0	12	142	0

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	51	635	601	753	31	43	11	81
Future Volume (vph)	51	635	601	753	31	43	11	81
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	1	6	5	2		4		8
Permitted Phases					4		8	
Detector Phase	1	6	5	2	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	11.5	26.4	41.0	55.9	22.6	22.6	22.6	22.6
Total Split (%)	12.8%	29.3%	45.6%	62.1%	25.1%	25.1%	25.1%	25.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	6.7	22.7	32.4	53.2	11.1	11.1	11.1	11.1
Actuated g/C Ratio	0.08	0.28	0.41	0.67	0.14	0.14	0.14	0.14
v/c Ratio	0.37	0.71	0.89	0.35	0.22	0.78	0.13	0.52
Control Delay	45.0	32.2	39.4	7.8	34.8	16.3	33.8	32.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	32.2	39.4	7.8	34.8	16.3	33.8	32.0
LOS	D	C	D	A	C	B	C	C
Approach Delay		33.1		21.7		17.6		32.1
Approach LOS		C		C		B		C

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 79.9	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 24.7	Intersection LOS: C
Intersection Capacity Utilization 89.0%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	54	714	639	814	33	436	12	142
v/c Ratio	0.37	0.71	0.89	0.35	0.22	0.78	0.13	0.52
Control Delay	45.0	32.2	39.4	7.8	34.8	16.3	33.8	32.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	32.2	39.4	7.8	34.8	16.3	33.8	32.0
Queue Length 50th (ft)	27	176	278	96	16	22	6	53
Queue Length 95th (ft)	67	#290	#542	165	42	117	21	108
Internal Link Dist (ft)		1230		2572		2575		1085
Turn Bay Length (ft)	150		255		160		150	
Base Capacity (vph)	156	1003	817	2354	244	670	153	426
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.71	0.78	0.35	0.14	0.65	0.08	0.33

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	51	635	36	601	753	12	31	43	367	11	81	53
Future Volume (veh/h)	51	635	36	601	753	12	31	43	367	11	81	53
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	54	676	38	639	801	13	33	46	390	12	86	56
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	74	861	48	679	2115	34	255	35	301	83	220	143
Arrive On Green	0.04	0.25	0.25	0.38	0.59	0.59	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1774	3407	191	1774	3564	58	1241	170	1439	949	1055	687
Grp Volume(v), veh/h	54	351	363	639	398	416	33	0	436	12	0	142
Grp Sat Flow(s),veh/h/ln	1774	1770	1829	1774	1770	1853	1241	0	1609	949	0	1742
Q Serve(g_s), s	2.6	16.0	16.0	30.1	10.2	10.2	2.0	0.0	18.1	0.0	0.0	6.1
Cycle Q Clear(g_c), s	2.6	16.0	16.0	30.1	10.2	10.2	8.1	0.0	18.1	18.1	0.0	6.1
Prop In Lane	1.00		0.10	1.00		0.03	1.00		0.89	1.00		0.39
Lane Grp Cap(c), veh/h	74	447	462	679	1050	1099	255	0	336	83	0	364
V/C Ratio(X)	0.73	0.78	0.79	0.94	0.38	0.38	0.13	0.00	1.30	0.14	0.00	0.39
Avail Cap(c_a), veh/h	143	447	462	747	1050	1099	255	0	336	83	0	364
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.0	30.2	30.2	25.8	9.2	9.2	33.0	0.0	34.3	43.3	0.0	29.5
Incr Delay (d2), s/veh	12.5	12.9	12.6	19.1	1.0	1.0	0.2	0.0	154.2	0.8	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	9.4	9.7	18.3	5.3	5.5	0.7	0.0	22.3	0.3	0.0	3.0
LnGrp Delay(d),s/veh	53.5	43.1	42.8	44.9	10.3	10.2	33.3	0.0	188.5	44.1	0.0	30.2
LnGrp LOS	D	D	D	D	B	B	C		F	D		C
Approach Vol, veh/h		768			1453			469			154	
Approach Delay, s/veh		43.7			25.5			177.6			31.3	
Approach LOS		D			C			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.1	55.9		22.6	37.7	26.4		22.6
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	7.0	51.4		18.1	36.5	21.9		18.1
Max Q Clear Time (g_c+I1), s	4.6	12.2		20.1	32.1	18.0		20.1
Green Ext Time (p_c), s	0.0	6.0		0.0	1.0	1.6		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	55.8
HCM 2010 LOS	E

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.988				0.850		0.989				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1840	0	1770	1863	1583	1770	1842	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1840	0	1770	1863	1583	1770	1842	0	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				136		3				171
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	712	353	30	7	489	183	49	121	10	177	126	958
Future Volume (vph)	712	353	30	7	489	183	49	121	10	177	126	958
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	727	360	31	7	499	187	50	123	10	181	129	978
Shared Lane Traffic (%)												
Lane Group Flow (vph)	727	391	0	7	499	187	50	133	0	181	129	978

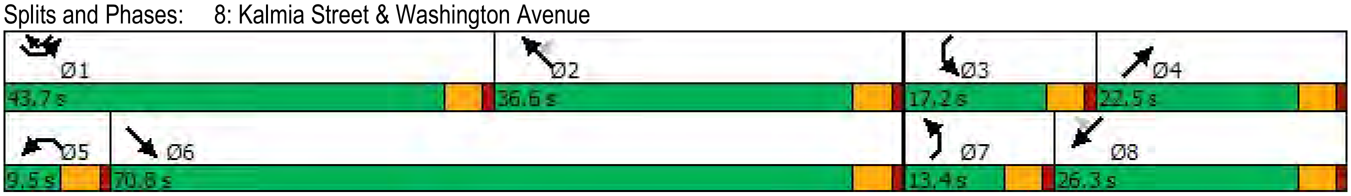
Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	712	353	7	489	183	49	121	177	126	958
Future Volume (vph)	712	353	7	489	183	49	121	177	126	958
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	43.7	70.8	9.5	36.6	36.6	13.4	22.5	17.2	26.3	43.7
Total Split (%)	36.4%	59.0%	7.9%	30.5%	30.5%	11.2%	18.8%	14.3%	21.9%	36.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	39.2	74.0	5.0	32.1	32.1	7.8	13.2	12.7	20.2	64.0
Actuated g/C Ratio	0.34	0.64	0.04	0.28	0.28	0.07	0.11	0.11	0.18	0.56
v/c Ratio	0.62	0.33	0.09	0.96	0.35	0.42	0.62	0.93	0.40	1.03
Control Delay	35.1	11.2	57.4	73.2	12.7	63.1	60.5	100.5	47.5	58.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.1	11.2	57.4	73.2	12.7	63.1	60.5	100.5	47.5	58.8
LOS	D	B	E	E	B	E	E	F	D	E
Approach Delay		26.8		56.8			61.2		63.5	
Approach LOS		C		E			E		E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 115.3
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 49.4 | Intersection LOS: D
Intersection Capacity Utilization 100.5% | ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 8: Kalmia Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	727	391	7	499	187	50	133	181	129	978
v/c Ratio	0.62	0.33	0.09	0.96	0.35	0.42	0.62	0.93	0.40	1.03
Control Delay	35.1	11.2	57.4	73.2	12.7	63.1	60.5	100.5	47.5	58.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.1	11.2	57.4	73.2	12.7	63.1	60.5	100.5	47.5	58.8
Queue Length 50th (ft)	231	114	5	366	28	36	93	135	89	~739
Queue Length 95th (ft)	313	232	22	#614	92	80	158	#288	150	#1009
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	1168	1183	76	519	539	136	290	195	364	953
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.33	0.09	0.96	0.35	0.37	0.46	0.93	0.35	1.03

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	712	353	30	7	489	183	49	121	10	177	126	958
Future Volume (veh/h)	712	353	30	7	489	183	49	121	10	177	126	958
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	727	360	31	7	499	187	50	123	10	181	129	978
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	837	1009	87	16	675	573	64	201	16	203	365	696
Arrive On Green	0.24	0.60	0.60	0.01	0.36	0.36	0.04	0.12	0.12	0.11	0.20	0.20
Sat Flow, veh/h	3442	1691	146	1774	1863	1583	1774	1700	138	1774	1863	1583
Grp Volume(v), veh/h	727	0	391	7	499	187	50	0	133	181	129	978
Grp Sat Flow(s),veh/h/ln	1721	0	1837	1774	1863	1583	1774	0	1838	1774	1863	1583
Q Serve(g_s), s	22.5	0.0	12.1	0.4	25.9	9.5	3.1	0.0	7.6	11.2	6.6	21.8
Cycle Q Clear(g_c), s	22.5	0.0	12.1	0.4	25.9	9.5	3.1	0.0	7.6	11.2	6.6	21.8
Prop In Lane	1.00		0.08	1.00		1.00	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	837	0	1096	16	675	573	64	0	217	203	365	696
V/C Ratio(X)	0.87	0.00	0.36	0.45	0.74	0.33	0.78	0.00	0.61	0.89	0.35	1.41
Avail Cap(c_a), veh/h	1214	0	1096	80	675	573	142	0	298	203	365	696
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.3	0.0	11.5	54.8	30.9	25.6	53.1	0.0	46.6	48.5	38.6	31.1
Incr Delay (d2), s/veh	4.8	0.0	0.9	19.1	7.1	1.5	17.8	0.0	2.8	35.4	0.6	190.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.3	0.0	6.4	0.3	14.6	4.4	1.8	0.0	4.0	7.5	3.5	58.2
LnGrp Delay(d),s/veh	45.2	0.0	12.4	73.9	38.0	27.1	70.9	0.0	49.3	83.9	39.1	222.1
LnGrp LOS	D		B	E	D	C	E		D	F	D	F
Approach Vol, veh/h		1118			693			183			1288	
Approach Delay, s/veh		33.7			35.4			55.2			184.3	
Approach LOS		C			D			E			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	31.5	44.7	17.2	17.6	5.5	70.8	8.5	26.3				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	39.2	32.1	12.7	18.0	5.0	66.3	8.9	21.8				
Max Q Clear Time (g_c+I1), s	24.5	27.9	13.2	9.6	2.4	14.1	5.1	23.8				
Green Ext Time (p_c), s	2.5	1.5	0.0	0.4	0.0	2.7	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			94.4									
HCM 2010 LOS			F									
Notes												

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	60		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.986						0.932				0.850
Flt Protected				0.950				0.976			0.950	
Satd. Flow (prot)	0	1837	0	1770	1863	0	0	1694	0	0	1770	1583
Flt Permitted				0.950				0.976			0.950	
Satd. Flow (perm)	0	1837	0	1770	1863	0	0	1694	0	0	1770	1583
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1045			237			351			183	
Travel Time (s)		23.8			5.4			8.0			4.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	0	43	5	9	26	0	5	0	5	49	0	30
Future Volume (vph)	0	43	5	9	26	0	5	0	5	49	0	30
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	54	6	11	33	0	6	0	6	62	0	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	60	0	11	33	0	0	12	0	0	62	38

Intersection Summary

Intersection												
Int Delay, s/veh	5.1											
Movement	**SEL**	**SET**	**SER**	**NWL**	**NWT**	**NWR**	**NEL**	**NET**	**NER**	**SWL**	**SWT**	**SWR**
Lane Configurations												
Traffic Vol, veh/h	0	43	5	9	26	0	5	0	5	49	0	30
Future Vol, veh/h	0	43	5	9	26	0	5	0	5	49	0	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	60	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	54	6	11	33	0	6	0	6	62	0	38

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	60	0	0	131	112	57	115	115	33
Stage 1	-	-	-	-	-	-	57	57	-	55	55	-
Stage 2	-	-	-	-	-	-	74	55	-	60	60	-
Critical Hdwy	-	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1544	-	0	841	778	1009	862	775	1041
Stage 1	0	-	-	-	-	0	955	847	-	957	849	-
Stage 2	0	-	-	-	-	0	935	849	-	951	845	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1544	-	-	806	773	1009	852	770	1041
Mov Cap-2 Maneuver	-	-	-	-	-	-	806	773	-	852	770	-
Stage 1	-	-	-	-	-	-	955	847	-	957	843	-
Stage 2	-	-	-	-	-	-	894	843	-	945	845	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	1.9	9.1	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	896	1544	-	-	-	852	1041
HCM Lane V/C Ratio	0.014	0.007	-	-	-	0.073	0.036
HCM Control Delay (s)	9.1	7.3	-	-	-	9.6	8.6
HCM Lane LOS	A	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	0	-	-	-	0.2	0.1

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected				0.950		
Satd. Flow (prot)	1863	0	0	1770	1863	0
Flt Permitted				0.950		
Satd. Flow (perm)	1863	0	0	1770	1863	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	112			181	2481	
Travel Time (s)	2.5			4.1	56.4	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	0	0	71	0	0	0
Future Volume (vph)	0	0	71	0	0	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	0	0	88	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	88	0	0

Intersection Summary

Intersection						
Int Delay, s/veh	7.2					

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	0	0	71	0	0	0
Future Vol, veh/h	0	0	71	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	88	0	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	177	1	1	0	-	0
Stage 1	1	-	-	-	-	-
Stage 2	176	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	813	1084	1622	-	-	-
Stage 1	1022	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	769	1084	1622	-	-	-
Mov Cap-2 Maneuver	769	-	-	-	-	-
Stage 1	967	-	-	-	-	-
Stage 2	855	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	0	7.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	1622	-	-	-	-
HCM Lane V/C Ratio	0.054	-	-	-	-
HCM Control Delay (s)	7.3	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-	-

Appendix I

Mitigated Project Buildout Year With Ambient Growth
Plus Project Conditions
Intersection Analysis

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.742			
Satd. Flow (perm)	1770	1583	1382	1863	1863	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		7				570
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

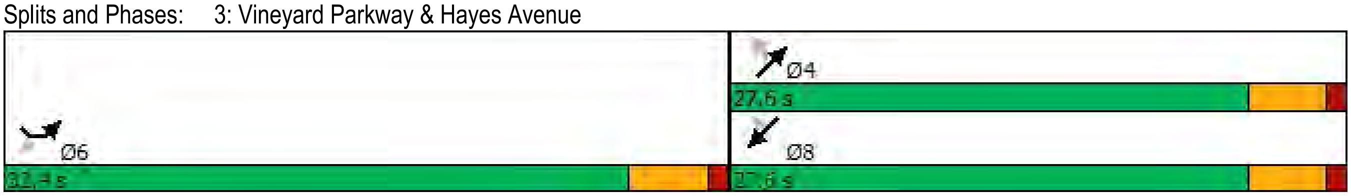
Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	415	6	6	19	19	473
Future Volume (vph)	415	6	6	19	19	473
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	500	7	7	23	23	570
Shared Lane Traffic (%)						
Lane Group Flow (vph)	500	7	7	23	23	570

Intersection Summary

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	415	6	6	19	19	473
Future Volume (vph)	415	6	6	19	19	473
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	6			4	8	
Permitted Phases		6	4			8
Detector Phase	6	6	4	4	8	8
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	32.4	32.4	27.6	27.6	27.6	27.6
Total Split (%)	54.0%	54.0%	46.0%	46.0%	46.0%	46.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Min	Min	None	None	None	None
Act Effct Green (s)	15.0	15.0	9.5	9.5	9.5	9.5
Actuated g/C Ratio	0.43	0.43	0.28	0.28	0.28	0.28
v/c Ratio	0.65	0.01	0.02	0.04	0.04	0.67
Control Delay	12.7	4.7	10.8	10.8	10.8	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	4.7	10.8	10.8	10.8	6.0
LOS	B	A	B	B	B	A
Approach Delay	12.6			10.8	6.2	
Approach LOS	B			B	A	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 34.5	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 9.2	Intersection LOS: A
Intersection Capacity Utilization 41.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Vineyard Parkway & Hayes Avenue



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Group Flow (vph)	500	7	7	23	23	570
v/c Ratio	0.65	0.01	0.02	0.04	0.04	0.67
Control Delay	12.7	4.7	10.8	10.8	10.8	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	4.7	10.8	10.8	10.8	6.0
Queue Length 50th (ft)	48	0	1	3	3	0
Queue Length 95th (ft)	171	5	8	16	16	39
Internal Link Dist (ft)	1281			586	2575	
Turn Bay Length (ft)	120		100			
Base Capacity (vph)	1493	1336	1025	1382	1382	1321
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.01	0.01	0.02	0.02	0.43

Intersection Summary

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	415	6	6	19	19	473
Future Volume (veh/h)	415	6	6	19	19	473
Number	1	16	7	4	8	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	500	7	7	23	23	570
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	616	550	525	782	782	665
Arrive On Green	0.35	0.35	0.42	0.42	0.42	0.42
Sat Flow, veh/h	1774	1583	821	1863	1863	1583
Grp Volume(v), veh/h	500	7	7	23	23	570
Grp Sat Flow(s),veh/h/ln	1774	1583	821	1863	1863	1583
Q Serve(g_s), s	9.9	0.1	0.2	0.3	0.3	12.6
Cycle Q Clear(g_c), s	9.9	0.1	0.5	0.3	0.3	12.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	616	550	525	782	782	665
V/C Ratio(X)	0.81	0.01	0.01	0.03	0.03	0.86
Avail Cap(c_a), veh/h	1280	1143	671	1113	1113	946
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.5	8.3	6.7	6.6	6.6	10.2
Incr Delay (d2), s/veh	2.6	0.0	0.0	0.0	0.0	5.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	0.1	0.0	0.1	0.1	6.4
LnGrp Delay(d),s/veh	14.1	8.3	6.7	6.6	6.6	15.8
LnGrp LOS	B	A	A	A	A	B
Approach Vol, veh/h	507			30	593	
Approach Delay, s/veh	14.0			6.6	15.5	
Approach LOS	B			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				20.7		17.9		20.7
Change Period (Y+Rc), s				4.5		4.5		4.5
Max Green Setting (Gmax), s				23.1		27.9		23.1
Max Q Clear Time (g_c+I1), s				2.5		11.9		14.6
Green Ext Time (p_c), s				0.1		1.5		1.6

Intersection Summary		
HCM 2010 Ctrl Delay		14.6
HCM 2010 LOS		B

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.990			0.995				0.850		0.967	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3504	0	1770	3522	0	1770	1863	1583	1770	1801	0
Flt Permitted	0.950			0.950			0.679			0.705		
Satd. Flow (perm)	1770	3504	0	1770	3522	0	1265	1863	1583	1313	1801	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			7				34		20	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

Intersection Summary	
Area Type:	Other

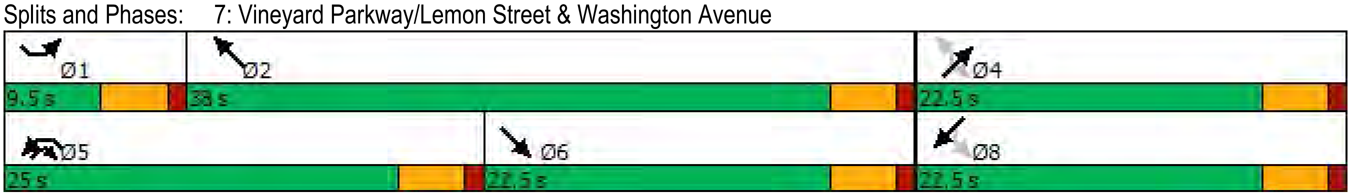
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	13	610	44	379	297	11	43	74	350	14	87	25
Future Volume (vph)	13	610	44	379	297	11	43	74	350	14	87	25
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	14	663	48	412	323	12	47	80	380	15	95	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	711	0	412	335	0	47	80	380	15	122	0

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NEL	NET	NER	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	13	610	379	297	43	74	350	14	87
Future Volume (vph)	13	610	379	297	43	74	350	14	87
Turn Type	Prot	NA	Prot	NA	Perm	NA	pm+ov	Perm	NA
Protected Phases	1	6	5	2		4	5		8
Permitted Phases					4		4	8	
Detector Phase	1	6	5	2	4	4	5	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	9.5	22.5	25.0	38.0	22.5	22.5	25.0	22.5	22.5
Total Split (%)	13.6%	32.1%	35.7%	54.3%	32.1%	32.1%	35.7%	32.1%	32.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag			Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes		
Recall Mode	None	Max	None	Max	None	None	None	None	None
Act Effct Green (s)	5.2	18.8	17.5	40.6	8.8	8.8	28.0	8.8	8.8
Actuated g/C Ratio	0.09	0.34	0.31	0.72	0.16	0.16	0.50	0.16	0.16
v/c Ratio	0.09	0.60	0.75	0.13	0.24	0.28	0.47	0.07	0.41
Control Delay	28.4	20.3	28.4	4.6	25.7	25.2	9.5	22.7	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	20.3	28.4	4.6	25.7	25.2	9.5	22.7	24.4
LOS	C	C	C	A	C	C	A	C	C
Approach Delay		20.4		17.7		13.5			24.2
Approach LOS		C		B		B			C

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 56.1	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 18.1	Intersection LOS: B
Intersection Capacity Utilization 59.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	14	711	412	335	47	80	380	15	122
v/c Ratio	0.09	0.60	0.75	0.13	0.24	0.28	0.47	0.07	0.41
Control Delay	28.4	20.3	28.4	4.6	25.7	25.2	9.5	22.7	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	20.3	28.4	4.6	25.7	25.2	9.5	22.7	24.4
Queue Length 50th (ft)	5	117	128	15	16	27	65	5	35
Queue Length 95th (ft)	21	186	#264	53	42	60	116	19	77
Internal Link Dist (ft)		1230		2572		2575			1085
Turn Bay Length (ft)	150		255		160			150	
Base Capacity (vph)	163	1179	671	2552	421	620	911	437	613
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.60	0.61	0.13	0.11	0.13	0.42	0.03	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	13	610	44	379	297	11	43	74	350	14	87	25
Future Volume (veh/h)	13	610	44	379	297	11	43	74	350	14	87	25
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	14	663	48	412	323	12	47	80	380	15	95	27
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	31	1003	73	470	1905	71	317	400	760	284	300	85
Arrive On Green	0.02	0.30	0.30	0.27	0.55	0.55	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1774	3347	242	1774	3481	129	1264	1863	1583	928	1396	397
Grp Volume(v), veh/h	14	350	361	412	164	171	47	80	380	15	0	122
Grp Sat Flow(s),veh/h/ln	1774	1770	1820	1774	1770	1840	1264	1863	1583	928	0	1793
Q Serve(g_s), s	0.5	10.6	10.6	13.6	2.8	2.8	2.0	2.2	10.1	0.8	0.0	3.5
Cycle Q Clear(g_c), s	0.5	10.6	10.6	13.6	2.8	2.8	5.5	2.2	10.1	3.0	0.0	3.5
Prop In Lane	1.00		0.13	1.00		0.07	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	31	530	545	470	969	1007	317	400	760	284	0	385
V/C Ratio(X)	0.46	0.66	0.66	0.88	0.17	0.17	0.15	0.20	0.50	0.05	0.00	0.32
Avail Cap(c_a), veh/h	145	530	545	594	969	1007	417	548	885	358	0	527
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	29.8	18.7	18.7	21.5	6.9	6.9	22.6	19.7	10.9	20.9	0.0	20.2
Incr Delay (d2), s/veh	10.2	6.3	6.2	11.6	0.4	0.4	0.2	0.2	0.5	0.1	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	6.1	6.3	8.2	1.5	1.5	0.7	1.1	4.4	0.2	0.0	1.8
LnGrp Delay(d),s/veh	40.0	25.1	24.9	33.2	7.3	7.3	22.8	20.0	11.4	21.0	0.0	20.7
LnGrp LOS	D	C	C	C	A	A	C	B	B	C		C
Approach Vol, veh/h		725			747			507			137	
Approach Delay, s/veh		25.3			21.5			13.8			20.7	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.6	38.0		17.6	20.7	22.8		17.6
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	33.5		18.0	20.5	18.0		18.0
Max Q Clear Time (g_c+I1), s	2.5	4.8		12.1	15.6	12.6		5.5
Green Ext Time (p_c), s	0.0	2.0		1.1	0.6	2.1		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	20.9
HCM 2010 LOS	C

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		2
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88
Ped Bike Factor												
Frt		0.980				0.850		0.985				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1825	0	1770	1863	1583	1770	1835	0	1770	1863	2787
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1825	0	1770	1863	1583	1770	1835	0	1770	1863	2787
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				182		5				329
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	776	267	40	3	287	70	63	55	6	64	51	409
Future Volume (vph)	776	267	40	3	287	70	63	55	6	64	51	409
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	913	314	47	4	338	82	74	65	7	75	60	481
Shared Lane Traffic (%)												
Lane Group Flow (vph)	913	361	0	4	338	82	74	72	0	75	60	481

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	776	267	3	287	70	63	55	64	51	409
Future Volume (vph)	776	267	3	287	70	63	55	64	51	409
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	31.0	48.0	9.5	26.5	26.5	10.0	22.5	10.0	22.5	31.0
Total Split (%)	34.4%	53.3%	10.6%	29.4%	29.4%	11.1%	25.0%	11.1%	25.0%	34.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	24.5	52.2	5.2	23.3	23.3	5.8	8.4	5.8	8.4	34.5
Actuated g/C Ratio	0.33	0.70	0.07	0.31	0.31	0.08	0.11	0.08	0.11	0.46
v/c Ratio	0.81	0.28	0.03	0.58	0.13	0.54	0.34	0.55	0.29	0.33
Control Delay	30.9	7.9	37.3	30.2	0.4	54.0	36.1	54.5	36.8	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	7.9	37.3	30.2	0.4	54.0	36.1	54.5	36.8	4.5
LOS	C	A	D	C	A	D	D	D	D	A
Approach Delay		24.4		24.5			45.1		13.7	
Approach LOS		C		C			D		B	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 74.5	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 23.0	Intersection LOS: C
Intersection Capacity Utilization 58.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 8: Kalmia Street & Washington Avenue

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	913	361	4	338	82	74	72	75	60	481
v/c Ratio	0.81	0.28	0.03	0.58	0.13	0.54	0.34	0.55	0.29	0.33
Control Delay	30.9	7.9	37.3	30.2	0.4	54.0	36.1	54.5	36.8	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	7.9	37.3	30.2	0.4	54.0	36.1	54.5	36.8	4.5
Queue Length 50th (ft)	212	64	2	150	0	37	32	37	28	22
Queue Length 95th (ft)	277	150	11	232	0	#92	66	#95	60	43
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	1277	1281	124	581	619	136	467	136	470	1571
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.28	0.03	0.58	0.13	0.54	0.15	0.55	0.13	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	776	267	40	3	287	70	63	55	6	64	51	409
Future Volume (veh/h)	776	267	40	3	287	70	63	55	6	64	51	409
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	913	314	47	4	338	82	74	65	7	75	60	481
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	1023	892	134	9	506	430	95	256	28	96	290	1262
Arrive On Green	0.30	0.56	0.56	0.01	0.27	0.27	0.05	0.16	0.16	0.05	0.16	0.16
Sat Flow, veh/h	3442	1584	237	1774	1863	1583	1774	1653	178	1774	1863	2787
Grp Volume(v), veh/h	913	0	361	4	338	82	74	0	72	75	60	481
Grp Sat Flow(s),veh/h/ln	1721	0	1821	1774	1863	1583	1774	0	1831	1774	1863	1393
Q Serve(g_s), s	20.6	0.0	8.8	0.2	13.1	3.2	3.3	0.0	2.8	3.4	2.3	9.2
Cycle Q Clear(g_c), s	20.6	0.0	8.8	0.2	13.1	3.2	3.3	0.0	2.8	3.4	2.3	9.2
Prop In Lane	1.00		0.13	1.00		1.00	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	1023	0	1026	9	506	430	95	0	284	96	290	1262
V/C Ratio(X)	0.89	0.00	0.35	0.42	0.67	0.19	0.78	0.00	0.25	0.78	0.21	0.38
Avail Cap(c_a), veh/h	1126	0	1026	109	506	430	120	0	407	120	414	1447
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.2	0.0	9.6	40.2	26.3	22.7	37.9	0.0	30.1	37.8	29.8	14.7
Incr Delay (d2), s/veh	8.7	0.0	0.9	27.5	6.9	1.0	21.9	0.0	0.5	22.2	0.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	0.0	4.6	0.2	7.6	1.5	2.2	0.0	1.5	2.3	1.2	3.6
LnGrp Delay(d),s/veh	36.0	0.0	10.6	67.7	33.1	23.7	59.7	0.0	30.6	60.1	30.2	14.8
LnGrp LOS	D		B	E	C	C	E		C	E	C	B
Approach Vol, veh/h		1274			424			146			616	
Approach Delay, s/veh		28.8			31.6			45.4			21.8	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	28.6	26.5	8.9	17.1	4.9	50.1	8.8	17.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	26.5	22.0	5.5	18.0	5.0	43.5	5.5	18.0
Max Q Clear Time (g_c+I1), s	22.6	15.1	5.4	4.8	2.2	10.8	5.3	11.2
Green Ext Time (p_c), s	1.5	1.3	0.0	0.2	0.0	2.4	0.0	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	28.5
HCM 2010 LOS	C

Notes

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.784			
Satd. Flow (perm)	1770	1583	1460	1863	1863	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		4				152
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

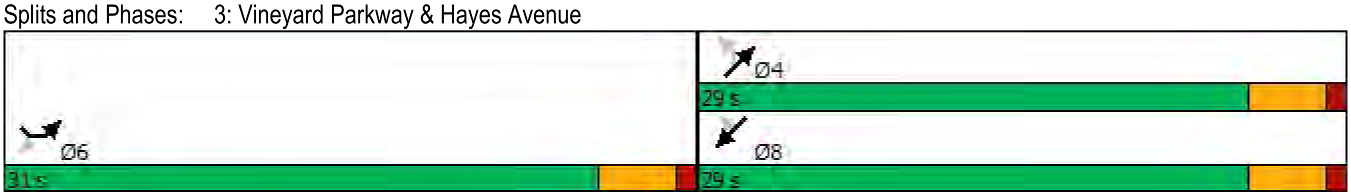
Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	81	3	2	23	23	117
Future Volume (vph)	81	3	2	23	23	117
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	105	4	3	30	30	152
Shared Lane Traffic (%)						
Lane Group Flow (vph)	105	4	3	30	30	152

Intersection Summary

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	81	3	2	23	23	117
Future Volume (vph)	81	3	2	23	23	117
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	6			4	8	
Permitted Phases		6	4			8
Detector Phase	6	6	4	4	8	8
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	31.0	31.0	29.0	29.0	29.0	29.0
Total Split (%)	51.7%	51.7%	48.3%	48.3%	48.3%	48.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Min	Min	None	None	None	None
Act Effct Green (s)	12.7	12.7	6.2	6.2	6.2	6.2
Actuated g/C Ratio	0.50	0.50	0.25	0.25	0.25	0.25
v/c Ratio	0.12	0.00	0.01	0.07	0.07	0.30
Control Delay	5.9	4.0	6.0	6.5	6.5	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.9	4.0	6.0	6.5	6.5	3.3
LOS	A	A	A	A	A	A
Approach Delay	5.8			6.5	3.9	
Approach LOS	A			A	A	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 25.2	
Natural Cycle: 45	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.30	
Intersection Signal Delay: 4.8	Intersection LOS: A
Intersection Capacity Utilization 18.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Vineyard Parkway & Hayes Avenue



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Group Flow (vph)	105	4	3	30	30	152
v/c Ratio	0.12	0.00	0.01	0.07	0.07	0.30
Control Delay	5.9	4.0	6.0	6.5	6.5	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.9	4.0	6.0	6.5	6.5	3.3
Queue Length 50th (ft)	7	0	0	2	2	0
Queue Length 95th (ft)	17	2	2	7	7	9
Internal Link Dist (ft)	1281			586	2575	
Turn Bay Length (ft)	120		100			
Base Capacity (vph)	1714	1533	1387	1769	1769	1511
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.00	0.00	0.02	0.02	0.10

Intersection Summary

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	81	3	2	23	23	117
Future Volume (veh/h)	81	3	2	23	23	117
Number	1	16	7	4	8	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	105	4	3	30	30	152
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	515	460	626	348	348	295
Arrive On Green	0.29	0.29	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1774	1583	1197	1863	1863	1583
Grp Volume(v), veh/h	105	4	3	30	30	152
Grp Sat Flow(s),veh/h/ln	1774	1583	1197	1863	1863	1583
Q Serve(g_s), s	0.8	0.0	0.0	0.2	0.2	1.5
Cycle Q Clear(g_c), s	0.8	0.0	0.3	0.2	0.2	1.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	515	460	626	348	348	295
V/C Ratio(X)	0.20	0.01	0.00	0.09	0.09	0.51
Avail Cap(c_a), veh/h	2731	2438	2106	2652	2652	2254
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	4.6	4.3	5.9	5.8	5.8	6.3
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.1	0.1	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.0	0.1	0.1	0.7
LnGrp Delay(d),s/veh	4.8	4.4	5.9	5.9	5.9	7.7
LnGrp LOS	A	A	A	A	A	A
Approach Vol, veh/h	109			33	182	
Approach Delay, s/veh	4.8			5.9	7.4	
Approach LOS	A			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				7.7		9.5		7.7
Change Period (Y+Rc), s				4.5		4.5		4.5
Max Green Setting (Gmax), s				24.5		26.5		24.5
Max Q Clear Time (g_c+I1), s				2.3		2.8		3.5
Green Ext Time (p_c), s				0.1		0.3		0.6

Intersection Summary			
HCM 2010 Ctrl Delay			6.4
HCM 2010 LOS			A

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.990			0.997				0.850		0.936	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3504	0	1770	3529	0	1770	1863	1583	1770	1744	0
Flt Permitted	0.950			0.950			0.952			0.952		
Satd. Flow (perm)	1770	3504	0	1770	3529	0	1773	1863	1583	1773	1744	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			4				105		30	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

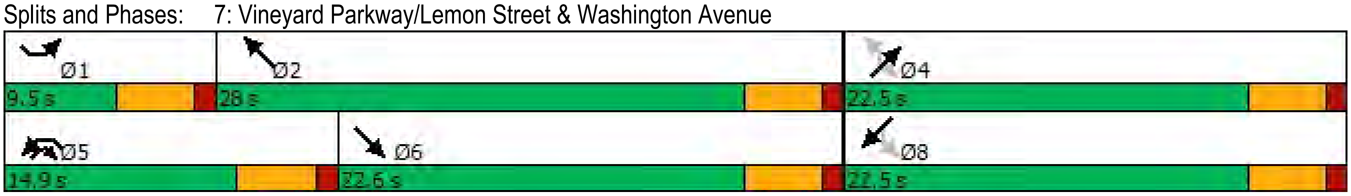
Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	14	483	36	135	596	12	31	18	99	11	38	28
Future Volume (vph)	14	483	36	135	596	12	31	18	99	11	38	28
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	15	514	38	144	634	13	33	19	105	12	40	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	552	0	144	647	0	33	19	105	12	70	0
Intersection Summary												

Lane Group	SEL	SET	NWL	NWT	NEL	NET	NER	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	14	483	135	596	31	18	99	11	38
Future Volume (vph)	14	483	135	596	31	18	99	11	38
Turn Type	Prot	NA	Prot	NA	Perm	NA	pm+ov	Perm	NA
Protected Phases	1	6	5	2		4	5		8
Permitted Phases					4		4	8	
Detector Phase	1	6	5	2	4	4	5	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	9.5	22.6	14.9	28.0	22.5	22.5	14.9	22.5	22.5
Total Split (%)	15.8%	37.7%	24.8%	46.7%	37.5%	37.5%	24.8%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag			Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes		
Recall Mode	None	Max	None	Max	None	None	None	None	None
Act Effct Green (s)	5.1	23.7	8.6	34.2	6.8	6.8	15.2	6.8	6.8
Actuated g/C Ratio	0.11	0.53	0.19	0.76	0.15	0.15	0.34	0.15	0.15
v/c Ratio	0.07	0.30	0.43	0.24	0.12	0.07	0.17	0.04	0.24
Control Delay	21.4	10.0	21.1	4.5	19.0	18.4	2.9	18.2	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.4	10.0	21.1	4.5	19.0	18.4	2.9	18.2	14.5
LOS	C	B	C	A	B	B	A	B	B
Approach Delay		10.3		7.5		8.2			15.1
Approach LOS		B		A		A			B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 45	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.43	
Intersection Signal Delay: 9.0	Intersection LOS: A
Intersection Capacity Utilization 41.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	15	552	144	647	33	19	105	12	70
v/c Ratio	0.07	0.30	0.43	0.24	0.12	0.07	0.17	0.04	0.24
Control Delay	21.4	10.0	21.1	4.5	19.0	18.4	2.9	18.2	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.4	10.0	21.1	4.5	19.0	18.4	2.9	18.2	14.5
Queue Length 50th (ft)	4	54	35	27	8	5	0	3	10
Queue Length 95th (ft)	18	97	79	94	27	19	19	14	37
Internal Link Dist (ft)		1230		2572		2575			1085
Turn Bay Length (ft)	150		255		160			150	
Base Capacity (vph)	200	1851	417	2682	724	760	672	724	730
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.30	0.35	0.24	0.05	0.03	0.16	0.02	0.10

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	14	483	36	135	596	12	31	18	99	11	38	28
Future Volume (veh/h)	14	483	36	135	596	12	31	18	99	11	38	28
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	15	514	38	144	634	13	33	19	105	12	40	30
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	34	1557	115	188	1961	40	266	206	343	297	109	82
Arrive On Green	0.02	0.47	0.47	0.11	0.55	0.55	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	1774	3342	247	1774	3547	73	1325	1863	1583	1262	990	742
Grp Volume(v), veh/h	15	272	280	144	316	331	33	19	105	12	0	70
Grp Sat Flow(s),veh/h/ln	1774	1770	1819	1774	1770	1850	1325	1863	1583	1262	0	1732
Q Serve(g_s), s	0.4	4.1	4.1	3.4	4.1	4.1	1.0	0.4	2.4	0.4	0.0	1.6
Cycle Q Clear(g_c), s	0.4	4.1	4.1	3.4	4.1	4.1	2.6	0.4	2.4	0.8	0.0	1.6
Prop In Lane	1.00		0.14	1.00		0.04	1.00		1.00	1.00		0.43
Lane Grp Cap(c), veh/h	34	825	848	188	978	1023	266	206	343	297	0	192
V/C Ratio(X)	0.44	0.33	0.33	0.77	0.32	0.32	0.12	0.09	0.31	0.04	0.00	0.37
Avail Cap(c_a), veh/h	209	825	848	434	978	1023	681	789	838	692	0	733
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.6	7.2	7.2	18.5	5.2	5.2	18.7	17.0	14.0	17.3	0.0	17.5
Incr Delay (d2), s/veh	8.8	1.1	1.0	6.4	0.9	0.8	0.2	0.2	0.5	0.1	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.2	2.3	2.0	2.3	2.4	0.4	0.2	1.1	0.1	0.0	0.8
LnGrp Delay(d),s/veh	29.4	8.2	8.2	24.9	6.1	6.0	18.9	17.2	14.5	17.4	0.0	18.7
LnGrp LOS	C	A	A	C	A	A	B	B	B	B		B
Approach Vol, veh/h		567			791			157			82	
Approach Delay, s/veh		8.8			9.5			15.7			18.5	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.3	28.0		9.2	9.0	24.3		9.2
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	23.5		18.0	10.4	18.1		18.0
Max Q Clear Time (g_c+I1), s	2.4	6.1		4.6	5.4	6.1		3.6
Green Ext Time (p_c), s	0.0	3.7		0.4	0.1	2.6		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	10.3
HCM 2010 LOS	B

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		2
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88
Ped Bike Factor												
Frt		0.981				0.850		0.985				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1827	0	1770	1863	1583	1770	1835	0	1770	1863	2787
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1827	0	1770	1863	1583	1770	1835	0	1770	1863	2787
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				234		8				492
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	437	193	28	5	306	107	48	78	9	86	53	501
Future Volume (vph)	437	193	28	5	306	107	48	78	9	86	53	501
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	446	197	29	5	312	109	49	80	9	88	54	511
Shared Lane Traffic (%)												
Lane Group Flow (vph)	446	226	0	5	312	109	49	89	0	88	54	511

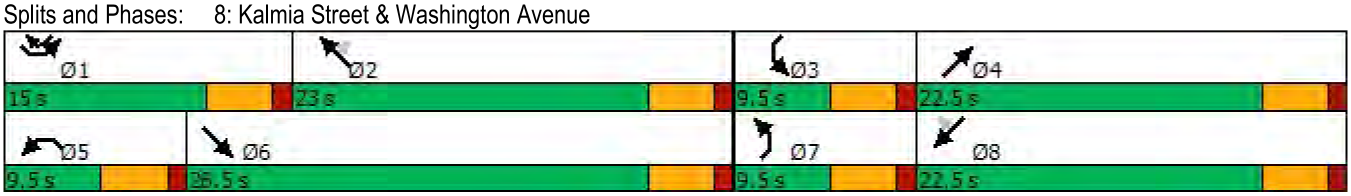
Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	437	193	5	306	107	48	78	86	53	501
Future Volume (vph)	437	193	5	306	107	48	78	86	53	501
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	15.0	28.5	9.5	23.0	23.0	9.5	22.5	9.5	22.5	15.0
Total Split (%)	21.4%	40.7%	13.6%	32.9%	32.9%	13.6%	32.1%	13.6%	32.1%	21.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	10.4	34.2	5.2	19.3	19.3	5.2	8.1	5.2	9.9	22.0
Actuated g/C Ratio	0.19	0.61	0.09	0.35	0.35	0.09	0.14	0.09	0.18	0.39
v/c Ratio	0.70	0.20	0.03	0.48	0.16	0.30	0.33	0.53	0.16	0.37
Control Delay	30.7	9.3	26.8	20.4	0.5	31.9	25.1	42.3	23.5	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	9.3	26.8	20.4	0.5	31.9	25.1	42.3	23.5	2.5
LOS	C	A	C	C	A	C	C	D	C	A
Approach Delay		23.5		15.4			27.5		9.6	
Approach LOS		C		B			C		A	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 55.9
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 17.2 — Intersection LOS: B
Intersection Capacity Utilization 51.3% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 8: Kalmia Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	446	226	5	312	109	49	89	88	54	511
v/c Ratio	0.70	0.20	0.03	0.48	0.16	0.30	0.33	0.53	0.16	0.37
Control Delay	30.7	9.3	26.8	20.4	0.5	31.9	25.1	42.3	23.5	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	9.3	26.8	20.4	0.5	31.9	25.1	42.3	23.5	2.5
Queue Length 50th (ft)	79	35	2	92	0	17	27	32	18	2
Queue Length 95th (ft)	#148	103	11	173	0	47	63	#94	45	29
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	673	1121	165	644	700	165	622	165	626	1415
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.20	0.03	0.48	0.16	0.30	0.14	0.53	0.09	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	437	193	28	5	306	107	48	78	9	86	53	501
Future Volume (veh/h)	437	193	28	5	306	107	48	78	9	86	53	501
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	446	197	29	5	312	109	49	80	9	88	54	511
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	2
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	551	721	106	12	560	476	82	301	34	112	373	1005
Arrive On Green	0.16	0.45	0.45	0.01	0.30	0.30	0.05	0.18	0.18	0.06	0.20	0.20
Sat Flow, veh/h	3442	1588	234	1774	1863	1583	1774	1645	185	1774	1863	2787
Grp Volume(v), veh/h	446	0	226	5	312	109	49	0	89	88	54	511
Grp Sat Flow(s),veh/h/ln	1721	0	1821	1774	1863	1583	1774	0	1830	1774	1863	1393
Q Serve(g_s), s	7.7	0.0	4.8	0.2	8.7	3.2	1.7	0.0	2.6	3.0	1.5	8.8
Cycle Q Clear(g_c), s	7.7	0.0	4.8	0.2	8.7	3.2	1.7	0.0	2.6	3.0	1.5	8.8
Prop In Lane	1.00		0.13	1.00		1.00	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	551	0	827	12	560	476	82	0	335	112	373	1005
V/C Ratio(X)	0.81	0.00	0.27	0.42	0.56	0.23	0.60	0.00	0.27	0.78	0.14	0.51
Avail Cap(c_a), veh/h	587	0	827	144	560	476	144	0	535	144	545	1262
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	0.0	10.5	30.4	18.1	16.2	28.8	0.0	21.6	28.4	20.3	15.4
Incr Delay (d2), s/veh	7.9	0.0	0.8	22.3	4.0	1.1	6.8	0.0	0.4	18.9	0.2	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	2.6	0.2	5.0	1.5	1.0	0.0	1.3	2.1	0.8	3.4
LnGrp Delay(d),s/veh	32.8	0.0	11.3	52.7	22.0	17.3	35.6	0.0	22.0	47.3	20.4	15.8
LnGrp LOS	C		B	D	C	B	D		C	D	C	B
Approach Vol, veh/h		672			426			138			653	
Approach Delay, s/veh		25.6			21.2			26.8			20.4	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.4	23.0	8.4	15.8	4.9	32.4	7.3	16.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	18.5	5.0	18.0	5.0	24.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	9.7	10.7	5.0	4.6	2.2	6.8	3.7	10.8
Green Ext Time (p_c), s	0.2	1.4	0.0	0.3	0.0	1.1	0.0	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	22.9
HCM 2010 LOS	C

Notes

Appendix J

Mitigated Project Buildout Year With Ambient Growth
With Cumulative Projects Plus Project Conditions
Intersection Analysis

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.564			
Satd. Flow (perm)	1770	1583	1051	1863	1863	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		7				570
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

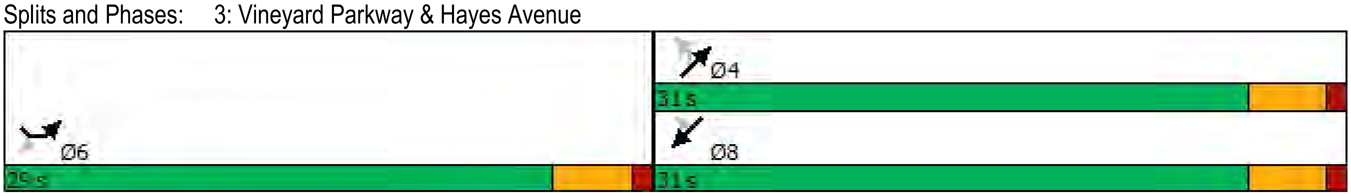
Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	415	6	6	500	238	473
Future Volume (vph)	415	6	6	500	238	473
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	500	7	7	602	287	570
Shared Lane Traffic (%)						
Lane Group Flow (vph)	500	7	7	602	287	570
Intersection Summary						

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	415	6	6	500	238	473
Future Volume (vph)	415	6	6	500	238	473
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	6			4	8	
Permitted Phases		6	4			8
Detector Phase	6	6	4	4	8	8
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	29.0	29.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Min	Min	None	None	None	None
Act Effct Green (s)	18.4	18.4	20.4	20.4	20.4	20.4
Actuated g/C Ratio	0.38	0.38	0.42	0.42	0.42	0.42
v/c Ratio	0.74	0.01	0.02	0.77	0.37	0.57
Control Delay	21.6	6.8	9.5	20.5	11.8	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	6.8	9.5	20.5	11.8	3.8
LOS	C	A	A	C	B	A
Approach Delay	21.4			20.4	6.5	
Approach LOS	C			C	A	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 48.4	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 14.6	Intersection LOS: B
Intersection Capacity Utilization 56.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Vineyard Parkway & Hayes Avenue



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Group Flow (vph)	500	7	7	602	287	570
v/c Ratio	0.74	0.01	0.02	0.77	0.37	0.57
Control Delay	21.6	6.8	9.5	20.5	11.8	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	6.8	9.5	20.5	11.8	3.8
Queue Length 50th (ft)	121	0	1	139	53	0
Queue Length 95th (ft)	212	6	7	245	103	33
Internal Link Dist (ft)	1281			586	2575	
Turn Bay Length (ft)	120		100			
Base Capacity (vph)	954	857	613	1086	1086	1161
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.01	0.01	0.55	0.26	0.49

Intersection Summary

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	415	6	6	500	238	473
Future Volume (veh/h)	415	6	6	500	238	473
Number	1	16	7	4	8	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	500	7	7	602	287	570
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	604	539	392	821	821	698
Arrive On Green	0.34	0.34	0.44	0.44	0.44	0.44
Sat Flow, veh/h	1774	1583	642	1863	1863	1583
Grp Volume(v), veh/h	500	7	7	602	287	570
Grp Sat Flow(s),veh/h/ln	1774	1583	642	1863	1863	1583
Q Serve(g_s), s	10.7	0.1	0.3	11.0	4.2	13.0
Cycle Q Clear(g_c), s	10.7	0.1	4.5	11.0	4.2	13.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	604	539	392	821	821	698
V/C Ratio(X)	0.83	0.01	0.02	0.73	0.35	0.82
Avail Cap(c_a), veh/h	1055	941	522	1198	1198	1018
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.5	9.0	9.1	9.5	7.6	10.1
Incr Delay (d2), s/veh	3.0	0.0	0.0	1.3	0.3	3.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	0.1	0.1	5.8	2.2	6.2
LnGrp Delay(d),s/veh	15.4	9.0	9.1	10.8	7.9	13.5
LnGrp LOS	B	A	A	B	A	B
Approach Vol, veh/h	507			609	857	
Approach Delay, s/veh	15.4			10.8	11.6	
Approach LOS	B			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				22.7		18.5		22.7
Change Period (Y+Rc), s				4.5		4.5		4.5
Max Green Setting (Gmax), s				26.5		24.5		26.5
Max Q Clear Time (g_c+I1), s				13.0		12.7		15.0
Green Ext Time (p_c), s				3.4		1.4		3.2

Intersection Summary	
HCM 2010 Ctrl Delay	12.3
HCM 2010 LOS	B

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.991			0.996				0.850		0.947	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3507	0	1770	3525	0	1770	1863	1583	1770	1764	0
Flt Permitted	0.950			0.950			0.463			0.626		
Satd. Flow (perm)	1770	3507	0	1770	3525	0	862	1863	1583	1166	1764	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			5				20		27	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

Intersection Summary

Area Type: Other

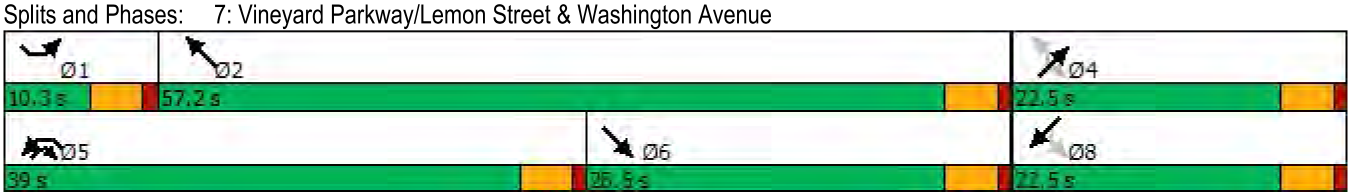
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	28	717	44	579	388	11	43	114	790	14	106	57
Future Volume (vph)	28	717	44	579	388	11	43	114	790	14	106	57
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	30	779	48	629	422	12	47	124	859	15	115	62
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	827	0	629	434	0	47	124	859	15	177	0

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NEL	NET	NER	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	28	717	579	388	43	114	790	14	106
Future Volume (vph)	28	717	579	388	43	114	790	14	106
Turn Type	Prot	NA	Prot	NA	Perm	NA	pm+ov	Perm	NA
Protected Phases	1	6	5	2		4	5		8
Permitted Phases					4		4	8	
Detector Phase	1	6	5	2	4	4	5	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	10.3	28.5	39.0	57.2	22.5	22.5	39.0	22.5	22.5
Total Split (%)	11.4%	31.7%	43.3%	63.6%	25.0%	25.0%	43.3%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag			Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes		
Recall Mode	None	Max	None	Max	None	None	None	None	None
Act Effct Green (s)	5.8	24.1	33.0	57.8	12.4	12.4	49.9	12.4	12.4
Actuated g/C Ratio	0.07	0.29	0.40	0.70	0.15	0.15	0.60	0.15	0.15
v/c Ratio	0.25	0.81	0.89	0.18	0.37	0.45	0.90	0.09	0.62
Control Delay	44.1	35.8	41.8	5.8	40.5	37.8	27.8	31.4	38.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	35.8	41.8	5.8	40.5	37.8	27.8	31.4	38.1
LOS	D	D	D	A	D	D	C	C	D
Approach Delay		36.1		27.1		29.6			37.6
Approach LOS		D		C		C			D

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 83.1	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 31.0	Intersection LOS: C
Intersection Capacity Utilization 85.6%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	30	827	629	434	47	124	859	15	177
v/c Ratio	0.25	0.81	0.89	0.18	0.37	0.45	0.90	0.09	0.62
Control Delay	44.1	35.8	41.8	5.8	40.5	37.8	27.8	31.4	38.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	35.8	41.8	5.8	40.5	37.8	27.8	31.4	38.1
Queue Length 50th (ft)	15	213	298	27	23	61	342	7	75
Queue Length 95th (ft)	44	#341	#552	79	55	112	#646	24	139
Internal Link Dist (ft)		1230		2572		2575			1085
Turn Bay Length (ft)	150		255		160			150	
Base Capacity (vph)	124	1023	739	2453	187	405	990	254	405
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.81	0.85	0.18	0.25	0.31	0.87	0.06	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	28	717	44	579	388	11	43	114	790	14	106	57
Future Volume (veh/h)	28	717	44	579	388	11	43	114	790	14	106	57
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	30	779	48	629	422	12	47	124	859	15	115	62
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	52	918	57	662	2161	61	218	379	913	165	232	125
Arrive On Green	0.03	0.27	0.27	0.37	0.61	0.61	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1774	3387	209	1774	3515	100	1203	1863	1583	570	1140	615
Grp Volume(v), veh/h	30	407	420	629	212	222	47	124	859	15	0	177
Grp Sat Flow(s),veh/h/ln	1774	1770	1826	1774	1770	1845	1203	1863	1583	570	0	1754
Q Serve(g_s), s	1.5	19.3	19.3	30.5	4.6	4.7	3.2	5.0	18.0	2.0	0.0	7.9
Cycle Q Clear(g_c), s	1.5	19.3	19.3	30.5	4.6	4.7	11.1	5.0	18.0	7.1	0.0	7.9
Prop In Lane	1.00		0.11	1.00		0.05	1.00		1.00	1.00		0.35
Lane Grp Cap(c), veh/h	52	480	495	662	1088	1134	218	379	913	165	0	357
V/C Ratio(X)	0.57	0.85	0.85	0.95	0.20	0.20	0.22	0.33	0.94	0.09	0.00	0.50
Avail Cap(c_a), veh/h	116	480	495	691	1088	1134	218	379	913	165	0	357
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.4	30.5	30.5	27.0	7.5	7.5	36.2	30.1	17.4	33.1	0.0	31.2
Incr Delay (d2), s/veh	9.5	16.8	16.4	22.3	0.4	0.4	0.5	0.5	17.3	0.2	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	11.6	11.9	19.0	2.4	2.5	1.1	2.6	23.6	0.3	0.0	3.9
LnGrp Delay(d),s/veh	52.0	47.4	47.0	49.3	7.9	7.9	36.7	30.6	34.7	33.4	0.0	32.3
LnGrp LOS	D	D	D	D	A	A	D	C	C	C		C
Approach Vol, veh/h		857			1063			1030			192	
Approach Delay, s/veh		47.3			32.4			34.3			32.4	
Approach LOS		D			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.1	58.9		22.5	37.5	28.5		22.5				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.8	52.7		18.0	34.5	24.0		18.0				
Max Q Clear Time (g_c+I1), s	3.5	6.7		20.0	32.5	21.3		9.9				
Green Ext Time (p_c), s	0.0	2.8		0.0	0.5	1.4		0.6				
Intersection Summary												
HCM 2010 Ctrl Delay			37.1									
HCM 2010 LOS			D									
Notes												

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		2
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88
Ped Bike Factor												
Frt		0.986				0.850		0.991				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1837	0	1770	1863	1583	1770	1846	0	1770	1863	2787
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1837	0	1770	1863	1583	1770	1846	0	1770	1863	2787
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				136		2				163
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary	
Area Type:	Other

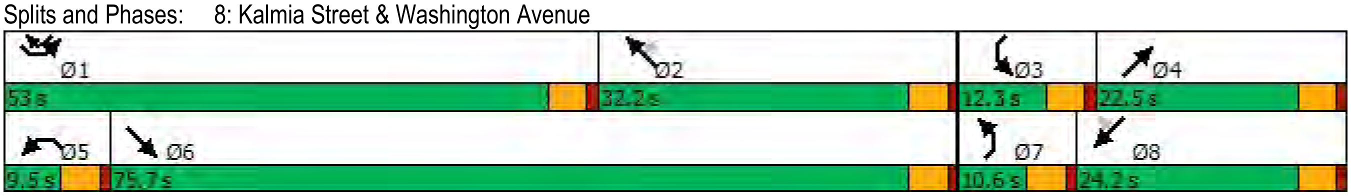
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	1206	392	40	3	386	125	64	111	7	94	69	604
Future Volume (vph)	1206	392	40	3	386	125	64	111	7	94	69	604
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	1419	461	47	4	454	147	75	131	8	111	81	711
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1419	508	0	4	454	147	75	139	0	111	81	711

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	1206	392	3	386	125	64	111	94	69	604
Future Volume (vph)	1206	392	3	386	125	64	111	94	69	604
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	53.0	75.7	9.5	32.2	32.2	10.6	22.5	12.3	24.2	53.0
Total Split (%)	44.2%	63.1%	7.9%	26.8%	26.8%	8.8%	18.8%	10.3%	20.2%	44.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	48.5	78.9	5.0	27.7	27.7	9.2	13.5	7.8	14.4	65.2
Actuated g/C Ratio	0.42	0.68	0.04	0.24	0.24	0.08	0.12	0.07	0.12	0.56
v/c Ratio	0.98	0.40	0.05	1.02	0.30	0.54	0.64	0.93	0.35	0.43
Control Delay	54.3	10.1	56.3	91.4	9.4	69.1	61.6	120.9	49.6	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.3	10.1	56.3	91.4	9.4	69.1	61.6	120.9	49.6	11.2
LOS	D	B	E	F	A	E	E	F	D	B
Approach Delay		42.6		71.2			64.2		28.1	
Approach LOS		D		E			E		C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 115.6	
Natural Cycle: 130	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.02	
Intersection Signal Delay: 45.0	Intersection LOS: D
Intersection Capacity Utilization 77.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 8: Kalmia Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	1419	508	4	454	147	75	139	111	81	711
v/c Ratio	0.98	0.40	0.05	1.02	0.30	0.54	0.64	0.93	0.35	0.43
Control Delay	54.3	10.1	56.3	91.4	9.4	69.1	61.6	120.9	49.6	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.3	10.1	56.3	91.4	9.4	69.1	61.6	120.9	49.6	11.2
Queue Length 50th (ft)	530	139	3	~351	6	56	99	84	55	114
Queue Length 95th (ft)	#664	263	15	#538	52	#137	155	#189	98	142
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	1441	1256	76	446	483	140	289	119	317	1642
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.40	0.05	1.02	0.30	0.54	0.48	0.93	0.26	0.43

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	1206	392	40	3	386	125	64	111	7	94	69	604
Future Volume (veh/h)	1206	392	40	3	386	125	64	111	7	94	69	604
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	1419	461	47	4	454	147	75	131	8	111	81	711
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	1391	1048	107	9	430	365	90	261	16	115	306	1584
Arrive On Green	0.40	0.63	0.63	0.01	0.23	0.23	0.05	0.15	0.15	0.07	0.16	0.16
Sat Flow, veh/h	3442	1663	170	1774	1863	1583	1774	1738	106	1774	1863	2787
Grp Volume(v), veh/h	1419	0	508	4	454	147	75	0	139	111	81	711
Grp Sat Flow(s),veh/h/ln	1721	0	1833	1774	1863	1583	1774	0	1844	1774	1863	1393
Q Serve(g_s), s	48.5	0.0	17.0	0.3	27.7	9.4	5.0	0.0	8.3	7.5	4.6	17.7
Cycle Q Clear(g_c), s	48.5	0.0	17.0	0.3	27.7	9.4	5.0	0.0	8.3	7.5	4.6	17.7
Prop In Lane	1.00		0.09	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	1391	0	1154	9	430	365	90	0	277	115	306	1584
V/C Ratio(X)	1.02	0.00	0.44	0.43	1.06	0.40	0.83	0.00	0.50	0.96	0.26	0.45
Avail Cap(c_a), veh/h	1391	0	1154	74	430	365	90	0	277	115	306	1584
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.8	0.0	11.4	59.5	46.1	39.1	56.4	0.0	46.9	56.0	43.8	15.0
Incr Delay (d2), s/veh	29.3	0.0	1.2	29.0	58.9	3.3	45.4	0.0	1.4	71.8	0.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	28.7	0.0	9.0	0.2	21.2	4.5	3.6	0.0	4.4	6.0	2.4	6.8
LnGrp Delay(d),s/veh	65.1	0.0	12.6	88.5	105.1	42.4	101.8	0.0	48.3	127.8	44.3	15.2
LnGrp LOS	F		B	F	F	D	F		D	F	D	B
Approach Vol, veh/h		1927			605			214			903	
Approach Delay, s/veh		51.2			89.7			67.1			31.7	
Approach LOS		D			F			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	53.0	32.2	12.3	22.5	5.1	80.1	10.6	24.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	48.5	27.7	7.8	18.0	5.0	71.2	6.1	19.7
Max Q Clear Time (g_c+I1), s	50.5	29.7	9.5	10.3	2.3	19.0	7.0	19.7
Green Ext Time (p_c), s	0.0	0.0	0.0	0.4	0.0	3.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	53.7
HCM 2010 LOS	D

Notes

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	120	0	100			0
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.280			
Satd. Flow (perm)	1770	1583	522	1863	1863	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		4				152
Link Speed (mph)	30			30	30	
Link Distance (ft)	1361			666	2655	
Travel Time (s)	30.9			15.1	60.3	

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Traffic Volume (vph)	81	3	2	315	532	117
Future Volume (vph)	81	3	2	315	532	117
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	105	4	3	409	691	152
Shared Lane Traffic (%)						
Lane Group Flow (vph)	105	4	3	409	691	152

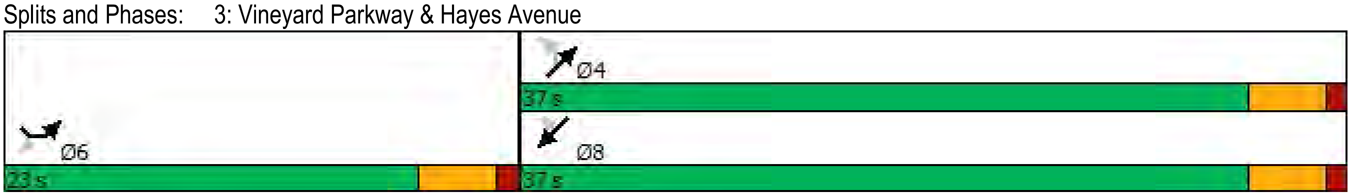
Intersection Summary

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	81	3	2	315	532	117
Future Volume (vph)	81	3	2	315	532	117
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	6			4	8	
Permitted Phases		6	4			8
Detector Phase	6	6	4	4	8	8
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	23.0	23.0	37.0	37.0	37.0	37.0
Total Split (%)	38.3%	38.3%	61.7%	61.7%	61.7%	61.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Min	Min	None	None	None	None
Act Effct Green (s)	8.2	8.2	20.4	20.4	20.4	20.4
Actuated g/C Ratio	0.21	0.21	0.53	0.53	0.53	0.53
v/c Ratio	0.28	0.01	0.01	0.41	0.69	0.17
Control Delay	17.2	11.3	4.0	6.5	10.6	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	11.3	4.0	6.5	10.6	1.5
LOS	B	B	A	A	B	A
Approach Delay	17.0			6.4	9.0	
Approach LOS	B			A	A	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 38.2
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 8.9 Intersection LOS: A
Intersection Capacity Utilization 40.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Vineyard Parkway & Hayes Avenue



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Group Flow (vph)	105	4	3	409	691	152
v/c Ratio	0.28	0.01	0.01	0.41	0.69	0.17
Control Delay	17.2	11.3	4.0	6.5	10.6	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	11.3	4.0	6.5	10.6	1.5
Queue Length 50th (ft)	18	0	0	39	83	0
Queue Length 95th (ft)	52	5	2	73	142	10
Internal Link Dist (ft)	1281			586	2575	
Turn Bay Length (ft)	120		100			
Base Capacity (vph)	916	821	441	1574	1574	1361
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.00	0.01	0.26	0.44	0.11

Intersection Summary

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	81	3	2	315	532	117
Future Volume (veh/h)	81	3	2	315	532	117
Number	1	16	7	4	8	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	105	4	3	409	691	152
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	297	265	407	989	989	841
Arrive On Green	0.17	0.17	0.53	0.53	0.53	0.53
Sat Flow, veh/h	1774	1583	650	1863	1863	1583
Grp Volume(v), veh/h	105	4	3	409	691	152
Grp Sat Flow(s),veh/h/ln	1774	1583	650	1863	1863	1583
Q Serve(g_s), s	1.6	0.1	0.1	3.9	8.3	1.5
Cycle Q Clear(g_c), s	1.6	0.1	8.4	3.9	8.3	1.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	297	265	407	989	989	841
V/C Ratio(X)	0.35	0.02	0.01	0.41	0.70	0.18
Avail Cap(c_a), veh/h	1099	981	769	2028	2028	1724
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.0	10.4	8.3	4.2	5.2	3.6
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.3	0.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	0.0	2.0	4.3	0.7
LnGrp Delay(d),s/veh	11.7	10.4	8.3	4.5	6.1	3.7
LnGrp LOS	B	B	A	A	A	A
Approach Vol, veh/h	109			412	843	
Approach Delay, s/veh	11.7			4.5	5.7	
Approach LOS	B			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				20.4		9.5		20.4
Change Period (Y+Rc), s				4.5		4.5		4.5
Max Green Setting (Gmax), s				32.5		18.5		32.5
Max Q Clear Time (g_c+I1), s				10.4		3.6		10.3
Green Ext Time (p_c), s				2.6		0.2		5.6

Intersection Summary		
HCM 2010 Ctrl Delay		5.8
HCM 2010 LOS		A

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	255		0	160		0	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.992			0.998				0.850		0.941	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3511	0	1770	3532	0	1770	1863	1583	1770	1753	0
Flt Permitted	0.950			0.950			0.566			0.727		
Satd. Flow (perm)	1770	3511	0	1770	3532	0	1054	1863	1583	1354	1753	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			3				26		33	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1310			2652			2655			1165	
Travel Time (s)		29.8			60.3			60.3			26.5	

Intersection Summary	
Area Type:	Other

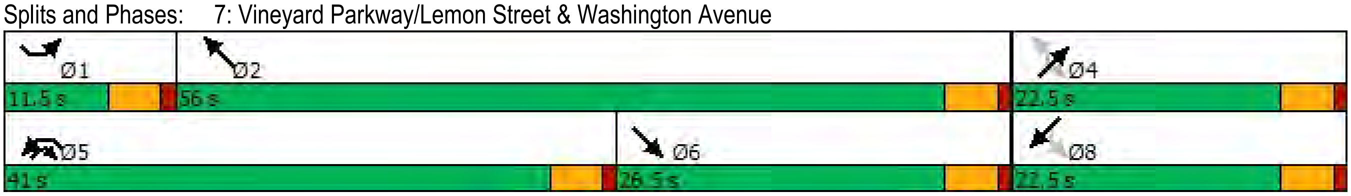
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	51	635	36	601	753	12	31	43	367	11	81	53
Future Volume (vph)	51	635	36	601	753	12	31	43	367	11	81	53
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	54	676	38	639	801	13	33	46	390	12	86	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	714	0	639	814	0	33	46	390	12	142	0

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NEL	NET	NER	SWL	SWT
Lane Configurations									
Traffic Volume (vph)	51	635	601	753	31	43	367	11	81
Future Volume (vph)	51	635	601	753	31	43	367	11	81
Turn Type	Prot	NA	Prot	NA	Perm	NA	pm+ov	Perm	NA
Protected Phases	1	6	5	2		4	5		8
Permitted Phases					4		4	8	
Detector Phase	1	6	5	2	4	4	5	8	8
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	11.5	26.5	41.0	56.0	22.5	22.5	41.0	22.5	22.5
Total Split (%)	12.8%	29.4%	45.6%	62.2%	25.0%	25.0%	45.6%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag			Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes		
Recall Mode	None	Max	None	Max	None	None	None	None	None
Act Effct Green (s)	6.7	22.8	32.5	53.4	10.4	10.4	47.5	10.4	10.4
Actuated g/C Ratio	0.08	0.29	0.41	0.67	0.13	0.13	0.60	0.13	0.13
v/c Ratio	0.36	0.71	0.88	0.34	0.24	0.19	0.41	0.07	0.55
Control Delay	44.1	31.4	37.5	7.3	36.1	33.2	8.8	31.6	33.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	31.4	37.5	7.3	36.1	33.2	8.8	31.6	33.7
LOS	D	C	D	A	D	C	A	C	C
Approach Delay		32.3		20.6		13.1			33.5
Approach LOS		C		C		B			C

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 79.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 23.2	Intersection LOS: C
Intersection Capacity Utilization 78.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 7: Vineyard Parkway/Lemon Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	54	714	639	814	33	46	390	12	142
v/c Ratio	0.36	0.71	0.88	0.34	0.24	0.19	0.41	0.07	0.55
Control Delay	44.1	31.4	37.5	7.3	36.1	33.2	8.8	31.6	33.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	31.4	37.5	7.3	36.1	33.2	8.8	31.6	33.7
Queue Length 50th (ft)	27	176	278	96	16	22	83	6	53
Queue Length 95th (ft)	66	#264	#518	153	42	52	133	21	109
Internal Link Dist (ft)		1230		2572		2575			1085
Turn Bay Length (ft)	150		255		160			150	
Base Capacity (vph)	157	1011	822	2377	241	426	1042	310	427
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.71	0.78	0.34	0.14	0.11	0.37	0.04	0.33

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	51	635	36	601	753	12	31	43	367	11	81	53
Future Volume (veh/h)	51	635	36	601	753	12	31	43	367	11	81	53
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	54	676	38	639	801	13	33	46	390	12	86	56
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	76	942	53	683	2205	36	215	328	889	234	186	121
Arrive On Green	0.04	0.28	0.28	0.39	0.62	0.62	0.18	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	1774	3407	191	1774	3564	58	1241	1863	1583	949	1055	687
Grp Volume(v), veh/h	54	351	363	639	398	416	33	46	390	12	0	142
Grp Sat Flow(s),veh/h/ln	1774	1770	1829	1774	1770	1853	1241	1863	1583	949	0	1742
Q Serve(g_s), s	2.5	14.9	14.9	28.8	9.2	9.2	2.0	1.7	11.9	0.9	0.0	6.1
Cycle Q Clear(g_c), s	2.5	14.9	14.9	28.8	9.2	9.2	8.1	1.7	11.9	2.6	0.0	6.1
Prop In Lane	1.00		0.10	1.00		0.03	1.00		1.00	1.00		0.39
Lane Grp Cap(c), veh/h	76	489	505	683	1095	1146	215	328	889	234	0	307
V/C Ratio(X)	0.71	0.72	0.72	0.94	0.36	0.36	0.15	0.14	0.44	0.05	0.00	0.46
Avail Cap(c_a), veh/h	149	489	505	778	1095	1146	264	403	952	272	0	377
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.3	27.2	27.2	24.6	7.8	7.8	34.4	29.0	10.6	30.1	0.0	30.7
Incr Delay (d2), s/veh	11.5	8.7	8.5	17.2	0.9	0.9	0.3	0.2	0.3	0.1	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	8.4	8.7	17.3	4.7	4.9	0.7	0.9	5.2	0.2	0.0	3.0
LnGrp Delay(d),s/veh	50.9	35.9	35.7	41.8	8.7	8.7	34.7	29.1	11.0	30.2	0.0	31.8
LnGrp LOS	D	D	D	D	A	A	C	C	B	C		C
Approach Vol, veh/h		768			1453			469			154	
Approach Delay, s/veh		36.9			23.3			14.4			31.7	
Approach LOS		D			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.1	56.0		19.2	36.6	27.5		19.2
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	7.0	51.5		18.0	36.5	22.0		18.0
Max Q Clear Time (g_c+I1), s	4.5	11.2		13.9	30.8	16.9		8.1
Green Ext Time (p_c), s	0.0	6.0		0.7	1.3	2.0		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	25.9
HCM 2010 LOS	C

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	100		100	105		0	150		150
Storage Lanes	2		0	1		1	1		0	1		2
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88
Ped Bike Factor												
Frt		0.988				0.850		0.989				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1840	0	1770	1863	1583	1770	1842	0	1770	1863	2787
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1840	0	1770	1863	1583	1770	1842	0	1770	1863	2787
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				182		4				312
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2652			1695			1544			1371	
Travel Time (s)		60.3			38.5			35.1			31.2	

Intersection Summary	
Area Type:	Other

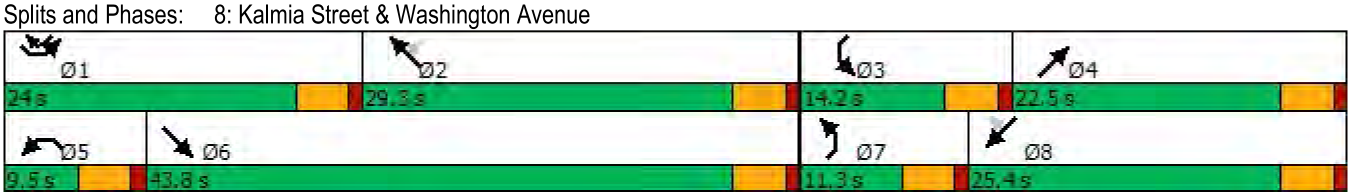
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Traffic Volume (vph)	712	353	30	7	489	183	49	121	10	177	126	958
Future Volume (vph)	712	353	30	7	489	183	49	121	10	177	126	958
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	727	360	31	7	499	187	50	123	10	181	129	978
Shared Lane Traffic (%)												
Lane Group Flow (vph)	727	391	0	7	499	187	50	133	0	181	129	978

Intersection Summary

Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	712	353	7	489	183	49	121	177	126	958
Future Volume (vph)	712	353	7	489	183	49	121	177	126	958
Turn Type	Prot	NA	Prot	NA	Perm	Prot	NA	Prot	NA	pm+ov
Protected Phases	1	6	5	2		7	4	3	8	1
Permitted Phases					2					8
Detector Phase	1	6	5	2	2	7	4	3	8	1
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	24.0	43.8	9.5	29.3	29.3	11.3	22.5	14.2	25.4	24.0
Total Split (%)	26.7%	48.7%	10.6%	32.6%	32.6%	12.6%	25.0%	15.8%	28.2%	26.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	Max	None	None	None	None	None
Act Effct Green (s)	19.5	47.1	5.0	24.8	24.8	6.5	11.1	9.7	18.7	42.7
Actuated g/C Ratio	0.23	0.57	0.06	0.30	0.30	0.08	0.13	0.12	0.22	0.51
v/c Ratio	0.90	0.37	0.07	0.90	0.31	0.36	0.53	0.88	0.31	0.62
Control Delay	48.0	12.5	39.9	50.3	5.8	45.2	40.6	77.0	31.0	12.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.0	12.5	39.9	50.3	5.8	45.2	40.6	77.0	31.0	12.1
LOS	D	B	D	D	A	D	D	E	C	B
Approach Delay		35.6		38.2			41.8		23.1	
Approach LOS		D		D			D		C	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 83.2	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 31.6	Intersection LOS: C
Intersection Capacity Utilization 77.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 8: Kalmia Street & Washington Avenue



Lane Group	SEL	SET	NWL	NWT	NWR	NEL	NET	SWL	SWT	SWR
Lane Group Flow (vph)	727	391	7	499	187	50	133	181	129	978
v/c Ratio	0.90	0.37	0.07	0.90	0.31	0.36	0.53	0.88	0.31	0.62
Control Delay	48.0	12.5	39.9	50.3	5.8	45.2	40.6	77.0	31.0	12.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.0	12.5	39.9	50.3	5.8	45.2	40.6	77.0	31.0	12.1
Queue Length 50th (ft)	190	96	4	248	2	25	64	94	61	147
Queue Length 95th (ft)	#317	222	17	#462	50	63	118	#225	112	218
Internal Link Dist (ft)		2572		1615			1464		1291	
Turn Bay Length (ft)	200		100		100	105		150		150
Base Capacity (vph)	805	1043	106	556	600	144	402	206	481	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.37	0.07	0.90	0.31	0.35	0.33	0.88	0.27	0.62

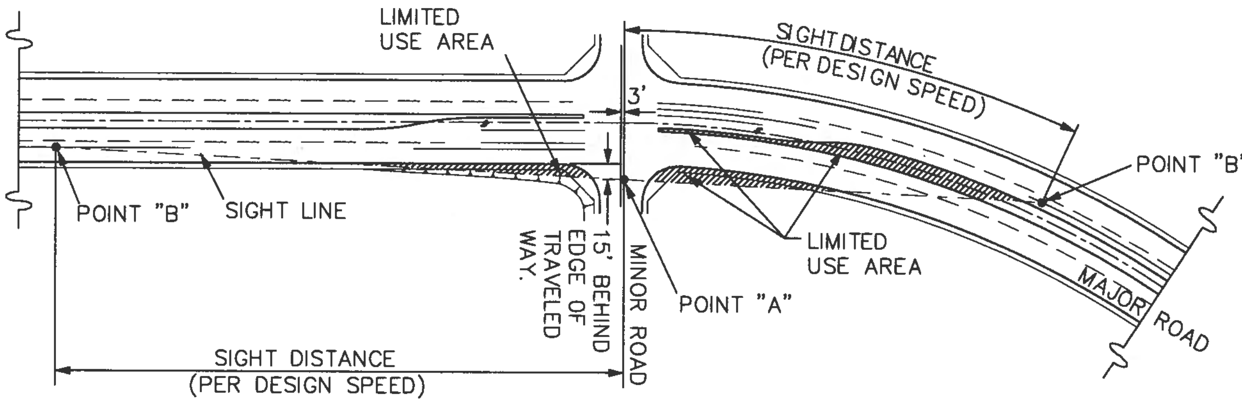
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	712	353	30	7	489	183	49	121	10	177	126	958
Future Volume (veh/h)	712	353	30	7	489	183	49	121	10	177	126	958
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	727	360	31	7	499	187	50	123	10	181	129	978
Adj No. of Lanes	2	1	0	1	1	1	1	1	0	1	1	2
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	774	849	73	16	533	453	72	288	23	198	449	1299
Arrive On Green	0.22	0.50	0.50	0.01	0.29	0.29	0.04	0.17	0.17	0.11	0.24	0.24
Sat Flow, veh/h	3442	1691	146	1774	1863	1583	1774	1700	138	1774	1863	2787
Grp Volume(v), veh/h	727	0	391	7	499	187	50	0	133	181	129	978
Grp Sat Flow(s),veh/h/ln	1721	0	1837	1774	1863	1583	1774	0	1838	1774	1863	1393
Q Serve(g_s), s	18.0	0.0	11.7	0.3	22.6	8.3	2.4	0.0	5.6	8.7	4.9	20.9
Cycle Q Clear(g_c), s	18.0	0.0	11.7	0.3	22.6	8.3	2.4	0.0	5.6	8.7	4.9	20.9
Prop In Lane	1.00		0.08	1.00		1.00	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	774	0	922	16	533	453	72	0	312	198	449	1299
V/C Ratio(X)	0.94	0.00	0.42	0.44	0.94	0.41	0.70	0.00	0.43	0.91	0.29	0.75
Avail Cap(c_a), veh/h	774	0	922	102	533	453	139	0	382	198	449	1299
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.0	0.0	13.7	42.7	30.2	25.1	41.1	0.0	32.2	38.1	26.8	19.0
Incr Delay (d2), s/veh	19.1	0.0	1.4	18.0	26.1	2.8	11.6	0.0	0.9	40.2	0.3	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.6	0.0	6.2	0.2	15.5	4.0	1.4	0.0	2.9	6.5	2.6	10.0
LnGrp Delay(d),s/veh	52.1	0.0	15.1	60.8	56.2	27.8	52.6	0.0	33.2	78.3	27.2	21.6
LnGrp LOS	D		B	E	E	C	D		C	E	C	C
Approach Vol, veh/h		1118			693			183			1288	
Approach Delay, s/veh		39.2			48.6			38.5			30.1	
Approach LOS		D			D			D			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	24.0	29.3	14.2	19.2	5.3	48.0	8.0	25.4				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	19.5	24.8	9.7	18.0	5.0	39.3	6.8	20.9				
Max Q Clear Time (g_c+I1), s	20.0	24.6	10.7	7.6	2.3	13.7	4.4	22.9				
Green Ext Time (p_c), s	0.0	0.1	0.0	0.4	0.0	2.5	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			37.6									
HCM 2010 LOS			D									
Notes												

Appendix K

City of Murrieta Sight Distance Standards



LEGEND:

- LIMITED USE AREA
- SIGHT LINE
- CENTERLINE OF ROADWAY
- CENTERLINE OF TRAFFIC LANE

POINT "A": DRIVER'S VANTAGE POINT.

POINT "B": THE REQUIRED SIGHT DISTANCE POINT, MEASURED ALONG THE CENTERLINE OF THE NEAREST LANE OF APPROACHING TRAFFIC.

NOT TO SCALE

DESIGN SPEED (M.P.H.)	CORNER SIGHT DIST. (FT.)	STOPPING SIGHT DIST. (FT.)
25	275	150
30	330	200
35	385	250
40	440	300
45	495	360
50	550	430
55	605	500
60	660	580

NOTES:

1. THE LIMITED USE AREA IS DETERMINED BY THE GRAPHICAL METHOD. IT SHALL BE USED FOR THE PURPOSE OF PROHIBITING OR CLEARING OBSTRUCTIONS TO MAINTAIN ADEQUATE SIGHT DISTANCE AT INTERSECTIONS.
2. LIMITED USE AREA TO BE KEPT CLEAR OF ALL OBSTRUCTIONS OVER 30 INCHES HIGH, INCLUDING VEGETATION.
3. NO TREES, WALLS, OR ANY OBSTRUCTIONS SHALL BE ALLOWED IN THE LIMITED USE AREA.
4. THE TOE OF SLOPE SHALL NOT ENCROACH INTO THE LIMITED USE AREA
5. THE SIGHT DISTANCE SHALL BE MEASURED ALONG THE CENTERLINE OF THE ROAD.
6. POINT "A" IS THE LOCATION OF THE DRIVER'S EYE, MEASURED 15 FEET BACK FROM THE EDGE OF THE TRAVELED WAY. (6 FEET FROM ETW, 1 FOOT STOP BAR, AND 8 FEET FROM FRONT BUMPER TO DRIVER.) IF THE STOP BAR IS MORE THAN 6 FEET FROM THE ETW, ADDITIONAL ALLOWANCE SHOULD BE CONSIDERED.
7. POINT "B" IS THE REQUIRED SIGHT DISTANCE POINT LOCATED ALONG THE CENTER OF THE NEAREST TRAFFIC LANE.
8. THE LINE OF SIGHT SHALL BE SHOWN AT INTERSECTIONS ON TENTATIVE MAPS, SITE PLANS, GRADING PLANS, STREET PLANS, AND LANDSCAPE PLANS.
9. CORNER SIGHT DISTANCE IS MEASURED FROM A 3.5 FOOT HEIGHT AT THE LOCATION OF THE DRIVER'S EYE ON THE MINOR ROAD, TO A 4.25 FOOT OBJECT HEIGHT IN THE CENTER OF THE NEAREST TRAFFIC LANE OF THE MAJOR ROAD.
10. WHEN AN INTERSECTION IS LOCATED ON A VERTICAL CURVE, A PROFILE OF THE SIGHT LINE SHALL BE PROVIDED.
11. IF DESIGNING A MINOR ROAD OR DRIVEWAY FOR TRUCK TRAFFIC, OR DOWNGRADES STEEPER THAN 3% AND LONGER THAN 1 MILE, ADDITIONAL SIGHT DISTANCE MAY BE REQUIRED AS DETERMINED BY THE CITY ENGINEER.

CITY OF MURRIETA
DEPARTMENT OF PUBLIC WORKS

REVISIONS: 5/92

APPROVED 1/14/10

INTERSECTION SIGHT DISTANCE

STD. NO. 214