Sonoma Boulevard Multi-Family Residential Project

Class 32 Categorical Exemption Report

prepared by

City of Vallejo
Planning and Development Services
555 Santa Clara Street
Vallejo, California 94590

prepared with the assistance of

Rincon Consultants, Inc.
449 15th Street, Suite 303
Oakland, California 94612

February 2021

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Environmental Scientists | Planners | Engineers
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1 Introduction

This report serves as the technical documentation of an environmental analysis performed by Rincon Consultants, Inc. for the proposed Sonoma Boulevard Multi-Family Residential Project in the City of Vallejo. The intent of the analysis is to document whether the project is eligible for a Class 32 Categorical Exemption (CE). The report provides an introduction, project description, and evaluation of the project's consistency with the requirements for a Class 32 exemption. This includes an analysis of the project's potential impacts in the areas of biological resources, traffic, air quality, noise, water quality, and historic resources. The report concludes that the project is eligible for a Class 32 CE.

The *CEQA Guidelines* Section 15332 states that a Class 32 CE is allowed when:

a. The project is consistent with the applicable general plan designation and all applicable general plan policies as well as with applicable zoning designation and regulations.
b. The proposed development occurs within city limits on a project site of no more than five acres substantially surrounded by urban uses.
c. The project site has no value as habitat for endangered, rare, or threatened species.
d. Approval of the project would not result in any significant effects relating to traffic,[1] noise, air quality, or water quality.
e. The site can be adequately served by all required utilities and public services.

Additionally, *CEQA Guidelines* Section 15300.2 states that a categorical exemption "shall not be used for a project which may cause a substantial adverse change in the significance of a historical resource," among several other exceptions to the applicability of a categorical exemption.

Rincon evaluated the project's consistency with the above requirements, including its potential impacts in the areas of biological resources, traffic, air quality, noise, water quality, historic resources, and the additional exceptions to exemptions to confirm the project's eligibility for the Class 32 exemption.

[1] Impacts related to parking are not discussed in this report, as such impacts are generally not considered as physical effects on the environment under CEQA. Per Senate Bill 743 traffic congestion is no longer considered a CEQA impact and this analysis focuses on vehicle miles traveled.

2 Project Description

The proposed project would involve construction of a new multi-family residential development at the northwest corner of Sonoma Boulevard (California State Route 29) and Magazine Street, on a currently vacant 4.95-acre site (project site). The site has frontage on Sonoma Boulevard, Magazine Street, and Porter Street. The proposed buildings would be a maximum of three stories above ground level and 39 feet 4 inches in height. The multi-family development would consist of 132 total dwelling units and a community center. The total building footprint of 56,558square feet would occupy approximately 26 percent of the total lot area of 215,622 square feet. The proposed multi-family apartment buildings would have a gross floor area of 146,658 square feet, not including the community center, and parking areas, and would rise approximately 40 feet to the top of the roof. A total of 233 parking spaces would be provided on site, including 132 covered carport spaces and 26 guest parking spaces. Table 1 includes the characteristics of the proposed project. Figure 1 and Figure 2 show the regional and project location of the project site, and Figure 3 shows the proposed site plan. Figure 4 shows the proposed building renderings.

Table 1 Project Characteristics

Assessor's Parcel Number (APN)	0061-160-210
Lot Area	4.95 acres (215,622 SF)
Total Building Footprint	56,558 SF
Gross Floor Area	**Building 1:** 22,508 SF **Building 2:** 28,568 SF **Building 3:** 16,071 SF **Building 4:** 27,964 SF **Building 5:** 22,979 SF **Building 6:** 28,568 SF **Community Center:** 7,621 SF **Storage:** 232 SF *Total: 154,511 SF*
Height	**Buildings 1 through 6:** 3 stories, 39' 4" maximum **Community Center:** 2 stories, 29' **Storage:** 1 story
Units	**Studio:** 6 units **1-bedroom:** 72 units **2-bedroom:** 54 units **Total:** 132 units
Common Open Space	3,070 SF
Landscaping	81,565 SF
Parking	233 spaces (includes 26 guest parking spaces and 132 covered carport spaces)

SF = square feet

Figure 1 Regional Location

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Project Location

N

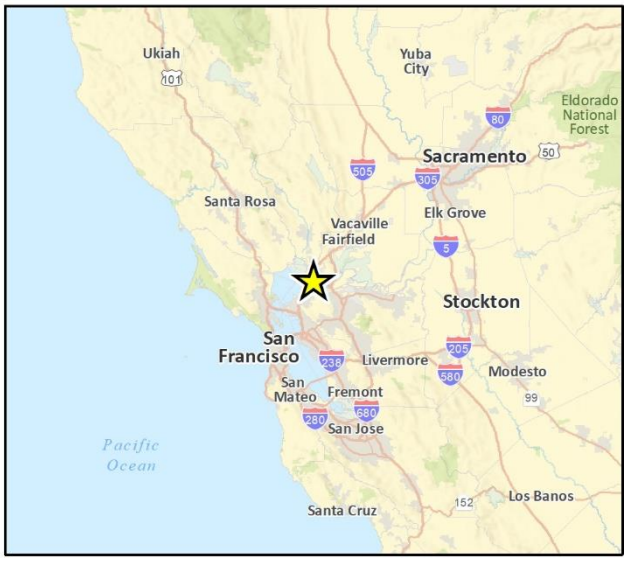

Figure 2 Project Location

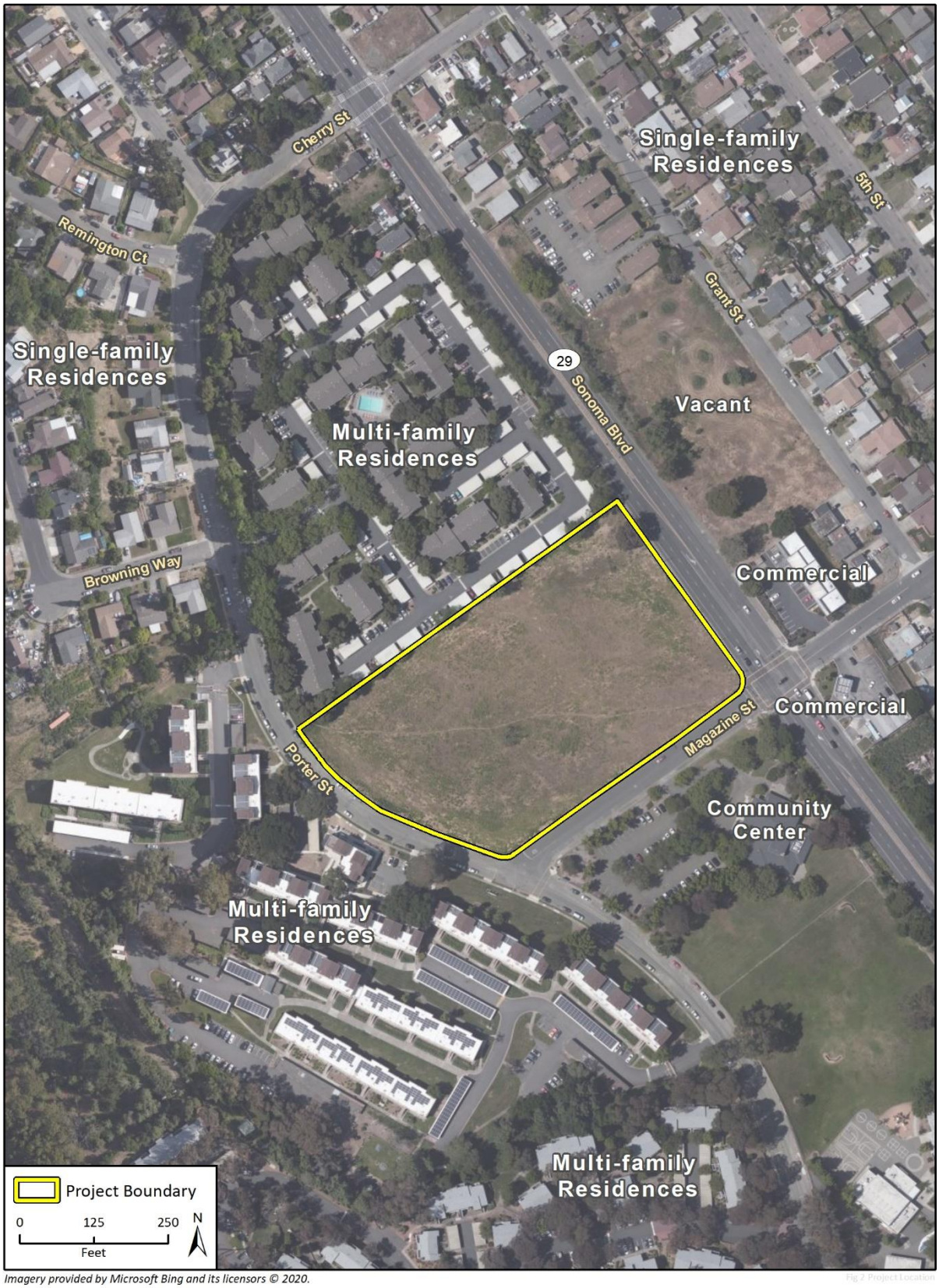

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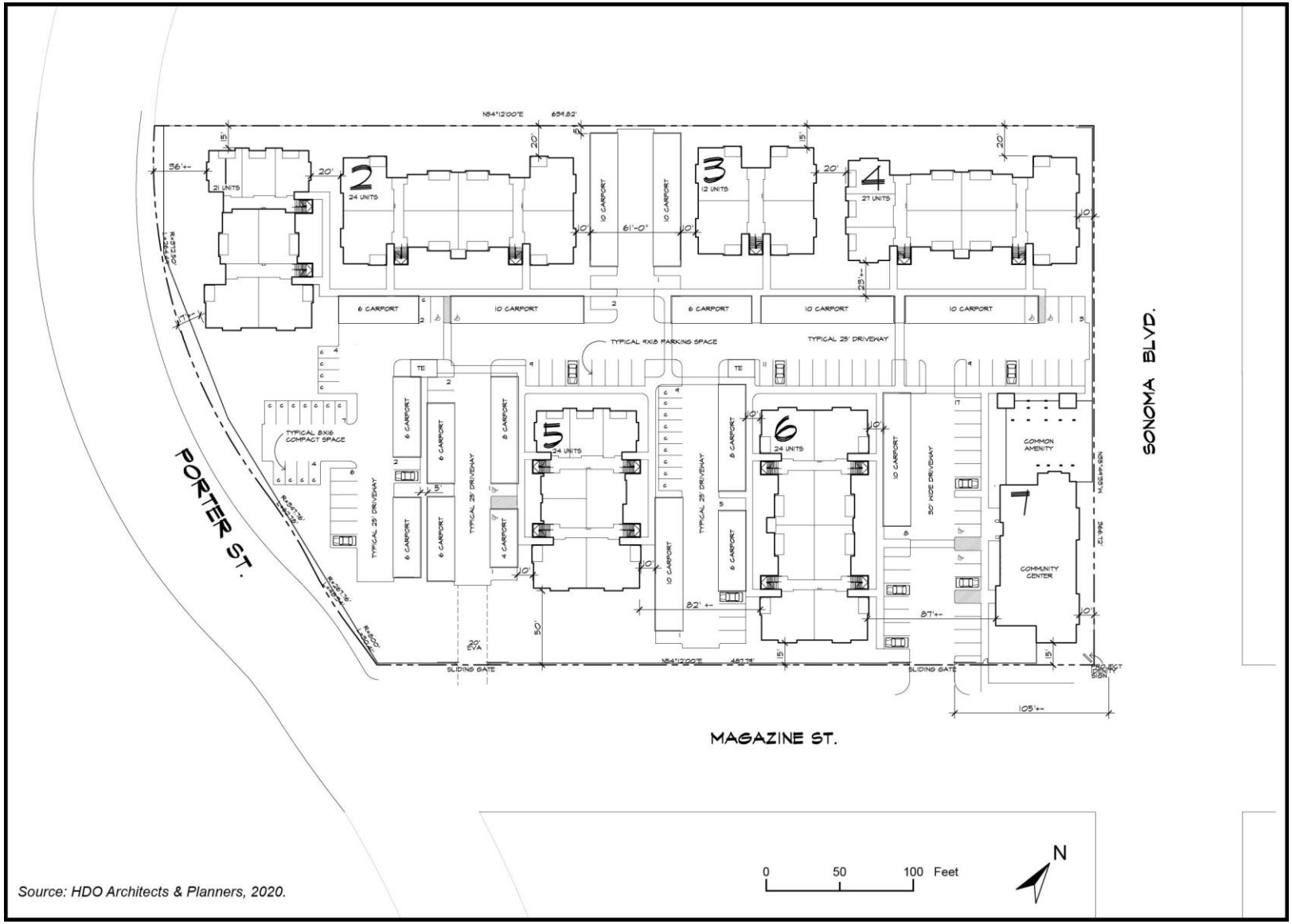
Figure 3 Proposed Site Plan



Source: HDO Architects & Planners, 2020.

Figure 4 Architectural Renderings

Building Type A, Buildings 2 and 6

Building Type A, Building 4

Building Type B – Buildings 1 and 5

Building Type C – Building 3

Community Center (West Elevation)

Vehicular access to the project site would be provided via one driveway located on Magazine Street 105 feet west of the intersection with Sonoma Boulevard. To ensure adequate emergency access to the site, a turf stone secondary access would be constructed near the Magazine Street and Porter Street intersection adjacent to Building 5. Both access driveways would include sliding gates, and residents would not be able to use the emergency vehicle access gate. Pedestrians would be able to access the project site from existing sidewalks along Sonoma Boulevard and proposed sidewalks along Porter Street and Magazine Street. Internal pedestrian walkways would provide access to each building and parking areas.

The project would include three proposed bioretention areas for compliance with Provision C.3 of Contra Costa Clean Water Program requirements. There are existing water, sanitary sewer, and storm drain pipelines within the Porter Street and Magazine Street rights-of-way. The project would construct new water, wastewater, and storm drain pipelines within the site, which would connect to the existing pipelines adjacent to the site. Specifically, the project would connect to the sewer connection in Porter Street, which flows to the Vallejo Flood and Wastewater District (VFWD) Wastewater Treatment Plant (WWTP) via Porter Street, Browning Way, Lemon Street, and Sonoma Boulevard. Project construction would occur over approximately 12 months.

3 Existing Site Conditions

The project site is a generally flat, quadrilateral lot located between Porter Street, Magazine Street, and Sonoma Boulevard in the City of Vallejo. The site varies in topography from approximately 85 feet above mean sea level at the southern parcel boundary adjacent to Magazine Street, to approximately 98 feet above mean sea level at the western corner of the site. See Figure 5, Figure 6, and Figure 7 for photos of the project site and surrounding areas. Ruderal vegetation and grass cover the site, with one tree located in the central portion of the site and a second tree located along the northern parcel boundary adjacent to Sonoma Boulevard. The project site is a currently vacant lot that encompasses approximately 4.95 acres.

Surrounding land uses include multi-family residences and commercial development. Adjacent to the project site's northern boundary is a multi-family development approximately two stories in height, with outdoor parking covered by carports. Southwest of the site is another multi-family residential development with buildings ranging from three to four stories in height, and similar outdoor parking and carports. To the south and east, there are a one-story community center and one-story commercial buildings, respectively. Beyond these uses are single-family developments to the northwest, north, northeast, east, and southeast. Patterson Elementary School is located south of the adjacent community center. Figure 2 shows the surrounding land uses to the project site.

Figure 5 Photographs of the Project Site

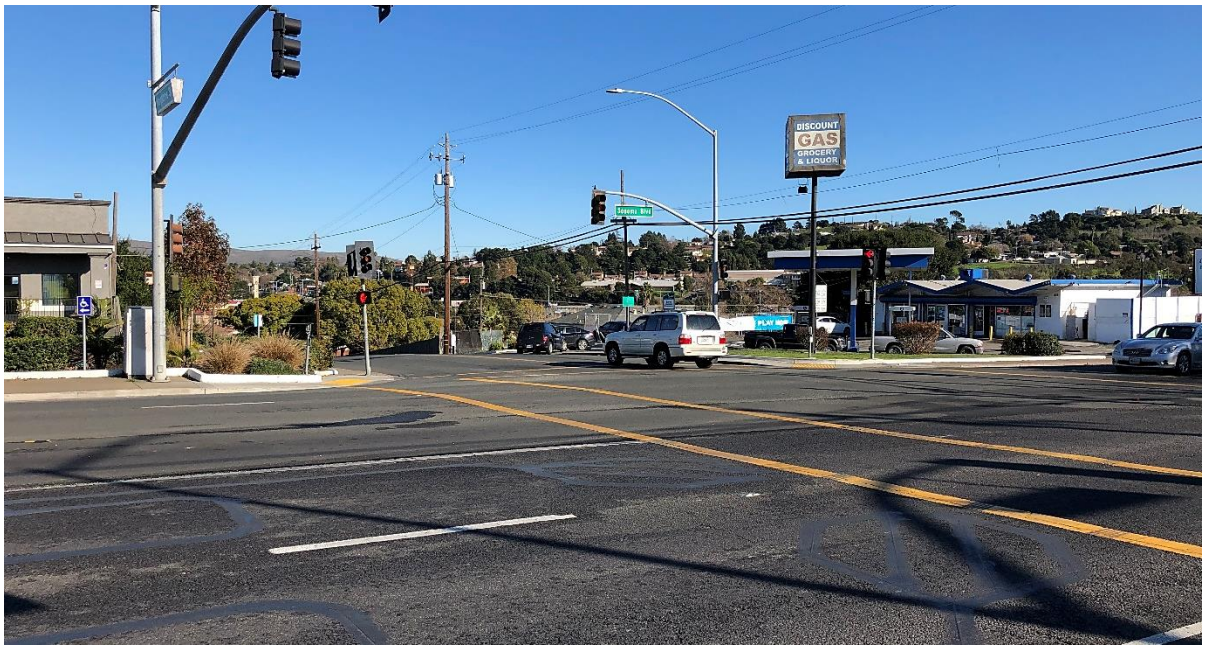
Photograph 1. View of the project site from Sonoma Boulevard, facing southwest.

Photograph 2. View of the project site from Porter Street, facing northeast.

Photograph 3. View of the project site from Magazine Street, facing northwest.

Figure 6 Photographs of the Surrounding Areas to the East

Photograph 4. View of the commercial building at the northern corner of Sonoma Boulevard and Magazine Street, facing northeast.



Photograph 5. View of the commercial building in the foreground and single-family residences in the background at the eastern corner of Sonoma Boulevard and Magazine Street, facing southeast.

Figure 7 Photographs of the Surrounding Areas to the South and West

Photograph 6. View of the Community Center located south of Magazine Street from the project site, facing south.

Photograph 7. View of the multi-family residences across Porter Street from the project site, facing southwest.

4 Consistency Analysis

4.1 Class 32 Criterion (a)

The project is consistent with the applicable general plan designation and all applicable general plan policies as well as with applicable zoning designation and regulations.

According to the City of Vallejo General Plan Land Use Map, the project site is designated for Business/Limited Residential (B/LR) uses. Residential-only or mixed-use projects containing a residential component are accommodated in this designation, providing that findings of compatibility can be made. The maximum permitted floor area ratio (FAR) in the B/LR designation is 2.0, with minimum residential density of 25 dwelling units per acre up to 50 dwelling units per acre.

On August 29, 2017, the City Council adopted the Interim Zoning Policy (IZP) to facilitate development that is consistent with General Plan 2040 until the new zoning code is adopted. Under the IZP, each General Plan 2040 land use designation correlates to the City's existing zoning districts and specific plans for the purposes of applying land use and development standards to a proposal.

The IZP identifies the following zoning districts and specific plans as consistent with the Business/Limited Residential (B/LR) designation:

- Pedestrian Shopping and Service (CP) District
- Linear Commercial (CL) District
- Neighborhood Shopping and Service (CN) District
- Professional Office (PO) District
- Intensive Use – Limited (IU-L) District
- High Density Residential (HDR) District
- White Slough Specific Plan

The project site is identified as Planned Development Commercial (PDC) District on the City's existing zoning map and is inconsistent with the project because the PDC District does not permit residential-only development.

The HDR District is the "best fit" zoning designation because a multi-family residential development is permitted with a Major Use Permit in accordance with Vallejo Municipal Code (VMC) Sections 16.17.020.A.1 and 16.57.020.A.

The project is consistent with the applicable development standards outlined in Title 16 of the VMC, as proposed. This includes VMC Chapter(s) 16.17, 16.62, 16.70, 16.71, and 16.79. Parking, landscape setbacks, and fencing are the exception for which a Minor Exception request has been filed for Planning Commission approval.

The proposed multi-family residential buildings would thus be consistent with the permitted uses of the project site, according to its zoning and land use designations.

Projects in the HDR District are required to submit development standards that identify project details. Table 2 shows the City's HDR District requirements for project plans and how the project plans meet these requirements.

Table 2 Zoning Ordinance Requirements and Project Plan Details

VMC Requirements[1]	Proposed Project[2]
Density	
Lot coverage – 60% building coverage	Sheet A1.1: Proposed lot coverage: 34.5% parking/impervious, 37.8% landscaping; 1.4% open space; 26.2% building coverage.
High Density Residential District – 135 units maximum Business/Limited Residential Designation – 124 to 248 units	Sheet A1.1: 132 units proposed. The HDR District has a maximum residential density of one unit per 1,600 square feet (135 units for the project site area of 215,622 square feet). Under the B/LR designation, the allowed density range for the 4.95-acre project site is 124-248 units for which the project is consistent at 132 units
Building Setback	
Sonoma Boulevard – 10 feet	10 feet
Magazine Street – 15 feet	15 feet
Porter Street – 10 feet	17 feet
North – 7 feet	15 feet
Building Requirements	
Building height – 75 feet	Sheet A3.3, A3.4, A6.3, and A6.4: Buildings be approximately 39 feet
Street Fence Height – 4 feet	Sheet A2.1 and A11.1: Minor Exemption requested for a five-foot fence. A 25% increase from the allowed height.
Landscaping and Open Space	
Landscape Buffer – 18,977 square feet	Sheet A2.1, L-1, L-2, L-3, L-4 Minor Exemption requested for a 17,635 square foot landscape buffer, a reduction of approximately 10.5%.
Street Trees – one per 25 feet	Sheet L-1, L-2, L-3, L-4 Conditioned
Open Space – 3,960 square feet	Sheet A.2.1 Project would include 3,070 square feet. VMC Section 16.79.060.C recommends, but does not require 300 square feet of usable open space be provided per unit for multi-family residential project. Therefore, project would be consistent.
Parking Requirements	
Covered Parking – 132 spaces	Sheet A2.1 Total of 132 spaces provided
Total Parking – 248 spaces	Sheet A2.1 Minor Exemption requested for 233 spaces, a reduction of 6%.
Other Requirements	

VMC Requirements[1]	Proposed Project[2]
Laundry Facilities – required	Sheet A2.1 Facilities Provided
Trash Enclosure – required	Sheet A2.1 Enclosure Provided

[1] Source: Sections 16.17, 16.62, 16.70, 16.71, and 16.79of the VMC.

[2] Source: Project site plans dated November 1, 2020.

As shown below in Table 3, the proposed project would be generally consistent with applicable General Plan policies. The project would be generally consistent with applicable General Plan land use designation, General Plan policies, zoning designation, and regulations. Therefore, the project would meet the requirements of *criterion (a)*.

Table 3 Consistency with Vallejo General Plan Policies

Policy	Consistency
Policy NBE-1.1 Natural Resources. Protect and enhance hillsides, waterways, wetlands, occurrences of special-status species and sensitive natural communities, and aquatic and important wildlife habitat through land use decisions that avoid and mitigate potential environmental impacts on these resources to the extent feasible.	**Consistent.** No waters or wetlands are present on the project site. Refer to Appendix A. Refer to Section 4.3, *Criterion (c)*, for a discussion of habitat for endangered, rare, or threatened species.
Policy NBE-1.7 Green Infrastructure. Encourage the installation of green infrastructure, including tools such as permeable pavement, rain gardens, constructed wetlands, grassy swales, rain barrels and cisterns, and green roofs, to treat stormwater, attenuate floods, increase groundwater recharge, and reduce urban heat islands.	**Consistent.** The proposed project would include three bioretention areas to capture on-site stormwater runoff prior to discharge into the City's storm drain. The project would be required to comply with standards set in California Building Code (CBC) Title 24, which would minimize the wasteful, inefficient, or unnecessary consumption of energy resources during operation. California's Green Building Standards Code (CBC Title 24, Part 11) requires implementation of energy efficient light fixtures and building materials into the design of new construction projects. Furthermore, CBC Title 24, Part 6 requires newly constructed buildings to meet energy performance standards set by the Energy Commission. In accordance with Section 150.1(b)14 of the 2019 Building Energy Efficiency Standards, the project would be required to be solar ready, or to install photovoltaic systems on all low-rise residential buildings (up to three stories), equal to the expected electricity usage.
Policy NBE-1.8 Urban Forest. Encourage planting of street trees and landscaping to beautify the city, encourage walking and biking, and create a stronger sense of identity.	**Consistent.** The proposed project includes planting new street trees along Sonoma Boulevard, Magazine Street, and Porter Street, as well as new sidewalks along Magazine Street and Porter Street, connecting to existing sidewalks on Sonoma Boulevard and Porter Street.
Policy NBE-2.1 Strengthen Local Identity. Focus future growth to foster a vibrant Downtown/Waterfront District, strong job centers, comfortable neighborhoods, thriving neighborhood corridors and urban villages, and retail/entertainment clusters that draw visitors from the city and the region.	**Consistent.** The proposed project would contribute to the existing neighborhood surrounding the project site be introducing a compatible multi-family use adjacent to existing multi-family developments.

Policy	Consistency
Policy NBE-2.8 Infill Development. Promote infill development targets vacant and underutilized sites for community-desired and enhancing uses that is compatible with surrounding uses.	**Consistent.** The project is an infill site, surrounded by developed parcels on all sides, with the exception of a small area of vacant land to the northeast. The proposed multi-family development is consistent with the multi-family uses present to the northwest, west, and southwest.

4.2 Criterion (b)

The proposed development occurs within city limits on a project site of no more than five acres substantially surrounded by urban uses.

The project site is located on an approximately 4.95-acre parcel within a developed urban neighborhood. The site is immediately surrounded by urban uses on all sides, with the exception of a small vacant parcel across Sonoma Boulevard to the northeast of the project site.

4.3 Criterion (c)

The project site has no value as habitat for endangered, rare, or threatened species.

The project site is comprised entirely of non-native annual grassland, consisting mostly of ruderal species with a small percentage of native plants present. Land uses surrounding the site are primarily suburban and residential with some commercial uses. The Biological Resources Technical Memorandum (Appendix A) for the project reviewed resource agency databases, including the California Department of Fish and Wildlife California Native Diversity Database, the California Native Plant Society Inventory of Rare and Endangered Plants, and the United States Fish and Wildlife Service Information Planning and Consultation, for the potential of known special-status species to occur on the project site. The memorandum evaluated the ability of the project site to provide suitable habitat for these species, and determined that the site provides no suitable habitat for the rare plant species with potential to occur in the project vicinity. In addition, the project site does not provide suitable habitat for special status wildlife species with potential to occur in the project vicinity including the western bumble bee. The project site only provides marginally suitable habitat for sensitive bird species. However, the City of Vallejo's General Plan (Action NBE-1.2C) requires scheduling construction and vegetation removal outside of nesting bird season or conducting a preconstruction nesting bird survey. This requirement, along with standard conditions of approval that would be applied to the project, would ensure that sensitive bird species that may nest on the site would not be impacted by the project. Therefore, the project site has no value as habitat for endangered, rare or threatened species.

4.4 Criterion (d)

Approval of the project would not result in any significant effects relating to traffic, noise, air quality, greenhouse gases, or water quality.

The following discussion provides an analysis of the project's potential effects with respect to traffic, noise, air quality, and water quality.

4.4.1 Traffic

Trip Generation

Trip generation rates for the project were based on estimates from Trip Generation, 10th Edition (Institute of Transportation Engineers [ITE] 2017), which are based on a compilation of empirical trip generation surveys at locations throughout the country to forecast the number of trips that would be generated by the project. As described in the Traffic Impact Study prepared by W-Trans (Appendix B), the trip rate for "Multifamily Housing" (ITE code 221) was applied to the proposed project. As shown in Table 4, the project is expected to generate 718 daily trips, 48 AM peak hour trips, and 58 PM peak hour trips.

Table 4 Trip Generation

Land Use	Units	Daily Trip Rate Per Unit	AM Trip Rate Per Unit	PM Trip Rate Per Unit	Daily Trips	AM Peak Hour Trips	PM Peak Hour Trips
Multifamily Housing	132	5.44	0.36	0.44	718	48	58

Source: W-Trans 2020, Appendix B

Traffic Impact Assessment

The City of Vallejo has adopted threshold criteria to determine the significance of traffic impacts. The City has identified level of service (LOS) E or better as acceptable intersection operation and provides acceptable volume-to-capacity (V/C) increases at intersections depending on the existing LOS. Although LOS is no longer considered a transportation impact under CEQA, traffic impacts are shown for informational purposes and to determine the project's consistency with the Vallejo General Plan. Traffic impacts would be considered inconsistent with City policies if an intersection operates acceptably (at LOS D or better), and the project would cause deterioration to LOS E or F, or if adding project-generated traffic would result an increase in the V/C ratio. The V/C ratio significance thresholds are show in Table 5. The City does not have a V/C ratio significance threshold for intersections currently operating at LOS A or B.

Table 5 Change in V/C Ratio Significance Thresholds

LOS Without Project	V/C Ratio Increase Thresholds
LOS C	> 0.04
LOS D	> 0.02
LOS E or F	> 0.01

Source: W-Trans 2020, Appendix B

The Traffic Impact Study prepared by W-Trans (Appendix B) analyzed transportation impacts at the following eight intersections in the project area:

1. Magazine Street and Pine Street
2. Pine Street and Lincoln Road West
3. I-80 South Ramps and Lincoln Road West
4. Magazine Street and Lincoln Road East
5. I-80 North Ramps and Lincoln Road East
6. Magazine Street and Sheridan Street
7. Magazine Street and Sonoma Boulevard
8. Magazine Street and Porter Street

With the addition of project related traffic, study intersections are expected to continue to operate acceptably during both the AM and PM peak hours under existing plus project conditions, as shown in Table 6. Only intersections operating at LOS C or worse under existing conditions are included in Table 6, as impacts to intersections currently operating at LOS A or B would be less than significant per the City's V/C ratio and LOS significance thresholds and the project would not cause any intersections currently operation at LOS A or B to deteriorate to LOS E or F.

Table 6 Existing Plus Project Peak Hour Levels of Service and Volume Capacity Ratio

Intersection Number	Study Intersection	Existing				Existing Plus Project			
		AM Peak		PM Peak		AM Peak		PM Peak	
		LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
4	Magazine St/Lincoln Rd East	D	0.68	E	0.66	D	0.69	E	0.66
7	Magazine St/Sonoma Blvd	B	0.42	C	0.57	B	0.45	C	0.61

Source: Appendix B

Under future plus project conditions, study intersections are expected to continue to operate acceptably during both the AM and PM peak hours, as shown in Table 7. Only intersections operating at LOS C or worse under existing conditions are included in Table 7, as impacts to intersections currently operating at LOS A or B would be less than significant per the City's V/C ratio and LOS significance thresholds and the project would not cause any intersections currently operation at LOS A or B to deteriorate to LOS E or F. As shown therein, although Magazine Street and Lincoln Road East would exceed the LOS threshold set by the City, the project would not cause a decrease in LOS or increase in the V/C ratio beyond the thresholds provided in Table 5.

Table 7 Future Plus Project Peak Hour Levels of Service and Volume Capacity Ratio

Intersection Number	Study Intersection	Future				Future Plus Project			
		AM Peak		PM Peak		AM Peak		PM Peak	
		LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
4	4. Magazine St/Lincoln Rd East	**F**	**0.84**	**F**	**0.77**	**F**	**0.84**	**F**	**0.77**
7	7. Magazine St/Sonoma Blvd	C	0.48	C	0.72	B	0.53	C	0.75

Bold text indicates deficient intersection operation

Source: Appendix B

Vehicle Miles Traveled

CEQA Guidelines Section 15064.3(b) identifies criteria for evaluating transportation impacts. Specifically, the guidelines state vehicle miles traveled (VMT) exceeding an applicable threshold of significance may indicate a significant impact. The VMT analysis for this project was conducted in accordance with the new City of Vallejo CEQA Transportation Impact Analysis Guidelines (Guidelines) and compared to the City's adopted VMT thresholds. For a description of methodology and models used see Appendix C. VMT was calculated under the following scenarios: Baseline (2015) Conditions, Baseline (2015) Plus Project Conditions, Cumulative (2040) Conditions, and Cumulative (2040) Plus Project Conditions.

Table 8 provides the per capita VMT metric for residential and office/employment uses in the City of Vallejo, and Table 9 provides the project-specific VMT analysis results. Impacts would be significant if the project exceeds the citywide baseline or cumulative VMT.

Table 8 City of Vallejo VMT Thresholds

Land use	Baseline Year (2015)	Cumulative Year (2040)
Residential (home-based tour trips)	26.0 VMT/resident	26.6 VMT/resident
Office/Employment (home-based work tour trips)	31.5 VMT/employee	32.4 VMT/employee

Source: Appendix C

Table 9 Project-Specific VMT

Analysis Scenario	Total VMT[1]	Total Population[1]	I-I VMT per Capita[1]	Adjusted Factor for External Trip Length[2]	Total VMT per Capita
City Baseline (2015)	2,823,379	117,494	24.0	1.06	25.5
City Baseline (2040)	3,209,247	130,702	24.6	1.07	26.3
Baseline (2015) Conditions	30,645	1,290	23.8	1.07	25.4
Baseline (2015) Plus Project Conditions	37,316	1,596	23.4	1.07	25.0
Cumulative (2040) Conditions	25,947	1,102	23.5	1.09	25.7
Cumulative (2040) Plus Project Conditions	30,966	1,370	22.6	1.09	24.6

I-I = internal-internal trips

[1] Calculated using the Solano Napa Activity-Based Model (SNABM)

[2] Calculated using the California Statewide Travel Demand Model (CSTDM)

Source: Appendix C

The 2015 and 2040 citywide VMT per capita calculated for the proposed project are consistent with those reported in the City's Guidelines. As shown in Table 9, the 2015 total VMT per capita for the project of 25.0 is below the Citywide baseline threshold of 25.5 total VMT per capita. And the project 2040 total VMT per capita of 24.6 is lower than the Citywide cumulative (2040) baseline of 26.3. Accordingly, there would be no significant VMT impacts associated with the proposed project.

Site Access

The project site would be accessed by a new stop-controlled driveway on Magazine Street, located approximately 80 feet west of the intersection at Sonoma Boulevard. Continuous pedestrian sidewalks would be constructed along the project site frontage with Magazine Street and Porter Street, improving sidewalk connectivity in the project vicinity. Pedestrians would have direct access to the project site and associated buildings via these new sidewalks in addition to the existing pedestrian sidewalk along Sonoma Boulevard. Additionally, an emergency access driveway would be constructed near the Magazine Street and Porter Street intersection adjacent to Building 5, which would ensure that emergency vehicles could easily enter and exit the project site. Therefore, the project would include adequate site access.

Construction Traffic

Construction traffic impacts could be significant if the project would create a prolonged impact due to lane closure; impede emergency vehicle access; create traffic hazards to bicycles and/or

pedestrians; or result in similar substantial impediments to circulation or safety. It is anticipated that the construction vehicles, haul trucks, and construction workers would travel along Sonoma Boulevard and Magazine Street, which are not approved truck routes for vehicles over 5 tons (City of Vallejo Resolution Number 10-294), to access the project site. Construction vehicles are not anticipated to be over 5 tons and would be permitted on area roadways. The approximately 12-month construction schedule would result in up to 109 vehicle trips per day for vendors and workers (refer to the *Trips and VMT* table in Appendix D). This represents 1.1 percent of existing trips along Sonoma Boulevard (10,000 ADT; Caltrans 2018). Construction trips would generally be staggered throughout the day, with most trips occurring during off-peak hours. Because the anticipated 718 daily project operational trips would not result in traffic impacts to nearby intersections, the maximum of 109 daily construction trips would similarly result in no significant disruption the flow of traffic on Sonoma Boulevard or Magazine Street.

To reduce temporary disruptions on the adjacent roadway network due to construction activities, the project would be subject to the standard City of Vallejo condition of approval requiring preparation and approval of a Traffic Plan (Section 8.08.060 of the Vallejo Municipal Code) prior to the initiation of construction activities. Additionally, construction vehicles would be staged on-site and would not be parked on adjacent streets. It is anticipated that workers traveling to the project site would have sufficient on-site access. Therefore, no additional management plans for construction workers are necessary. Project construction would not involve road closures that would significantly affect emergency vehicle access or create significant hazards to bicycles and pedestrians. Finally, it should be noted that construction traffic impacts are temporary by their nature, and would have no effect on traffic and circulation beyond the construction period.

Conclusion

Based on the assessment of construction and operational traffic impacts and site access above, there would be no significant impacts related to traffic.

4.4.2 Noise

Noise Characteristics and Measurement

Noise level (or volume) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound power levels to be consistent with that of human hearing response, which is most sensitive to frequencies around 4,000 Hertz (about the highest note on a piano) and less sensitive to low frequencies (below 100 Hertz).

One of the most frequently used noise metrics that considers duration as well as sound power level is the equivalent noise level (L_{eq}). The L_{eq} is defined as the steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual varying levels over a period of time (essentially, L_{eq} is the average sound level).

Noise Standards

The City of Vallejo General Plan 2040 incorporates comprehensive goals, policies, and actions related to noise and acceptable noise levels. These policies address unnecessary, excessive, and annoying noise levels and sources, such as vehicles, construction, and stationary sources (e.g., mechanical equipment).

Per VMC Section 12.40.070, all excavation, grading, and filing that is conducted in residential zones or within 1,000 feet of any residential occupancy, hotel, motel, or hospital shall be limited between the hours of 7:00 a.m. and 6:00 p.m. Section 16.72.050.C of the VMC exempts temporary construction and demolition from the noise provisions below.

VMC Section 16.72.030 sets noise performance standards per zoning district. Residential Districts are permitted a maximum noise level of 60 dBA and professional offices, neighborhood, and pedestrian districts are permitted a maximum noise level of 70 dBA (Table 4.10-6 of the VMC). VMC Section 16.72.040 provides a correction factor of plus 5 dB to these sound levels for noise emitted between 7:00 a.m. and 10:00 p.m.

Impacts relating to on-site activities would be significant when project-related activities create noise exceeding the standards as identified for the applicable noise zone for the adjacent land uses. The nearest receivers to the project site are multi-family residential uses located north, northwest, and west of the site. Of these receivers, multi-family apartment buildings located approximately 30 feet northwest of the project site boundary are the closest.

Traffic-related noise impacts would be significant if project-generated traffic results in the exposure of sensitive receivers to a perceptible increase in roadway noise. Roughly a doubling of traffic volume would be necessary to generate a perceptible increase in roadway noise levels of 3 dBA or more.

Existing Ambient Noise Levels

The primary source of noise in the vicinity of the project site is motor vehicle traffic, including automobiles, trucks, buses, and motorcycles. Among area roadways, Sonoma Boulevard has the most traffic and thus produces the highest traffic noise from vehicles. Secondary sources of roadway noise include traffic on Porter Street and Magazine Street. While typical parking lot noise such as conversations and door slams may occur at nearby residences and commercial buildings, traffic is the main contributor to existing ambient noise levels.

To determine existing ambient noise levels on the project site, two 15-minute noise measurements were taken on the project site between 1:45 p.m. and 2:30 p.m. on Monday, December 30, 2019, using an ANSI Type II integrating sound level meter. The first noise measurement was located along the southwestern boundary of the project site on Porter Street across from the adjacent multi-family development. The second noise measurement was located along the northeastern boundary of the site on Sonoma Boulevard. Figure 8 shows the on-site noise measurement locations, and Table 10 identifies the measured noise levels. As shown in Table 10, noise levels were measured at approximately 55 dBA L_{eq} along Porter Street and 68 dBA L_{eq} along Sonoma Boulevard.

Table 10 On-site Noise Measurement Results

Measurement Number	Measurement Location	Primary Noise Sources	Sample Time	L_{eq} (dBA)
1	Porter Street	Traffic on Porter Street	1:45 p.m. to 2:00 p.m.	55.3
2	Sonoma Boulevard	Traffic on Sonoma Boulevard	2:08 p.m. to 2:23 p.m.	67.7

Source: Field visit on December 30, 2019, using ANSI Type II Integrating sound level meter.
Refer to Appendix E for noise measurement files.

Construction Noise

The project would result in temporary noise level increases during site preparation, excavation, paving, architectural coating, and building. It is assumed pile drivers would not be required during construction. The grading phase of project construction generally creates the highest construction noise levels due to the operation of heavy equipment. Table 11, shows reference noise levels associated with heavy equipment typically used during project construction. Since grading would occur up to the property line, approximately 30 feet from the nearest sensitive receivers (adjacent apartment buildings), noise levels would range from 80 to 89 dBA as shown in Table 11.

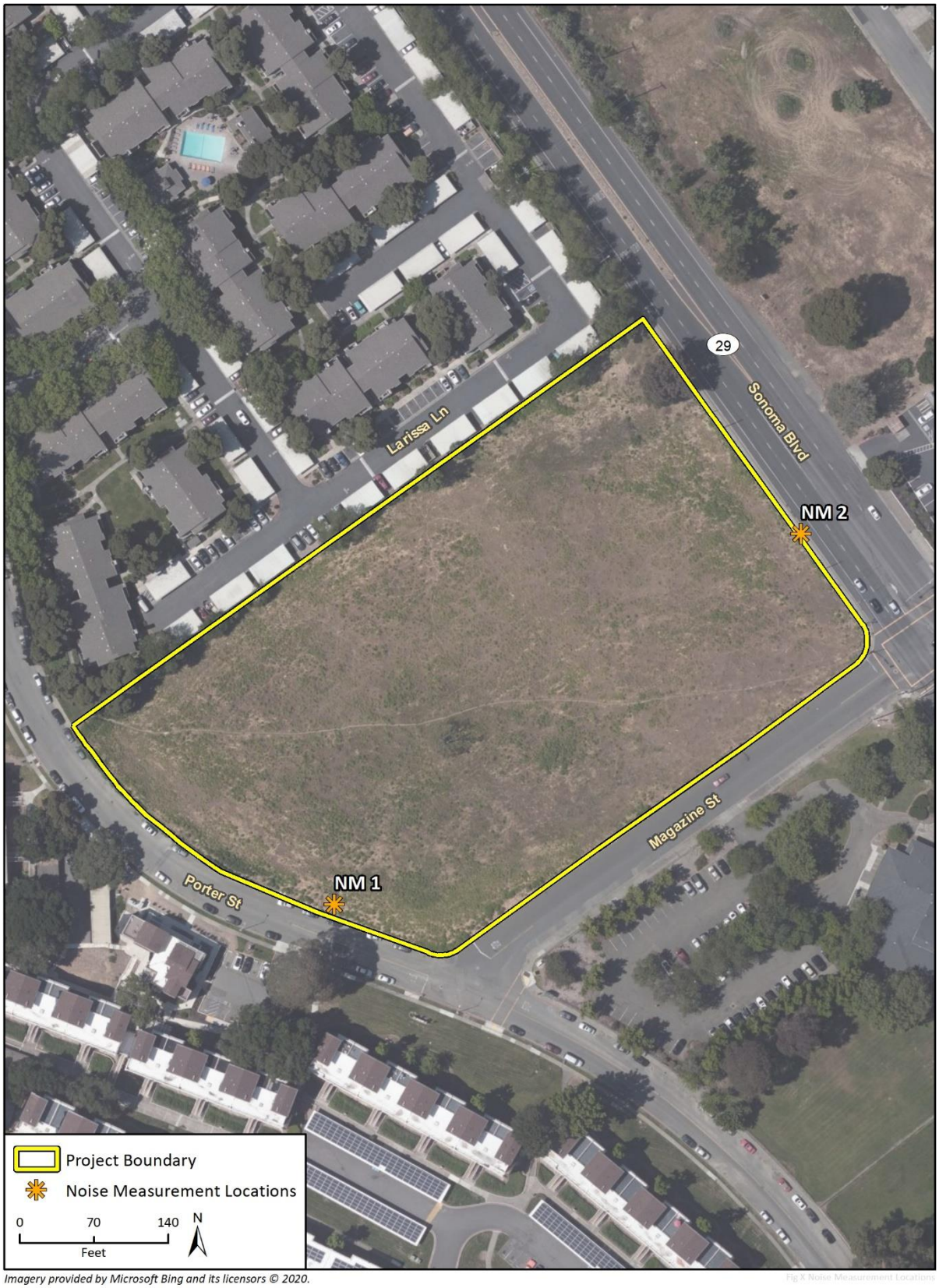
Table 11 Typical Noise Levels at Construction Sites

Equipment	Typical Level (dBA) 30 Feet from the Source	Noise Levels (dBA) 50 Feet from the Source
Air Compressor	84	80
Backhoe	84	80
Concrete Mixer	89	85
Generator	86	82
Grader	89	85
Paver	89	85
Roller	89	85
Saw	80	76
Scraper	89	85
Truck	88	84

Note: It is assumed that construction noise attenuates at 6 dBA per doubling of distance.

Source: Federal Transit Administration (FTA) 2018

Figure 8 Noise Measurement Locations



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Construction noise would be temporary, and would occur between 7:00 a.m. and 7:00 p.m. on weekdays, per General Plan Mitigation Measure NOI-4. Hours for loading, unloading, and power tool usage are also limited by the VMC Section 7.84.020(F). Additional equipment noise reduction measures, such as ensuring equipment is properly maintained, equipment is installed with operating mufflers, engine idling is limited, and low-noise emission equipment is used, would also be required per General Plan Mitigation Measure NOI-4. No unusually loud construction equipment, such as pile driving, would be required to implement the project. Construction noise would be similar to typical medium-scale urban construction that occurs throughout Vallejo on a regular basis. The City considers construction noise that occurs within the daytime hours specified above (per General Plan Mitigation Measure NOI-4 and VMC Section 7.84.020) to be less than significant. In addition, General Plan Mitigation Measure NOI-4 would require the project to maintain construction equipment to minimize noise; install mufflers, silencers, and engine shrouds on equipment; place stationary equipment as far as possible from residences; and use low-noise emission equipment. These strategies would further reduce construction noise levels resulting from project construction.

Operational Noise

Existing uses near the project site may periodically be subject to noises associated with operation of the proposed project, including noise that is typical of residential development such as conversations, music, trash hauling, and noise associated with rooftop ventilation and heating systems. For example, outdoor conversations and parking lot noise may potentially be heard at adjacent residences, because conversational levels range from 60 to 65 dBA L_{eq} at 50 feet (FTA 2018). However, this activity would not substantially contribute to average ambient noise levels and would be comparable to similar activity at the existing residential uses on surrounding properties.

In addition, the proposed project would generate traffic noise from vehicles traveling to and from the project site. As shown in Table 4, the proposed project would generate approximately 718 average daily trips, with 48 AM peak hour trips and 58 PM peak hour trips.

Existing daily traffic on Magazine Street was estimated based on the industry standard assumption that peak hour traffic volumes are equal to ten percent of the roadway average daily trips (ADT). Therefore, the traffic counts provided in the Traffic Impact Study (Appendix B), was multiplied by 10 to obtain an estimate of daily traffic. The approximate traffic volume estimate on Magazine Street is 3,260 ADT. All 718 project trips would use Magazine Street because the street includes the only proposed vehicle access to the site. Project-related operational trips would increase ADT on Magazine Street by approximately 22 percent. Noise increases are considered to be perceptible at 3 dBA, and a doubling in traffic (identical sound sources) corresponds to a 3 dBA increase in traffic noise levels (FTA 2018). Therefore, because the project would not double traffic on Magazine Street, an increase in roadway noise would not be perceptible.

Vibration

Vibration is a unique form of noise because its energy is carried through buildings, structures, and the ground, whereas most ambient noise is simply carried through the air. Thus, vibration is generally felt rather than heard. Some vibration effects can be caused by noise (e.g., the rattling of windows from truck pass-bys). This phenomenon is caused by the coupling of the acoustic energy at frequencies that are close to the resonant frequency of the material being vibrated. Typically, groundborne vibration generated by manmade activities attenuates rapidly as distance from the source of the vibration increases and vibration rapidly diminishes in amplitude with distance from the source.

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or RMS vibration velocity. Particle velocity is the velocity at which the ground moves. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the greatest magnitude of particle velocity associated with a vibration event. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings (Caltrans 2020).

Damage to structures occurs when vibration levels range from 0.5 to 2.0 in/sec PPV, depending on the age and condition of the structure, with the 0.5 in/sec PPV threshold applicable to older residential structures and the 2.0 in/sec PPV threshold applicable to modern industrial and commercial buildings. One half this minimum threshold, or 0.25 in/sec PPV is the criterion used herein to protect against structural damage of nearby buildings, none of which are historic or fragile (Caltrans 2020).

Established vibration criteria for evaluating human response ranges from approximately 0.04 in/sec PPV (barely perceptible) to 0.25 (distinctly perceptible) for transient sources of vibration (Caltrans 2020).

Construction activities that would occur on the project site have the potential to generate groundborne vibration. Table 12 identifies various vibration velocity levels for the types of construction equipment that are likely to operate at the project site during construction.

Table 12 Vibration Source Levels for Construction Equipment

	Approximate PPV (in/sec)	
Equipment	**25 Feet**	**30 Feet[1]**
Large Bulldozer	0.089	0.073
Loaded Trucks	0.076	0.062
Jackhammer	0.035	0.029
Small Bulldozer	0.003	0.003

[1] Calculated using the following formula: $VdB_{30\ ft} = VdB_{25\ ft} - 30*\log(30\ ft/25ft)$ (FTA 2018).

Source: FTA 2018

As shown in Table 12, vibration levels could be approximately 0.073 in/sec PPV at the existing residences located 30 feet northwest of the project site boundary. As noted above, impacts to structures would be significant if vibration levels exceeded 0.25 in/sec PPV. Vibration levels from some equipment (large bulldozers and loaded trucks) may exceed 0.04 in/sec PPV at 30 feet, the threshold for barely perceptible vibration at nearby sensitive receivers. However, construction vehicles would move around the site and would generally not be as close as 30 feet to sensitive receivers. Construction vibration would also be far below the threshold for distinct perception (0.25 in/sec PPV). In addition, the project would not exceed vibration levels that could potentially damage nearby buildings.

The project does not include the construction of vibration-generating uses (residences and a community center) and would not be a significant source of operational vibration. Impacts would be less than significant.

Conclusion

The proposed project would not result in a significant long-term increase in traffic noise levels, and temporary construction noise would be less than significant, based on compliance with the City's

time restrictions on construction activities, contained in the City's Municipal Code. The project's operational noise would be similar to noise from other nearby residential developments, including noise from nearby multi-family residences located to the north and east, and would be less than significant in the context of the existing noise in the surrounding area. Therefore, noise-related impacts resulting from implementation of the proposed project would be less than significant.

4.4.3 Air Quality

A significant adverse air quality impact may occur when a project individually or cumulatively interferes with progress toward the attainment of the state and national ozone standards and national particulate matter standard by releasing emissions that equal or exceed the established long term quantitative thresholds for pollutants, or causes an exceedance of a state or federal ambient air quality standard for any criteria pollutant. Primary criteria pollutants are emitted directly from a source (e.g., vehicle tailpipe, an exhaust stack of a factory, etc.) into the atmosphere. Commonly found primary criteria pollutants include reactive organic gases (ROG), nitric oxides (NO_x), carbon monoxide (CO), and particulate matter (PM_{10} and $PM_{2.5}$). PM $_{10}$ is particulate matter measuring no more than 10 microns in diameter, while $PM_{2.5}$ is fine particulate matter measuring no more than 2.5 microns in diameter. Because the project site is located within the San Francisco Bay Area Air Basin (SFBAAB) and falls under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD), this air quality analysis conforms to the methodologies recommended in BAAQMD's *CEQA Air Quality Guidelines* (2017).

BAAQMD has developed screening criteria where projects would have less than significant impacts from criteria air pollutant emissions if they are below a certain development size (BAAQMD 2017). For multi-family townhome developments, the construction screening criteria is 240 dwelling units and operational screening criteria is 451 dwelling units. For a project to meet the screening criteria for construction, it cannot include any of the following activities during construction:

- Demolition;
- Simultaneous occurrence of more than two construction phases (e.g., paving and building construction would occur simultaneously);
- Simultaneous construction of more than one land use type (e.g., project would develop residential and commercial uses on the same site) (not applicable to high density infill development);
- Extensive site preparation (i.e., greater than default assumptions used by the Urban Land Use Emissions Model [URBEMIS] for grading, cut/fill, or earth movement); or
- Extensive material transport (e.g., greater than 10,000 cubic yards of soil import/export) requiring a considerable amount of haul truck activity.

The project does not include demolition, as the site is currently undeveloped; multiple construction phases would not occur simultaneously; only one land use type is proposed; extensive site preparation would not be required; and extensive material transport from grading would not be required. The project would involve development of up to 132 total dwelling units, which is below the BAAQMD's screening criteria for significant air quality impacts. Therefore, air quality impacts would be less than significant.

The BAAQMD provides the screening criteria for carbon monoxide (CO) emissions as a conservative indication of whether a project would exceed CO thresholds of significance. The project is consistent with an applicable congestion management program, project traffic would not increase traffic

volumes at affected intersections to more than 44,000 vehicles per hour, and project traffic would not increase traffic volumes to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is limited (e.g., tunnel, parking garage, bridge underpass) (BAAQMD 2017). Additionally, the Health Risk Assessment completed by Rincon Consultants (dated April 2020, on file with the City of Vallejo Planning Division) concluded that the project would not expose residents to significant individual or cumulative excess cancer risks associated with toxic air contaminant emissions or excessive $PM_{2.5}$ concentrations associated with vehicle traffic on Sonoma Boulevard.

BAAQMD also provides a list of facilities considered to be odor-generating facilities, such as wastewater treatment plants, sanitary landfills, composting facilities, refineries, chemical and fiberglass manufacturing, coffee roasters, and metal smelting plants, among others. The proposed project does not include any of these uses and would not generate substantial odors, similar to the adjacent multi-family developments, nor would not place new receptors near any existing odor-generating facilities.

4.4.4 Hydrology and Water Quality

Urban runoff can have a variety of deleterious effects. Oil and grease contain a number of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Heavy metals such as lead, cadmium, and copper are the most common metals found in urban stormwater runoff. These metals can be toxic to aquatic organisms and have the potential to contaminate drinking water supplies. Nutrients from fertilizers, including nitrogen and phosphorous, can result in excessive or accelerated growth of vegetation or algae, resulting in oxygen depletion and additional impaired uses of water.

Currently, the project site is pervious, as it is entirely covered with dirt and ruderal vegetation. Stormwater runoff that does not infiltrate on site currently follows site topography, drains toward adjacent roadways, and enters the existing City storm drain at the intersection of Porter Street and Magazine Street. The project would replace the pervious surface with impervious paving and new buildings, resulting in approximately 72 percent impervious surfaces across the site and increasing the quantity and speed of stormwater runoff. However, the project includes low impact development measures in the form of three bioretention basins to capture on-site stormwater runoff prior to discharging into the existing storm drain systems. The basins have been sized to adequately capture and hold all stormwater runoff that occurs on site, per the Preliminary Stormwater Control Plan dated April 28, 2020. While the increase in impervious surfaces would increase total surface runoff from the site, the proposed bioretention basins would decrease peak flows in storm drains that collect water from the site during storm events and would not impact the downstream drainage system (West Yost 2020a). The project would also be required to comply with Provision C.3 of the Contra Costa Clean Water Program, which includes preparing and submitting a Stormwater Control Plan and Operation and Maintenance Plan. Features required by Provision C.3 would ensure that adequate stormwater treatment is provided for runoff at the project site.

The City maintains a Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit, which includes construction site controls, and requires standard conditions related to erosion control and stormwater discharge for construction within the city (City of Vallejo 2011).

Conclusion

The proposed project would be required to comply with Provision C.3 of the Contra Costa Clean Water Program and includes three bioretention areas to capture stormwater runoff. Since the project would also be required to incorporate standard construction best management practices per City requirements and permanent low impact development measures for ongoing operation, the project would not adversely affect hydrology and water quality.

4.5 Criterion (e)

The site can be adequately served by all required utilities and public services.

The project would be located in an existing urbanized area served by existing public utilities and services, including water, wastewater, and storm drainage facilities located in adjacent roadway rights-of-way. The City of Vallejo provides water, sewer, and solid waste collection services (via Recology Vallejo) to residential buildings surrounding the project site and would provide these services to the proposed project. Other services, including gas and electricity, would be provided to the project site by Pacific Gas and Electric Company (PG&E).

The City's current water usage is approximately 11,800 acre-feet per year, with a typical remaining capacity of approximately 4,100 acre-feet (City of Vallejo 2019). The project would require approximately 11.6 million gallons (35.6 acre-feet) of water per year (Appendix D), which represents less than 0.9 percent of the remaining capacity of the City's water supply.

The Vallejo Flood and Wastewater District has an average dry weather flow of 8.6 million gallons per day (mgd), and a maximum design flow of 15.5 mgd (San Francisco Bay Regional Water Quality Control Board 2017). The project would generate approximately 9.7 million gallons per year (0.027 mgd) of wastewater (assuming water use is 120 percent of wastewater generation), which represents less than 0.4 percent of the remaining capacity of the wastewater district. The project would require approval from VFWD prior to connecting to the existing sewer line in Porter Street, as peak flows would result in exceedances of the VFWD's Engineering Design Standards (West Yost 2020b).

As described in Section 4.4.4, the bioretention basins proposed on the site would not cause impacts to the downstream drainage system, and would reduce the peak flows in the system during storm events (West Yost 2020a). The project would not cause capacity exceedances in the City's storm drain system.

Recology Vallejo's Transfer Facility has a maximum throughput of 600 tons per day, with a design capacity of 775 tons per day (CalRecycle 2020a). Multi-family developments typically generate four pounds of waste per dwelling unit per day (CalRecycle 2020b). The project would generate approximately 496 pounds per day, or 0.25 tons per day, which represents less than 0.2 percent of the remaining capacity of Recology Vallejo's Transfer Facility.

As described previously, project operation would consume an estimated 511,915 kWh (0.51 GWh) of electricity and 1,071,290 kBTU (0.01 million therms) of natural gas per year (refer to Appendix D). In 2018, PG&E provided 80,369 GWh of electricity and 4,794 million therms of natural gas (CEC 2018a, 2018b). The project would represent a less than 0.001 percent increase in demand for electricity and natural gas from PG&E.

Thus, the project would be served by existing utilities and would only require a small percentage of available utility capacity. The project meets this criterion for exemption.

4.6 Exceptions to CE Applicability

The applicability of CEs is qualified by the exceptions listed in Section 15300.2(a) through (f) of the *CEQA Guidelines*. In the discussion below, each exception (in italics) is followed by an explanation of why the exception does not apply to the proposed project.

15300.2(a) ***Location****. Classes 3, 4, 5, 6, and 11 are qualified by consideration of where the project is to be located – a project that is ordinarily insignificant in its impact on the environment may in a particularly sensitive environment be significant. Therefore, these classes are considered to apply in all instances, except where the project may impact an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.*

The City of Vallejo does not propose to adopt a Class 3, 4, 5, 6, and 11 CE, and these classes of CEs are not applicable to the proposed project. Additionally, there are no environmental resources of hazardous or critical concern that are designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies on the project site, such as critical habitat for listed threatened or endangered species (United States Fish and Wildlife Service [USFWS] 2020a, Appendix A). According to a search of the State Water Resources Control Board GeoTracker database and the Department of Toxic Substances Control EnviroStor database conducted in May 2020, there are no active designated active hazardous waste sites on or within the project vicinity (State Water Resources Control Board [SWRCB] 2020, California Department of Toxic Substances Control [DTSC] 2020a). The project site is located in an urbanized area and there are not critical environmental resources, such as wetlands or wildlife, on site (USFWS 2020a, USFWS 2020b, Appendix A). Therefore, this exception to a CE does not apply to the project.

15300.2(b) ***Cumulative Impact****. All exemptions for these classes are inapplicable when the cumulative impact of successive projects of the same type in the same place, over time is significant.*

The proposed project would not result in significant environmental impacts and there are no other successive projects of the same type or scale planned for the surrounding area or nearby vacant parcels. Land to the north and west of the site is fully developed with existing residential uses, land to the east is developed with commercial uses, land to the southeast is developed with a community center, and one vacant lot (which is not currently planned for development) is located northeast of the site across Sonoma Boulevard. There are no major reasonably foreseeable future projects in the vicinity that would result in significant cumulative impacts. Therefore, no significant cumulative impact would result from successive projects of the same type in the same place over time. This exception to a CE does not apply to the proposed project.

15300.2(c) ***Significant Effect****. A categorical exemption shall not be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances.*

As described under Section 4.4, *Criterion (d)*, above, the project would not result in any significant effects relating to traffic, noise, air quality, greenhouse gases, water quality, or historic resources, and there are no unusual circumstances at the project site which would exacerbate any environmental effects. Thus, the project would not have a reasonable possibility for a significant effect on the environment due to unusual circumstances.

15300.2(d) ***Scenic Highways****. A categorical exemption shall not be used for a project which may result in damage to scenic resources, including but not limited to, trees, historic buildings, rock outcroppings, or similar resources, within a highway officially designated as a state scenic highway. This does not apply to improvements which are required as mitigation by an adopted negative declaration or certified EIR.*

The project site is not on or near an officially designated California Scenic Highway, although State Route 29 (Sonoma Boulevard) is considered to be eligible as a scenic highway (California Department of Transportation 2019). The project would remove and replace on-site trees, and would install additional landscaping to enhance the scenic quality of the proposed development. There are no rock-outcroppings or historic buildings located on site. Therefore, this exception of a CE is not applicable to the proposed project.

15300.2(e) ***Hazardous Waste Sites****. A categorical exemption shall not be used for a project located on a site which is included on any list compiled pursuant to Section 65962.5 of the Government Code.*

The project site at the northwest corner of Sonoma Boulevard and Magazine Street is not included on the DTSC EnviroStor database, DTSC Cortese List, SWRCB GeoTracker database, California Environmental Protection Agency (CalEPA) list of solid waste disposal sites, or CalEPA list of active cleanup orders (DTSC 2020a, DTSC 2020b, CalEPA 2016a, CalEPA 2016b, SWRCB 2020). The project site is not included on a list complied pursuant to Section 65962.5 of the Government Code; therefore, this exception to the applicability and use of a CE does not apply to the project.

15300.2(f) ***Historical Resources****. A categorical exemption shall not be used for a project which may cause a substantial adverse change in the significance of a historical resource.*

The project site is currently vacant and does not have any historically significant structures on-site or surrounding the project site. There are no buildings or structures on the project site. A search of the California Historical Resources Information System (CHRIS) included a review of the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR), the Office of Historic Preservation Historic Properties Directory, the California Inventory of Historic Resources, and the Archaeological Determinations of Eligibility list. This search found no eligible historic buildings within 0.5-mile of the project site. Because the proposed development would not alter an eligible historic resource or be located near a potentially eligible historic resource or any other existing historic resources, the project would not adversely affect the significance of historic resources. The proposed project would not modify structures and would not have a significant impact on historic resources.

Additionally, the Cultural Resource Assessment prepared by Rincon Consultants, Inc., dated February 20, 2020, did not identify any previously recorded or newly identified cultural resources within the project area. Given the results of the Cultural Resource Assessment, no impact to archaeological resources would occur.

5 Summary

Based on this analysis, the proposed Sonoma Boulevard Multi-Family Residential Project meets the criteria for a Class 32 Categorical Exemption pursuant to Section 15332 of the *CEQA Guidelines*.

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Appendix A

Biological Resources Technical Memorandum

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February 14, 2020
Project No: 19-08635

Jonathan Atkinson
City of Vallejo
555 Santa Clara Street
Vallejo, California 94590
Via email: jonathan.atkinson@cityofvallejo.net

Subject: **Biological Resources Technical Memorandum for the Proposed Multifamily Residential Project at the Corner of Sonoma Boulevard and Magazine Street, Vallejo, California**

Dear Mr. Atkinson:

Rincon Consultants, Inc. was retained by the City of Vallejo to prepare a biological study in support of California Environmental Quality Act (CEQA) under a Class 32, Infill Exemption documentation for the proposed Multifamily Residential Project at the corner of Sonoma Boulevard and Magazine Street. Per the *CEQA Guidelines*, the Class 32, Infill Exemption must meet the following condition in relation to biological resources: "*The Project site has no value as habitat for endangered, rare or threatened species*." Rincon evaluated the existing biological conditions of the site with the specific goal of determining whether the site provides any habitat value for endangered, rare or threatened species.

Project Location

The 4.95-acre project site is located at the northwest corner of Sonoma Boulevard and Magazine Street. The undeveloped site is bordered by Sonoma Boulevard (State Route 29) to the northeast, Magazine Boulevard to the southeast, Porter Street to the southwest, and multifamily residences to the northwest. The project site is located 0.28 mile west of Interstate 80 and 0.26 mile east of the Napa River.

Methods

Field Survey

Rincon biologist Anastasia Ennis conducted a site reconnaissance survey of the project site on January 10, 2020 between the hours of 11:00 and 12:00 to evaluate existing site conditions, assess vegetation communities, and evaluate the potential for presence of special status species, including sensitive plant and wildlife species.

Literature and Desktop Review

Prior to the site survey, Rincon conducted record searches of the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB, 9-quad search). The California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants and the United States Fish and Wildlife

Service (USFWS) Information for Planning and Consultation (IPaC) were also accessed for this review to obtain comprehensive information regarding state and federally listed species, as well as other special status species and sensitive plant communities considered to have potential to occur or known to occur within the *Benicia, California* USGS 7.5-minute topographic quadrangle and/or surrounding eight quadrangles.

Existing Conditions

The project site is comprised entirely of non-native annual grassland, consisting mostly of ruderal species with a small percentage of native plants present. No evidence of waters or wetlands was observed within or surrounding the project site. Dominant plants observed in the project site included fennel (*Foeniculum vulgare*), stork's-bills (*Erodium* sp.), and ruderal grasses. Other non-native plants observed included: English plantain (*Plantago lanceolata*), common vetch (*Vicia sativa*), malva (*Malva* sp.), and common ivy (*Hedera helix*). A single coyote bush (*Baccharis pilularus*) was observed in the center of the site, near a lone southern blue gum (*Eucalyptus globulus*). At the northwest edge of the site, trees and shrubs along the fenceline included the following species that were likely planted for landscaping purposes: coast live oak (*Quercus agrifolia*), blackwood acacia (*Acacia melanoxylon*), firethorn (*Pyracantha coccinea*), and passionflower vine (*Passiflora incarnata*). A well-established mountain blue gum *Eucalyptus deanei*) is located in the northernmost corner of the project site. Evidence of periodic mowing of the vegetation within the site was evident. A trail bisects the parcel running east to west, and trash was found scattered throughout the site.

Land use surrounding the project site is mostly suburban/residential with some commercial uses. A partially undeveloped lot is located across Sonoma Boulevard to the north and a community center and park are located across Magazine Street to the southeast. Common landscaping vegetation is present in the residentially and commercially developed areas surrounding the site, and includes ornamental trees, shrubs, and grasses. Ruderal grassland and eucalyptus trees are present in the empty lot to the north of the project site. Trees planted around the adjacent community center and park to the southeast are dominated by sweetgum (*Liquidambar styraciflua*).

Bird species observed in or near the project site included: Anna's hummingbird (*Calypte anna*), black phoebe, (*Sayornis nigricans*), Say's phoebe (*Sayornis saya*), house sparrow (*Passer domesticus*), and American crow (*Corvus brachyrhynchos*).

Special Status Species

The review of the resource agency databases for known special status animal occurrences within the nine USGS quadrangles containing and surrounding the project site identified 52 special status animal species and 50 special status plant species. The site was evaluated for its potential to provide habitat value for these species. Of the species known to occur in the region, the following rare or protected species (seven [7] animals and 15 plants) are known to occur in habitat types with characteristics similar to the project site : western bumble bee (*Bombus occidentalis*), Cooper's hawk (*Accipiter cooperii*), Burrowing owl (*Athene cunicularia*), northern harrier (*Circus hudsonius*), white-tailed kite (*Elanus leucurus*), peregrine falcon (*Falco peregrinus anatum*), osprey (*Pandion haliaetus*), bent-flowered fiddleneck (*Amsinckia lunaris*), big tarplant (*Blepharizonia plumosa*); Mt. Diablo fairy lantern (*Calochortus pulchellus*); Tiburon paintbrush (*Castilleja affinus* var. *neglecta*), Congdon's tarplant

(*Centromadia parryi* ssp. *congdonii*), pappose tarplant (*Centromadia parryi* ssp. *parryi*), Tiburon buckwheat (*Eriogonum luteolum* var. *caninum),* Mt. Diablo buckwheat (*Eriogonum truncatum*), Jepson's coyote thistle (*Eryngium jepsonii*), San Joaquin spearscale (*Extriplex joaquinana*), Diablo helianthella (*Helianthella castanea*), Santa Cruz tarplant (*Holocarpha macradenia*), Contra Costa goldfields (*Lasthenia conjugens*), two-fork clover (*Trifolium amoenum*), and saline clover (*Trifolium hydrophilum*).

The project site does not currently provide suitable habitat for any of the above 15 rare plant species to occur on the site due to high levels of disturbance, long-time development of areas surrounding the site, and the absence of native vegetation communities on the project site.

The western bumble bee (state candidate for listing) has a low potential to occur on site. This bee was once widespread in the northwestern United States but is in decline from Central California to southern British Colombia. In California, it has been lost from 53% of its historic range and has an 84% decline in relative abundance (Xerces Society et al. 2018). Habitat loss and alteration, pathogens, urban development and fragmentation, and other factors have contributed to their decline. The most recent of the five (5) occurrence records within five miles of the project site is from 1964 (CNDDB). A generalist forager, the western bumble bee nests underground in cavities or rodent burrows. It requires limited ground disturbance and an abundance of floral resources, as well as suitable overwintering sites for queens. Given the precipitous decline in bumblebees over the last two decades, absence of recently recorded occurrences in the project vicinity, and the fragmented and disturbed nature of vegetation communities in the project vicinity, the site does not provide suitable habitat for this species.

The six rare bird species that are known to occur in the vicinity of the site are all raptor species: Cooper's hawk (state watch list species), Burrowing owl (state species of special concern), northern harrier (state species of special concern), white-tailed kite (state fully protected species), peregrine falcon (state fully protected species), osprey (state watch list species). No rodent burrows were observed on the project site, indicating low prey base and poor-quality foraging habitat for predatory bird species, and absence of suitable habitat for burrowing owl. Cooper's hawk, northern harrier, and white-tailed kite are often associated with riparian and marsh habitats thus the species may pass through the site, however, there is a low potential for these species to use vegetation present on and in the vicinity of the site as nesting habitat. There is no suitable nesting habitat (e.g. cliffs or skyscrapers) for peregrine falcon on or adjacent to the project site. Osprey hunt fish exclusively, thus the project site does not provide suitable foraging habitat, although the mountain blue gum in the project site has the potential to provide suitable nesting habitat. No nests were observed in the mountain blue gum or any of the other trees or vegetation that occurred on the site. Due to absence of dense vegetative cover, prey base, and urbanized surroundings, the site only provides marginally suitable habitat for these sensitive bird species. Impacts to these species are not expected.

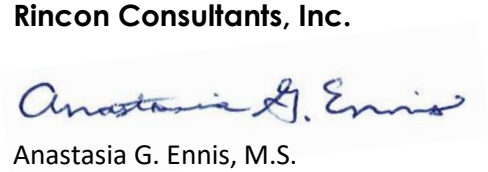
Conclusions

The existing conditions of the site are highly disturbed and isolated as a result of surrounding residential and commercial development. While the site does consist of marginally suitable habitat for Cooper's hawk, northern harrier, white-tailed kite, and osprey, the City of Vallejo's General Plan (Action NBE-1.2C) requires scheduling of construction and vegetation removal outside of nesting bird season or conducting a preconstruction nesting bird survey. Protecting active bird nests is a standard city policy and would be implemented as a condition of approval for the project, thus potentially significant

impacts to special status species will be avoided. As a result, the project site has no value as habitat for endangered, rare or threatened species.

Thank you for the opportunity to provide environmental support on this project service. Please contact us if you have questions, or if we can be of further assistance.

Sincerely,
Rincon Consultants, Inc.



Anastasia G. Ennis, M.S.
Associate Biologist

David Daitch, Ph.D.
Program Manager/Senior Biologist

Attachments

Attachment A	References
Attachment B	Figures
Attachment C	Site Photographs

Attachment A References

California Department of Fish and Wildlife. 2019a. Biogeographic Information and Observation System (BIOS). http://bios.dfg.ca.gov. (Accessed January 2020).

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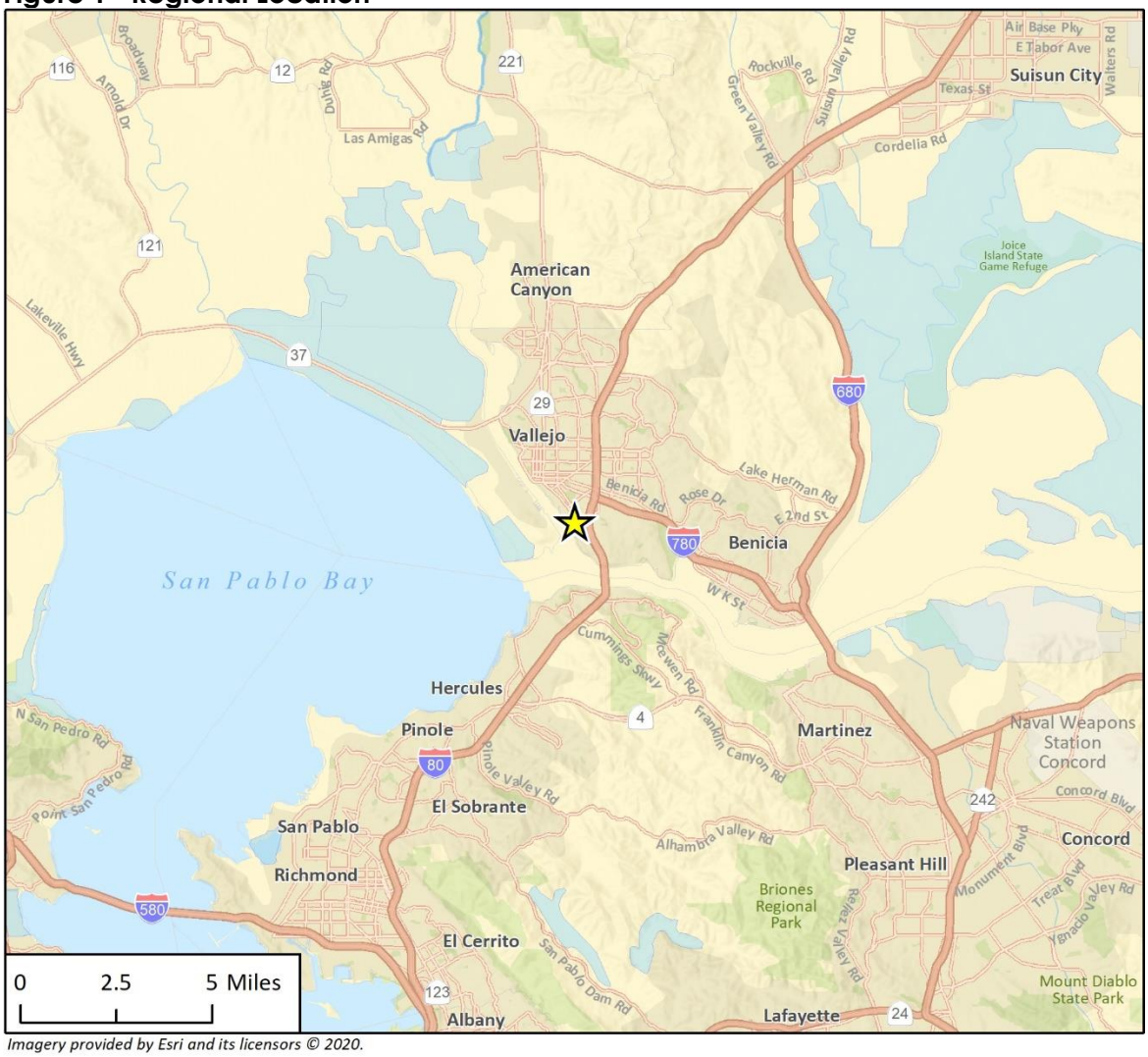
Attachment B Figures

Figure 1 Regional Location



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★ Project Location

N

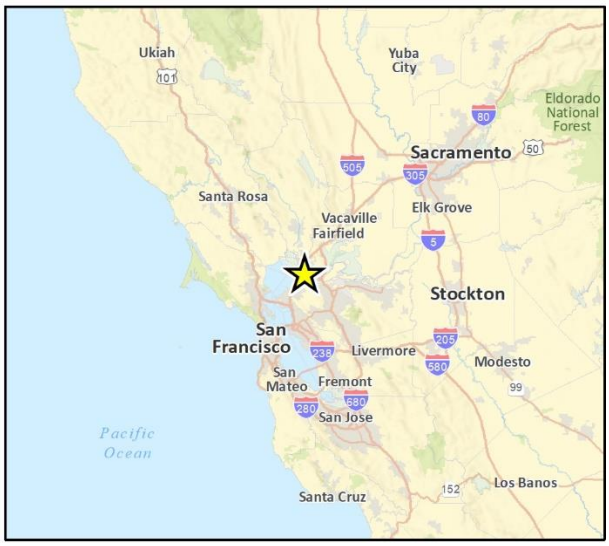

Figure 2 Project Location

Imagery provided by Microsoft Bing and its licensors © 2020.

Attachment C Site Photographs

Photograph 1. Overview of site, showing dominant vegetation, trail through site, and southern blue gum in the center, facing west.

Photograph 2. View from north corner of site, facing southwest.

Photograph 3. View of site from Porter Street, facing northeast.

Photograph 4. View along Sonoma Boulevard showing mountain blue gum eucalyptus at north corner of site, facing northwest.

Appendix B

Traffic Impact Study and Addendum

Traffic Impact Study for the Aventis-Vallejo Multifamily Community Project

Prepared for the City of Vallejo

Submitted by
W-Trans

February 26, 2020

TRAFFIC ENGINEERING
TRANSPORTATION PLANNING
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Table of Contents

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Executive Summary

The proposed Aventis Multifamily Community project includes the development of 124 units to be located on a currently undeveloped parcel at the northwest corner of Magazine Street and Sonoma Boulevard in the City of Vallejo.

The study area includes eight intersections. Under Existing conditions, seven study intersections are operating acceptably at LOS D or better; the intersection of Magazine Street/Lincoln Road East operates unacceptably at LOS E during the p.m. peak hour. Under Existing plus Project conditions, all study intersections are expected to continue operating acceptably.

Under Future and Future plus Project conditions, all study intersections would operate acceptably with the exception of Magazine Street/Lincoln Road East, which is expected to operate at LOS F. Although the intersection would operate below the adopted standard, the project is expected to result in a less-than-significant impact as the increase in the V/C (volume to capacity ratio) due to adding project traffic would be less than the City threshold.

To reduce a.m. peak hour eastbound queues that may occasionally occur in front of the project driveway, a recommendation has been formulated to establish a Keep Clear zone in front of the project driveway. This measure would create a gap in the eastbound queue to allow motorist to exit the project site. It would also encourage motorists to make left turns out of the project driveway, rather than turning right toward Porter Street.

Sight distance along Magazine Street is adequate towards and from the proposed driveway.

The proposed project would provide 248 on-site parking spaces, which is equal to the number of spaces required under the City of Vallejo Municipal Code.

Introduction

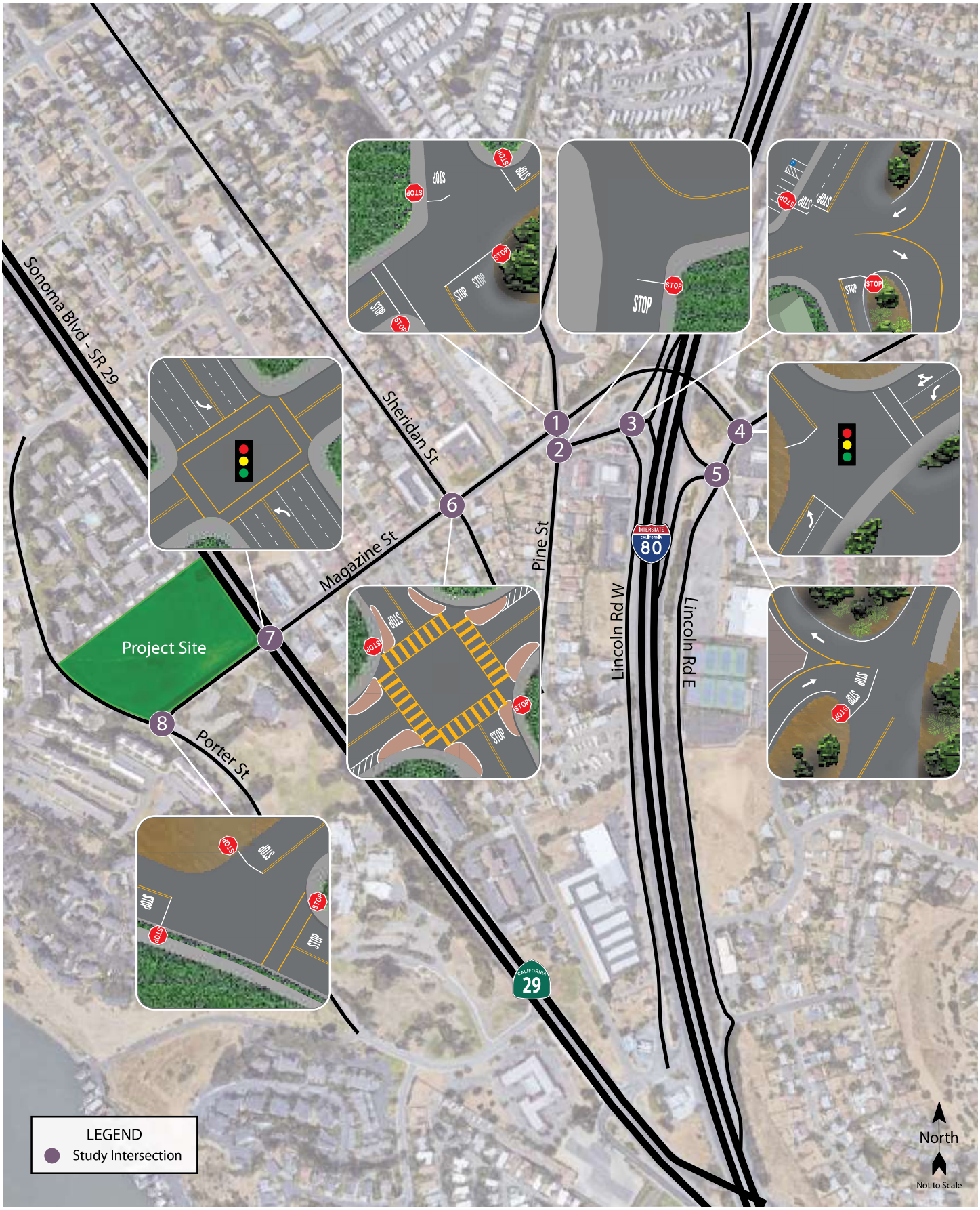
This report presents an analysis of the potential traffic impacts that would be associated with the proposed development of a 124-unit multifamily residential complex to be located on the northwest corner at Magazine Street/Sonoma Boulevard (SR 29) in the City of Vallejo. The proposed development would include various residential amenities in addition to 248 on-site parking spaces. The traffic study was completed in accordance with the criteria established by the City of Vallejo as well as the California Department of Transportation (Caltrans) and is consistent with standard traffic engineering techniques.

Prelude

The purpose of a traffic impact study is to provide City staff and policy makers with data they can use to make an informed decision regarding the potential traffic impacts of a proposed project, and any associated improvements that would be required to mitigate these impacts to a level of insignificance as defined by the City's General Plan or other policies. Vehicular traffic impacts are typically evaluated by determining the number of new trips that the proposed use would be expected to generate, distributing these trips to the surrounding street system based on existing travel patterns or anticipated travel patterns specific to the proposed project, then analyzing the impact the new traffic would be expected to have on critical intersections or roadway segments. Impacts relative to access for pedestrians, bicyclists, and to transit are also addressed.

Project Profile

The project as proposed includes the development of 124 multifamily residential apartment units on a currently vacant parcel at the northwest corner of Magazine Street/Sonoma Boulevard in the City of Vallejo. The proposed project would provide 248 on-site parking spaces and various residential amenities. The project site is shown in Figure 1.



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Traffic Impact Study for the Aventis-Vallejo Multifamily Community Project

Figure 1 – Study Area and Existing Lane Configurations

W-Trans

Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the following intersections:

1. Magazine Street/Pine Street
2. Pine Street/Lincoln Road West
3. Interstate 80 South Ramps/Lincoln Road West
4. Magazine Street/Lincoln Road East
5. Interstate 80 North Ramps/Lincoln Road East
6. Magazine Street/Sheridan Street
7. Magazine Street/Sonoma Boulevard (SR 29)
8. Magazine Street/Porter Street

Operating conditions during the a.m. and p.m. peak periods were evaluated to capture the highest potential impacts for the proposed project as well as the highest volumes on the local transportation network. The morning peak hour occurs between 7:00 and 9:00 a.m. and reflects conditions during the home to work or school commute, while the p.m. peak hour occurs between 4:00 and 6:00 p.m. and typically reflects the highest level of congestion during the homeward bound commute.

Study Intersections

Magazine Street/Pine Street is a four-way stop-controlled intersection including a crosswalk across the west leg.

Pine Street/Lincoln Road West is a tee intersection with stop-control on the west leg. No crosswalks are present.

Interstate 80 (I-80) South Ramps/Lincoln Road West is a four-legged intersection including stop-control on the north and south legs. No crosswalks are present.

Magazine Street/Lincoln Road East is a signalized tee intersection including a signalized driveway located at the east leg. A crosswalk is present across the north leg.

Interstate 80 (I-80) North Ramps/Lincoln Road East is a tee intersection including stop-control on the east leg. No pedestrian facilities are present at this intersection.

Magazine Street/Sheridan Street is a four-legged intersection including two-way stop-control at the north and south legs. Yellow high-visibility crosswalks are present across all legs to alert drivers of the potential presence of school-age children.

Magazine Street/Sonoma Boulevard (SR 29) is a signalized four-legged intersection including protected left-turn phasing along Sonoma Boulevard. Crosswalks are present across all legs.

Magazine Street/Porter Street is an all-way stop-controlled tee intersection. A crosswalk is present across the south leg.

The locations of the study intersections and the existing lane configurations and controls are shown in Figure 1.

Collision History

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on records available from the California Highway Patrol as published in their *Statewide Integrated Traffic Records System (SWITRS)* reports. The most current five-year period available is April 1, 2014 through March 31, 2019.

As presented in Table 1, the calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2016 Collision Data on California State Highways*, California Department of Transportation (Caltrans).

The collision rate calculations are provided in Appendix A.

Table 1 – Collision Rates at the Study Intersections

Study Intersection	Number of Collisions (2014-2019)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Magazine St/Pine St	4	**0.20**	0.19
2. Pine St/Lincoln Rd W	1	0.08	0.08
3. I-80 South Ramps/Lincoln Rd W	3	**0.23**	0.13
4. Magazine St/Lincoln Rd E	1	0.05	0.24
5. I-80 North Ramps/Lincoln Rd E	2	0.12	0.13
6. Magazine St/Sheridan St	-	n/a	0.13
7. Magazine St/Sonoma Blvd (SR 29)	10	**0.34**	0.24
8. Magazine St/Porter St	1	**0.24**	0.04

Note: c/mve = collisions per million vehicles entering; **bold text** = rates higher than statewide average

While a total of four collisions were reported at the intersection of Magazine Street/Pine Street resulting in a collision rate higher than the statewide average, a clear trend was not identified. Although two of the four reported collisions were rear-end collisions, the location and direction of travel varied. It is noted that one of the reported collisions resulted in an injury to one or more parties involved.

A total of three collisions were reported to have occurred at the intersection of I-80 South Ramps/Lincoln Road West, resulting in a rate of 0.23 collisions per million vehicles entering (c/mve) the intersection, compared to the statewide average of 0.13 c/mve. While no injuries were reported, the most prevalent primary collision factor consisted of unsafe speed violations (two collisions). The primary collision types included two hit object collisions and one broadside collision. The broadside collision may have resulted from a driver entering the intersection either late during the yellow clearance interval or even after the light changed to red. The hit object collisions are common where drivers are traveling at high speeds. Caltrans staff may wish to consider implementing additional red-clearance timing at this location to address the broadside collisions.

At the intersection of Magazine Street/Sonoma Boulevard, a total of 10 collisions were reported during the most recent five-year period, resulting in a rate of 0.34 collisions per million vehicles entering (c/mve) the intersection compared to the statewide average of 0.24 c/mve. Of the ten reported collisions, six resulted in injuries to one or more parties involved. The most prevalent collision type consisted of broadside collisions (five reported instances), all of which included a primary collision factor of either a traffic signals and signs violation or an automobile right-of-way violation. The broadside collisions likely resulted from drivers entering either late in the yellow clearance interval or even after the light changed to red. Caltrans may wish to consider implementing additional red-clearance timing at this location to address the broadside collisions.

Though the collision rate for the intersection of Magazine Street/Porter Street exceeds the statewide average, with only one reported collision there is insufficient data to determine any type of trend. The above-average rate is generally attributable to the low volumes of traffic at the intersection, resulting in a high collision rate for even a single collision. The primary collision factor for the collision at Magazine Street/Porter Street was unsafe speed. No specific safety concerns were identified relative to the intersection.

Alternative Modes

Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. In general, a network of sidewalks, crosswalks, pedestrian signals, and curb ramps provide access for pedestrians in the vicinity of the project site; however, sidewalk gaps, can be found along some of the roadways connecting to the project site. Existing gaps along the connecting roadways impact convenient and continuous access for pedestrians and present safety concerns in those locations where appropriate pedestrian infrastructure would address potential conflict points.

- **Porter Street** – Intermittent sidewalk coverage is provided on Porter Street with significant gaps on the east side of the street between Magazine Road and Larissa Lane. Sidewalks are generally present along developed property frontages and lighting is provided by overhead streetlights.

- **Magazine Street** – Continuous sidewalks are generally provided on one or both sides of Magazine Street between Porter Street and Pine Street. Sidewalks are not provided on the north side of the street between Porter Street and Sonoma Boulevard. Additionally, sidewalk is not provided on the south side of the street between Pine Street and Lincoln Road East. Curb ramps and crosswalks are present at side street approaches and lighting is provided by overhead streetlights.

- **Sonoma Boulevard** – Sidewalks are provided on the west side of Sonoma Boulevard north of Magazine Street adjacent to developed property. No sidewalk is present adjacent to the vacant parcels on the east side of Sonoma Boulevard north of the project site between Magazine Street and Cherry Street. Between Magazine Street and Sandy Beach Road, no sidewalks are provided on the west side of Sonoma Boulevard. Intermittent sidewalk is present along the east side of Sonoma Boulevard between Magazine Street and Sandy Beach Road adjacent to the residential units located at 266 Sonoma Boulevard and the Kingdom Hall of Jehovah's Witnesses. In general, Sonoma Boulevard is an arterial that provides vehicular access to I-80 south of the project site. Overhead streetlights are generally provided along the roadway.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2017, classifies bikeways into four categories:

- **Class I Multi-Use Path** – a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.
- **Class II Bike Lane** – a striped and signed lane for one-way bike travel on a street or highway.
- **Class III Bike Route** – signing only for shared use with motor vehicles within the same travel lane on a street or highway.
- **Class IV Bikeway** – also known as a separated bikeway, a Class IV Bikeway is for the exclusive use of bicycles and includes a separation between the bikeway and the motor vehicle traffic lane. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

In the project area, shoulder striping exists on Sonoma Boulevard between Cherry Street and Sequoia Avenue. Bicyclists ride in the roadway and/or on sidewalks along all other streets within the project study area.

Table 2 summarizes the existing and planned bicycle facilities in the project vicinity, as contained in the City of Vallejo *2040 General Plan*.

Table 2 – Bicycle Facility Summary

Status Facility	Class	Length (miles)	Begin Point	End Point
Existing				
Sonoma Blvd	II	0.66	Cherry St	Sequoia Ave
Magazine St	III	1.43	5th St	Old Glen Cove Rd
Planned				
Sonoma Blvd	II	1.22	Curtola Pkwy	Magazine St
Porter St	III	0.28	Magazine St	Sandy Beach Rd
Magazine St	III	0.20	Porter St	5th St

Source: *Propel Vallejo: General Plan 2040*, City of Vallejo, 2017

Transit Facilities

The Solano Transit Authority (SolTrans) provides fixed bus route service throughout the City of Vallejo. SolTrans Local Route 3 provides loop service to destinations throughout the southern portion of the City and stops on Magazine Street between Porter Street and Pine Street. Route 3 operates Monday through Friday with approximately one-half hour headways between 6:00 a.m. and 7:00 p.m. Saturday service operates with approximately one-half hour headways between 7:30 a.m. and 7:00 p.m.

Two bicycles can be carried on most SolTrans buses. Bike rack space is provided on a first come, first served basis. Additional bicycles are allowed on SolTrans buses at the discretion of the driver.

Dial-a-ride, also known as paratransit or door-to-door service, is available for those who are unable to independently use the transit system due to a physical or mental disability. SolTrans Paratransit is designed to serve the needs of individuals with disabilities within Vallejo and the greater Solano County area.

Capacity Analysis

Intersection Level of Service Methodologies

Level of Service (LOS) is used to rank traffic operation on various types of facilities based on traffic volumes and roadway capacity using a series of letter designations ranging from A to F. Generally, Level of Service A represents free flow conditions and Level of Service F represents forced flow or breakdown conditions. A unit of measure that indicates a level of delay generally accompanies the LOS designation.

The study intersections were analyzed using methodologies published in the *Highway Capacity Manual* (HCM), Transportation Research Board, 2000. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle.

The Levels of Service for the intersections with side street stop controls, or those which are unsignalized and have one or two approaches stop controlled, were analyzed using the "Two-Way Stop-Controlled" intersection capacity method from the HCM. This methodology determines a level of service for each minor turning movement by estimating the level of average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall average delay for the intersection.

The study intersections with stop signs on all approaches were analyzed using the "All-Way Stop-Controlled" Intersection methodology from the HCM. This methodology evaluates delay for each approach based on turning movements, opposing and conflicting traffic volumes, and the number of lanes. Average vehicle delay is computed for the intersection as a whole and is then related to a Level of Service.

The study intersections that are currently controlled by a traffic signal, or may be in the future, were evaluated using the signalized methodology from the HCM. This methodology is based on factors including traffic volumes, green time for each movement, phasing, whether the signals are coordinated or not, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology. For purposes of this study, delays were calculated using signal timing obtained from the California Department of Transportation and the City of Vallejo.

The ranges of delay associated with the various levels of service are indicated in Table 3.

Table 3 – Intersection Level of Service Criteria			
LOS	**Two-Way Stop-Controlled**	**All-Way Stop-Controlled**	**Signalized**
A	Delay of 0 to 10 seconds. Gaps in traffic are readily available for drivers exiting the minor street.	Delay of 0 to 10 seconds. Upon stopping, drivers are immediately able to proceed.	Delay of 0 to 10 seconds. Most vehicles arrive during the green phase, so do not stop at all.
B	Delay of 10 to 15 seconds. Gaps in traffic are somewhat less readily available than with LOS A, but no queuing occurs on the minor street.	Delay of 10 to 15 seconds. Drivers may wait for one or two vehicles to clear the intersection before proceeding from a stop.	Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop.
C	Delay of 15 to 25 seconds. Acceptable gaps in traffic are less frequent, and drivers may approach while another vehicle is already waiting to exit the side street.	Delay of 15 to 25 seconds. Drivers will enter a queue of one or two vehicles on the same approach and wait for vehicle to clear from one or more approaches prior to entering the intersection.	Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.
D	Delay of 25 to 35 seconds. There are fewer acceptable gaps in traffic, and drivers may enter a queue of one or two vehicles on the side street.	Delay of 25 to 35 seconds. Queues of more than two vehicles are encountered on one or more approaches.	Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop.
E	Delay of 35 to 50 seconds. Few acceptable gaps in traffic are available, and longer queues may form on the side street.	Delay of 35 to 50 seconds. Longer queues are encountered on more than one approach to the intersection.	Delay of 55 to 80 seconds. Most, if not all, vehicles must stop, and drivers consider the delay excessive.
F	Delay of more than 50 seconds. Drivers may wait for long periods before there is an acceptable gap in traffic for exiting the side streets, creating long queues.	Delay of more than 50 seconds. Drivers enter long queues on all approaches.	Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

Reference: *Highway Capacity Manual,* Transportation Research Board, 2000

Traffic Operation Standards

Caltrans

Caltrans indicates that they endeavor to maintain operation at the transition from LOS C to LOS D. Based on previous discussions with Caltrans staff, it is understood that the standard is to be applied to the overall average intersection delay, *not* that associated with any single movement or approach. Under this approach, if one movement experiences very high delay and also has moderate to high traffic volumes, the overall delay and level of service should reflect the critical nature of the condition. However, if one movement is expected to experience high delay, but has very low traffic volumes, the overall intersection operation will likely still meet Caltrans standards.

City of Vallejo

The City of Vallejo's Level of Service (LOS) standard is published in the *City of Vallejo Traffic Impact Analysis/ Study Guidelines,* City of Vallejo, 2008. The City of Vallejo identifies LOS E or better as acceptable operation at an intersection. Although, LOS E is considered acceptable, metrics for pedestrian, bicycle, transit, or emergency access performance should not be overridden. One component of the City's significance threshold criteria is the

comparison of a signalized intersection's volume-to-capacity (V/C) ratio under 'No Project' and 'Plus Project' conditions. The City requires use of the HCM 6 methodology although it is not the most current version because the HCM 6 methodology identifies V/C ratios for each movement, but does not identify an overall intersection V/C ratio. The 2000 HCM methodology was applied as it identifies an overall V/C ratio and therefore provides the information necessary to evaluate project impacts.

Traffic impacts are considered "significant" if either the intersection is operating acceptably at LOS D or better without the project and the project would cause deterioration to LOS E or F, or if adding project-generated traffic would cause a reduction in the V/C ratio that is more than the thresholds listed In Table 4.

Table 4 – Change in V/C Ratio Thresholds

LOS without project	V/C Ratio Increase Thresholds*
LOS C	> 0.04
LOS D	> 0.02
LOS E or F	> 0.01

Reference: *City of Vallejo Traffic Impact Analysis/Study Guidelines,* City of Vallejo, 2008
* An increase in excess of the thresholds shown is considered significant.

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the a.m. and p.m. peak periods. This condition does not include project-generated traffic volumes. Traffic volume data was collected while local schools were in session.

Intersection Levels of Service

Under Existing conditions, all intersections operate acceptably during the a.m. and p.m. peak hour. The existing traffic volumes are shown in Figure 2. A summary of the intersection level of service calculations is contained in Table 5, and copies of the Level of Service calculations are provided in Appendix B.

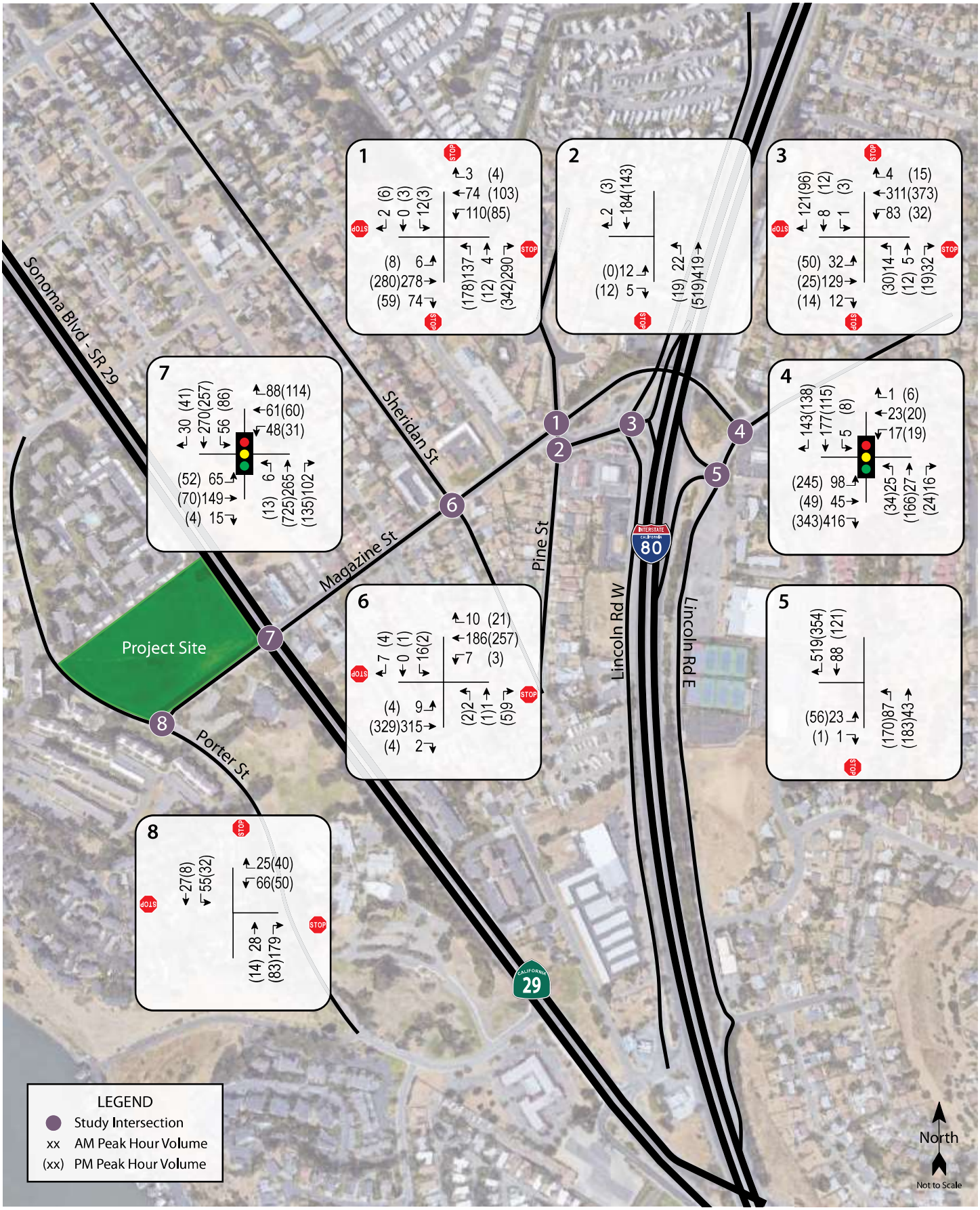

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Figure 2 – Existing Traffic Volumes

W-Trans

Table 5 – Existing Peak Hour Intersection Levels of Service							
Study Intersection		**AM Peak**			**PM Peak**		
	Approach	**Delay**	**LOS**	**V/C**	**Delay**	**LOS**	**V/C**
1.	Magazine St/Pine St	13.3	B	-	14.5	B	-
2.	Pine St/Lincoln Rd W	0.7	A	-	0.5	A	-
	Northbound (Pine St) Approach	*13.1*	*B*	-	*9.1*	*A*	-
3.	I-80 South Ramps/Lincoln Rd W	4.4	A	-	4.6	A	-
	Northbound (Lincoln Rd W) Approach	*14.8*	*B*	-	*17.0*	*C*	-
	Southbound (Lincoln Rd W) Approach	*11.3*	*B*	-	*12.2*	*B*	-
4.	Magazine St/Lincoln Rd E	39.9	D	0.68	65.8	E	0.66
5.	I-80 North Ramps/Lincoln Rd E	1.3	A	-	3.0	A	-
	Eastbound (I-80 N Off Ramp) Approach	*13.9*	*B*	-	*16.4*	*C*	-
6.	Magazine St/Sheridan St	1.0	A	-	0.4	A	-
	Northbound (Sheridan St) Approach	*11.1*	*B*	-	*11.9*	*B*	-
	Southbound (Sheridan St) Approach	*12.9*	*B*	-	*11.9*	*B*	-
7.	Magazine St/Sonoma Blvd (SR 29)	17.7	C	0.42	19.0	C	0.57
8.	Magazine St/Porter St	8.0	A	-	7.4	A	-

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; V/C = Volume to capacity ratio; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;*

Near-Term Conditions

An analysis of Near-Term operating conditions is generally required as noted within the *City of Vallejo Traffic Impact Analysis/Study Guidelines*. Typically, the Near-Term analysis period reflects conditions between two and five years after construction has been completed for an approved project. City staff was contacted and indicated that no other major development projects are expected during the next five years that would generate traffic within the study area.

As the project is not expected to be fully occupied upon opening, and the observed traffic conditions are not expected to change substantially within a five-year period, the Existing plus Project conditions are expected to adequately reflect the Near-Term plus Project conditions.

Future Conditions

Intersection turning movement volumes for the horizon year of 2040 were obtained via applying a growth factor of one percent to the observed turning movement volumes at study intersections. The application of the growth factor was used as future roadway segment volumes were not readily available for all roadways in the study area.

Under the projected Future volumes, the study intersections are expected to continue operating acceptably with the exception of the intersection of Magazine Street/Lincoln Road East, which is expected to deteriorate to unacceptable operation during both the a.m. and p.m. peak hours. Future volumes are shown in Figure 3 and operating conditions are summarized in Table 6.

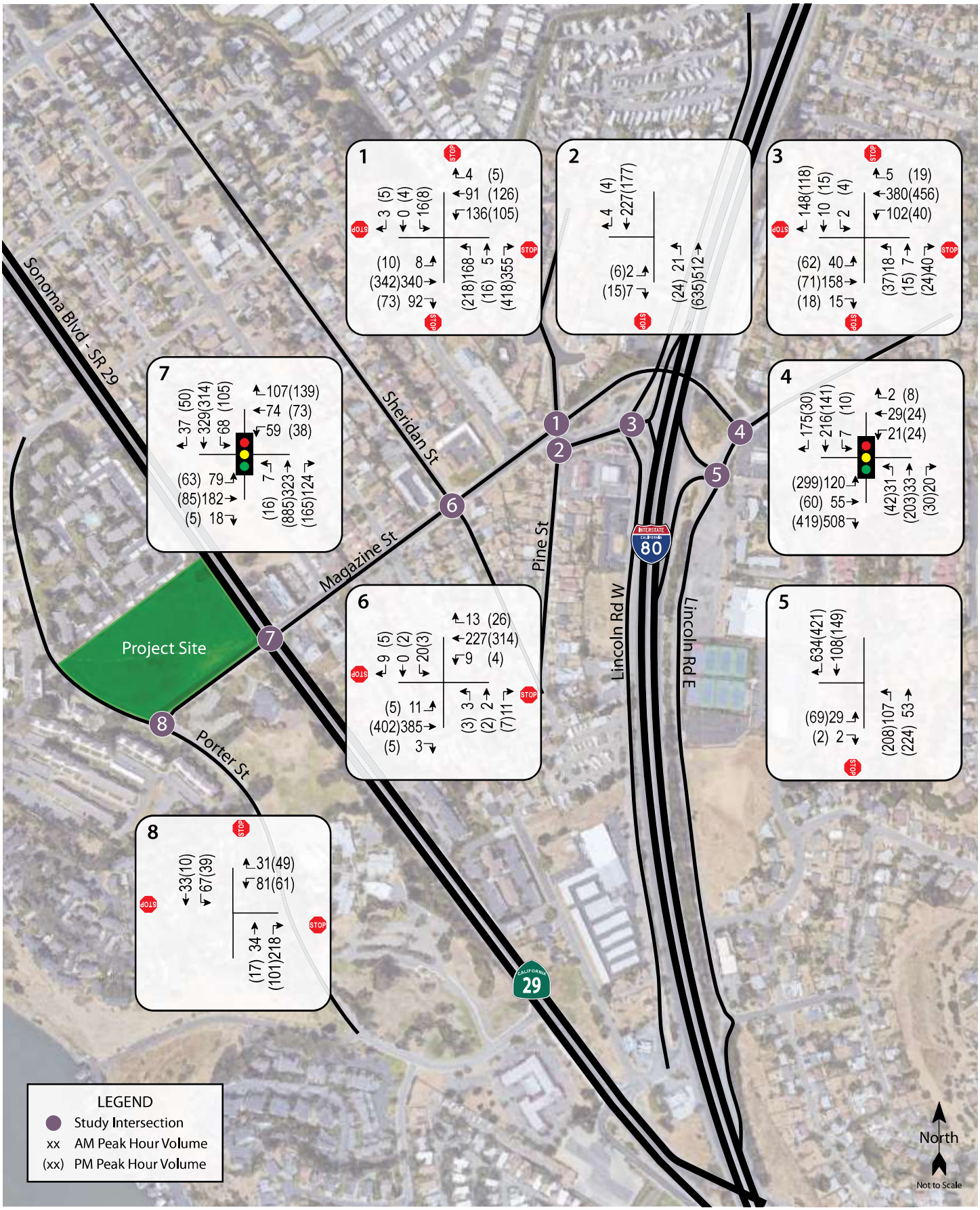

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Figure 3 – Future Traffic Volumes

W-Trans

Table 6 – Future Peak Hour Intersection Levels of Service							
Study Intersection		**AM Peak**			**PM Peak**		
	Approach	**Delay**	**LOS**	**V/C**	**Delay**	**LOS**	**V/C**
1.	Magazine St/Pine St	19.3	C	-	22.9	C	-
2.	Pine St/-Lincoln Rd W	0.5	A	-	0.7	A	-
	Northbound (Pine St) Approach	*11.0*	*B*	-	*12.1*	*B*	-
3.	I-80 South Ramps/Lincoln Rd W	*5.3*	*A*	-	*5.5*	*A*	-
	Northbound (Lincoln Rd W) Approach	20.6	C	-	26.1	D	-
	Southbound (Lincoln Rd W) Approach	12.5	B	-	13.6	B	-
4.	Magazine St/Lincoln Rd E	**94.6**	**F**	**0.84**	**139.0**	**F**	**0.77**
5.	I-80 North Ramps/Lincoln Rd E	1.5	A	-	3.7	A	-
	Eastbound (I-80 N Off Ramp) Approach	*16.1*	*C*	-	*29.0*	*D*	-
6.	Magazine St/Sheridan St	*1.2*	*A*	-	*0.5*	*A*	-
	Northbound (Sheridan St) Approach	12.4	B	-	13.6	B	-
	Southbound (Sheridan St) Approach	14.8	B	-	13.7	B	-
7.	Magazine St/Sonoma Blvd (SR 29)	22.7	C	0.71	18.3	C	0.48
8.	Magazine St/Porter St	8.5	A	-	7.7	A	-

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; V/C = Volume to Capacity ratio; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;* **Bold** text = deficient operation

Project Description

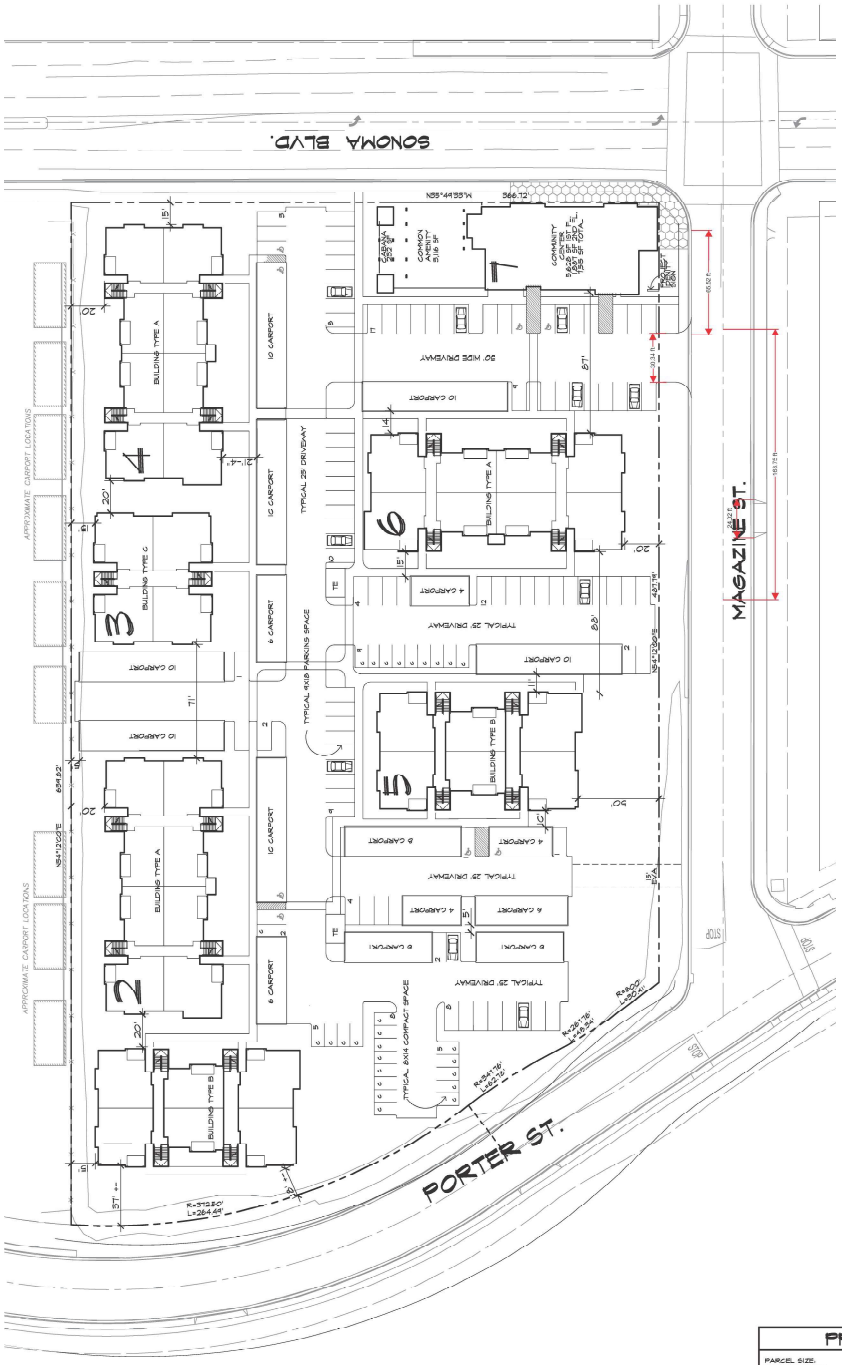
The proposed project consists of the construction of 124 multifamily residential units, including 74 two-bedroom units and 50 one-bedroom units. Additionally, the proposed project will include 248 parking spaces with a full access driveway located on Magazine Street. The proposed project site plan is shown in Figure 4.

Trip Generation

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 10th Edition, 2017 for Multifamily Housing (Land Use #221), as this description most closely matches the proposed project. Based on application of these assumptions, the proposed project is expected to generate an average of 675 trips per day, including 45 a.m. peak hour trips, and 55 trips during the p.m. peak hour. These results are summarized in Table 7.

Table 7 – Trip Generation Summary											
Land Use	**Units**	**Daily**		**AM Peak Hour**				**PM Peak Hour**			
		Rate	**Trips**	**Rate**	**Trips**	**In**	**Out**	**Rate**	**Trips**	**In**	**Out**
Multifamily Housing	124 du	5.44	675	0.36	45	12	33	0.44	55	33	22

Note: du = dwelling unit



PROJECT DATA

PARCEL SIZE:	4.95 ACRES (215,622 SQ. FT.)
PARCEL NUMBER	0081-180-210
NUMBER OF UNITS:	120 = 24.24 U/A
ONE BEDROOM UNITS:	48 = 40% 1.2 SPACES/UNIT= 72 SPACES
TWO BEDROOM UNITS:	72 = 60% 2.0 SPACES/UNIT= 144 SPACES
GUEST PARKING:	1/5 UNITS = 24 SPACES
PARKING REQUIRED/PROVIDED:	240/240

GRAPHIC SCALE

-30' 0' 15' 30' 60' 120'

BUILDING AREAS

BUILDING	FLOORS	LEVEL 1	LEVEL 2	LEVEL 3	TOTAL S.F.
BLDG 1	3	8,091 S.F.	7,541 S.F.	7,541 S.F.	23,181 S.F.
BLDG 2	3	9,468 S.F.	9,351 S.F.	9,351 S.F.	28,650 S.F.
BLDG 3	3	5,379 S.F.	5,268 S.F.	5,268 S.F.	16,111 S.F.
BLDG 4	3	9,468 S.F.	9,351 S.F.	9,351 S.F.	28,650 S.F.
BLDG 5	3	8,091 S.F.	7,541 S.F.	7,541 S.F.	23,181 S.F.
BLDG 6	3	9,468 S.F.	9,351 S.F.	9,351 S.F.	28,650 S.F.
COMMUNITY CENTER	2	5,628 S.F.	1,287 S.F.	-	7,315 S.F.
CABANA	1	526 S.F.	-	-	252 S.F.
ALL BLDGS					156,740 S.F.

LOT COVERAGE SITE TOTAL = 215,622 SQ. FT.

AREA	COVERAGE SQ. FT.	LOT PERCENTAGE
PARKING/IMPERVIOUS	75,985 S.F.	35.24%
LANDSCAPING	79,012 S.F.	36.64%
COMMON OPEN SPACE	3,116 S.F.	1.44%
BUILDING FOOTPRINTS	57,509 S.F.	26.67%
TOTAL:	215,622 S.F.	100%

Source: HDO Architects-Planners 6/19

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Figure 4 – Site Plan

Trip Distribution

The pattern used to allocate new project trips to the street network was determined by reviewing existing employment patterns for residents of the City of Vallejo as indicated by the 2010 Census together with engineering judgment. The assumptions and resulting project trips are shown in Table 8.

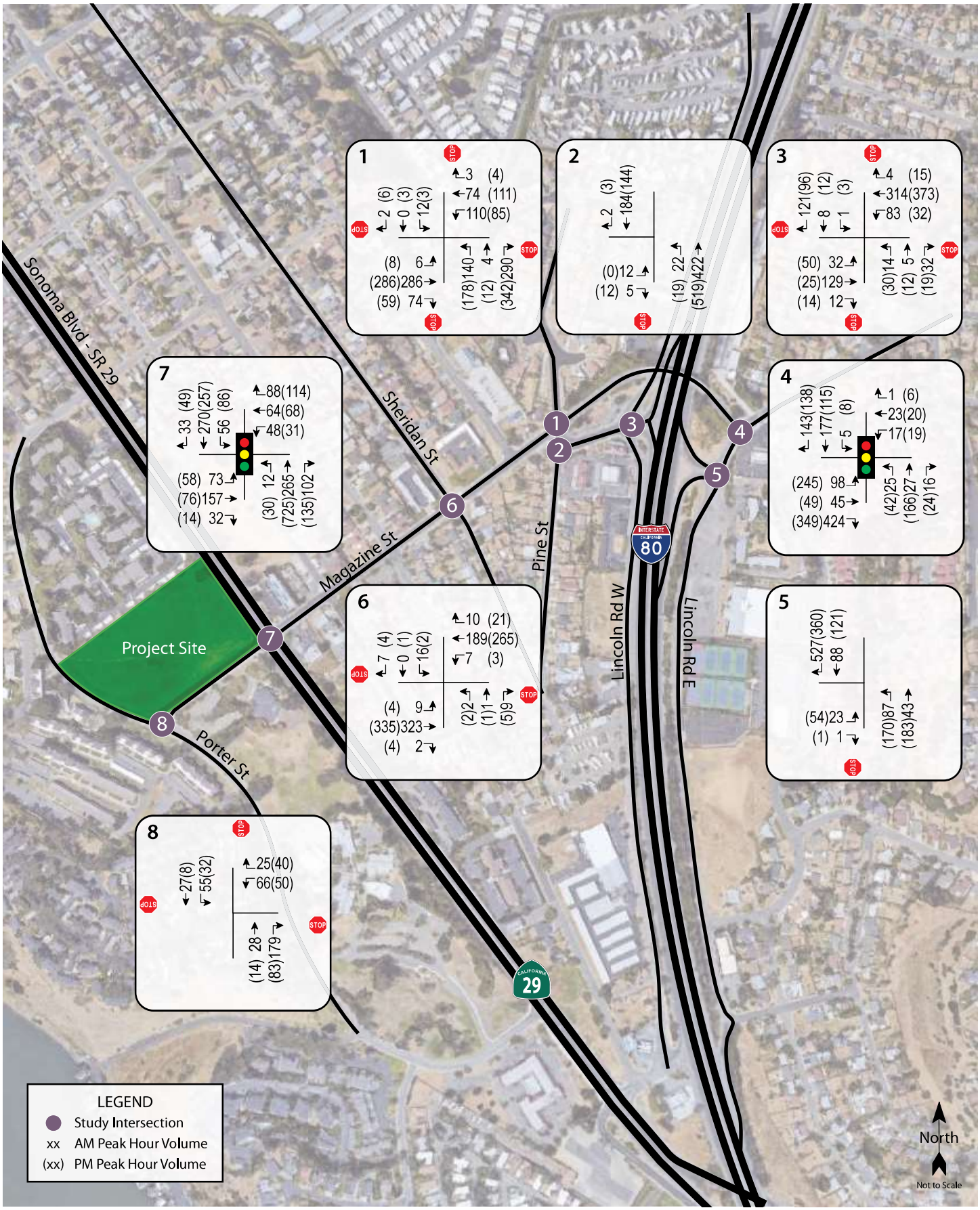
Table 8 – Trip Distribution Assumptions

Route	Percent	Daily Trips	AM Trips	PM Trips
Sonoma Boulevard north of Magazine St	25%	169	11	14
Sonoma Boulevard south of Magazine St	15%	101	7	8
Interstate 80 north of Magazine St	25%	169	11	14
Interstate 80 south of Magazine St	35%	236	16	19
TOTAL	**100%**	**675**	**45**	**55**

Intersection Operation

Existing plus Project Conditions

Upon the addition of project-related traffic to the Existing volumes the study intersections are expected to continue operating acceptably during both the a.m. and p.m. peak hour. The Existing plus Project traffic volumes are shown in Figure 5 and the results are summarized in Table 9.



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Traffic Impact Study for the Aventis-Vallejo Multifamily Community Project

Figure 5 – Existing plus Project Traffic Volumes

W-Trans

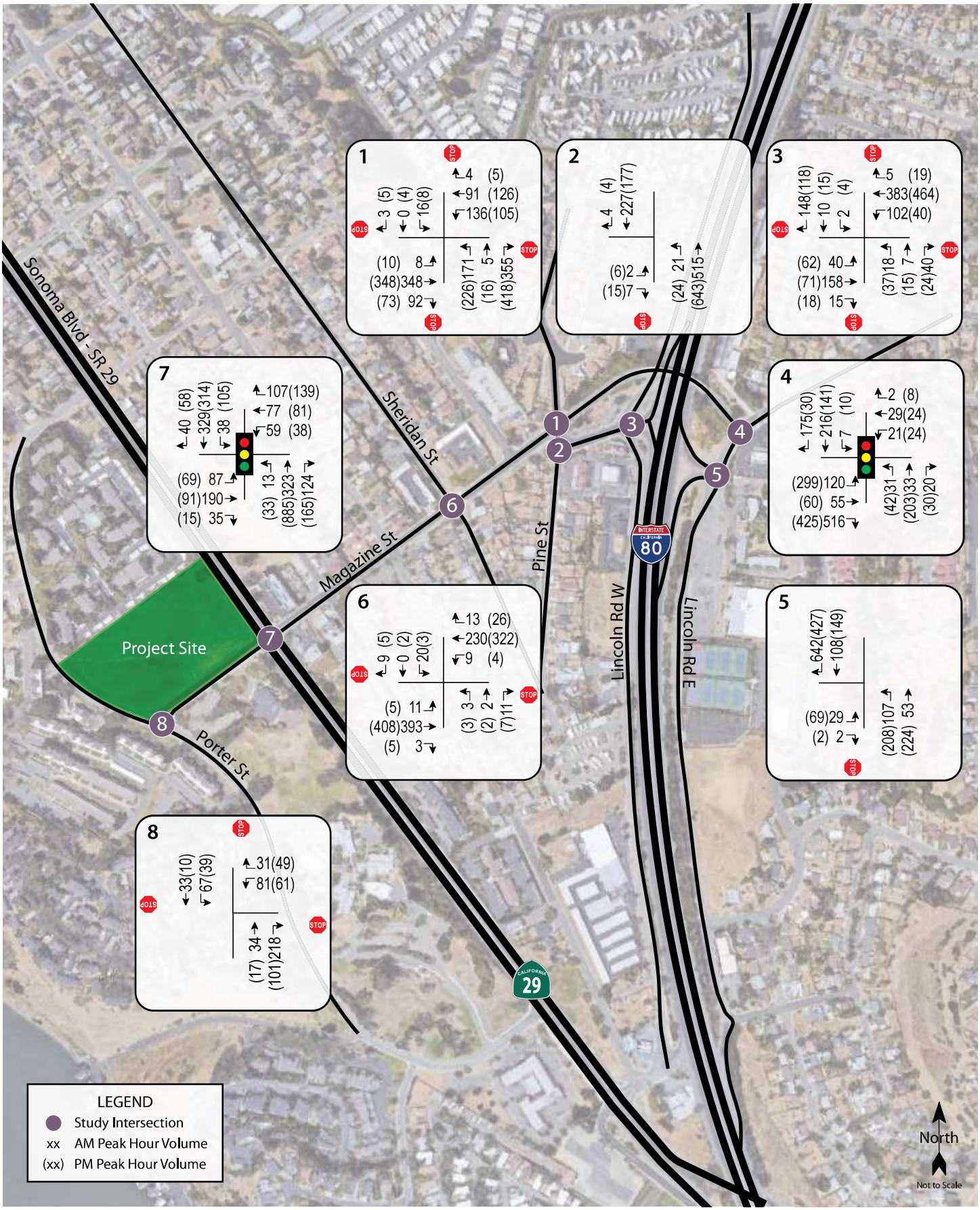
Table 9 – Existing and Existing plus Project Peak Hour Intersection Levels of Service

Study Intersection		Existing						Existing plus Project					
	Approach	AM Peak			PM Peak			AM Peak			PM Peak		
		Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C
1.	Magazine St/Pine St	13.3	B	-	14.5	B	-	13.4	B	-	14.8	B	-
2.	Pine St/Lincoln Rd W	0.7	A	-	0.5	A	-	0.7	A	-	0.5	A	-
	NB (Pine St) Approach	*13.1*	*B*	-	*9.1*	*A*	-	*13.1*	*B*	-	*9.1*	*A*	-
3.	I-80 S Ramps/Lincoln Rd W	4.4	A	-	4.6	A	-	4.4	A	-	4.6	A	-
	NB (Lincoln Rd W) Approach	*14.8*	*B*	-	*17.0*	*C*	-	*14.8*	*B*	-	*17.0*	*C*	-
	SB (Lincoln Rd W) Approach	*11.3*	*B*	-	*12.2*	*B*	-	*11.3*	*B*	-	*12.2*	*B*	-
4.	Magazine St/Lincoln Rd E	39.9	D	0.68	65.8	E	0.66	41.8	D	0.69	69.6	E	0.66
5.	I-80 N Ramps/Lincoln Rd E	1.3	A	-	3.0	A	-	1.3	A	-	3.2	A	-
	EB (I-80N Ramp) Approach	*13.9*	*B*	-	*16.4*	*C*	-	*13.9*	*B*	-	*20.8*	*C*	-
6.	Magazine St/Sheridan St	1.0	A	-	0.4	A	-	1.0	A	-	0.4	A	-
	NB (Sheridan St) Approach	*11.1*	*B*	-	*11.9*	*B*	-	*11.2*	*B*	-	*12.0*	*B*	-
	SB (Sheridan St) Approach	*12.9*	*B*	-	*11.9*	*B*	-	*13.0*	*B*	-	*12.0*	*B*	-
7.	Magazine St/Sonoma Blvd (SR 29)	17.7	B	0.42	19.0	C	0.57	19.0	B	0.45	21.1	C	0.61
8.	Magazine St/Porter St	8.0	A	-	7.4	A	-	*8.0*	*A*	-	7.4	A	-

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; V/C = Volume to Capacity ratio; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes, the study intersections are expected to operate acceptably with the exception of the intersection of Magazine Street/Lincoln Road East, which is expected to operate deficiently during both the a.m. and p.m. peak hours, without or with project traffic added. However, because the V/C with project traffic added is equal to the V/C ratio without it, the impact is considered less than significant. The Future plus Project traffic volumes are shown in Figure 6. The Future plus Project operating conditions are summarized in Table 10.



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Traffic Impact Study for the Aventis-Vallejo Multifamily Community Project

Figure 6 – Future plus Project Traffic Volumes

W-Trans

Table 10 – Future and Future plus Project Peak Hour Intersection Levels of Service

Study Intersection	Future						Future plus Project					
Approach	AM Peak			PM Peak			AM Peak			PM Peak		
	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C
1. Magazine St/Pine St	19.3	C	-	22.9	C	-	20.0	C	-	24.0	C	-
2. Pine St/Lincoln Rd W	0.5	A	-	0.7	A	-	*0.5*	*A*	-	*0.7*	*A*	-
NB (Pine St) Approach	11.0	B	-	12.1	B	-	*11.0*	*B*	-	*12.1*	*B*	-
3. I-80 S Ramps/Lincoln Rd W	*5.3*	*A*	-	*5.5*	*A*	-	*5.3*	*A*	-	*5.5*	*A*	-
NB (Lincoln Rd W) Approach	*20.6*	*C*	-	*26.1*	*D*	-	20.7	C	-	26.5	C	-
SB (Lincoln Rd W) Approach	*12.5*	*B*	-	*13.6*	*B*	-	12.6	B	-	13.7	B	-
4. Magazine St/Lincoln Rd E	**94.6**	**F**	**0.84**	**139.0**	**F**	**0.77**	**98.3**	**F**	**0.84**	**142.0**	**F**	**0.77**
5. I-80 N Ramps/Lincoln Rd E	1.5	A	-	3.7	A	-	1.4	A	-	3.7	A	-
WB (I-80 N Off Ramp) Approach	16.1	C	-	29.0	D	-	16.2	C	-	29.2	D	-
6. Magazine St/Sheridan St	*1.2*	*A*	-	*0.5*	*A*	-	1.2	A	-	0.5	A	-
NB (Sheridan St) Approach	*12.4*	*B*	-	*13.6*	*B*	-	12.5	B	-	13.7	B	-
SB (Sheridan St) Approach	*14.8*	*B*	-	*13.7*	*B*	-	15.0	C	-	13.9	B	-
7. Magazine St/Sonoma Blvd (SR 29)	18.3	C	0.48	23.7	C	0.72	19.3	B	0.53	25.9	C	0.75
8. Magazine St/Porter St	8.5	A	-	7.7	A	-	8.5	A	-	7.7	A	-

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; **Bold** text = deficient operation

Finding – While the study intersection of Magazine Street/Lincoln Road East would continue operating below acceptable Levels of Service with project traffic added, it would be at the same Levels of Service as without it. As there would be no increase in the V/C ratio, the impact is considered less than significant under the criteria provided in the *City of Vallejo Traffic Impact Analysis/Study Guidelines.*

Queuing

A queuing analysis was conducted to assess whether outbound trips from the project site would avoid eastbound queues extending back from the intersection of Magazine Street/Sonoma Boulevard, and instead turn right on westbound Magazine Street towards the intersection of Magazine Street/Porter Street to head towards I-80. The exit lane of proposed project driveway would be located approximately 100 feet west of the intersection of Magazine Street/Sonoma Boulevard. Under each Plus Project scenario during the a.m. peak hour, the projected queues at the intersection of Magazine Street/Sonoma Boulevard was determined using the 95th percentile queue. The queueing analysis for the proposed project was conducted only for the a.m. peak hour as this overlaps with nearby school a.m. peak hour traffic; the afternoon school peak period of traffic does not overlap with project-generated traffic.

During the Existing plus Project and Future plus Project scenarios, the eastbound queue would occasionally extend beyond the location of the proposed driveway during a brief period of the a.m. peak hour. Summarized in Table 11 are the predicted queue lengths for the west leg (eastbound approach) of the intersection of Sonoma Magazine Street/Sonoma Boulevard during the a.m. peak hour. Copies of the projections are contained in Appendix C.

Table 11 – 95th Percentile Queue Length at Proposed Project Driveway			
Study Intersection ***Approach***	**Available Storage**	**AM Peak Hour Queue Lengths**	
		E+P	**F+P**
Magazine Street *Eastbound*	100	**178**	**242**

Notes: all distances are measured in feet; E+P = existing plus project conditions; F+P = future plus project conditions; **Bold** text = queue length exceeds available storage

To reduce the queue eastbound length, adding "KEEP CLEAR" pavement markings on Magazine Street at the project driveway is recommended. This would create a gap in the queue such that outbound trips from the project site would be able to more easily exit the project driveway. The addition of the pavement markings would encourage and more easily facilitate left turns when exiting the project site.

Additionally, classes at nearby Patterson Elementary School, which includes an enrollment of approximately 450 students, begin at 8:30 a.m. Parents and guardians typically enter the drop-off loop on Adams Street via Sandy Beach Road and exit the loop onto Porter Street. Outbound trips originating from nearby residential projects typically avoid school-related congestion during the a.m. peak hour drop-off period, particularly during the peak 10 or 15 minutes before the morning school bell. Motorists in areas near schools adjust their commute habits to avoid congestion brought about by school related traffic.

Further, the 95th percentile output provided by Synchro gives a snapshot of the worst congestion during the peak hour. It should be noted that the estimated queue length should not be interpreted as the queue length that would occur after each traffic signal cycle. As such, motorist may experience queues lengths significantly less than what is reported via Synchro.

Finding – The a.m. peak hour eastbound queues are expected to occasionally extend beyond the project driveway from the intersection of Magazine Street/Sonoma Boulevard. The queue length would be bifurcated by including prohibitive pavement markings (e.g., "KEEP CLEAR"). Further, motorists making outbound trips are expected to alter travel habits to avoid congestion during the elementary school drop-off period, and travel when there is less school traffic in the area.

Alternative Modes

Pedestrian Facilities

Given the proximity of commercial businesses surrounding the site, it is reasonable to assume that some project patrons and employees would want to walk or bicycle for trips from and to the proposed residential units.

Project Site – Sidewalks do not exist along the south and west project frontages. A sidewalk exists along the east frontage along Sonoma Boulevard between Magazine Street and Cherry Street. A continuous sidewalk is proposed along the western and southern project frontage connecting to the existing sidewalk along the eastern project frontage.

Finding – Pedestrian facilities currently serving the project site and those proposed as part of the project are adequate.

Bicycle Facilities

Existing bicycle facilities, including bike lanes on Sonoma Boulevard, together with shared use of minor streets, would provide adequate access for bicyclists.

Finding – Bicycle facilities serving the project site are adequate with respect to on-street facilities which provide access to and from the project site.

Transit

Existing transit routes would adequately accommodate project-generated transit trips. Existing stops are within an acceptable walking distance of the site.

Finding – Transit facilities serving the project site are adequate.

Access and Circulation

Site Access

Access to the project site would be provided by a new full access driveway on Magazine Street that would be located approximately 80 feet west of the intersection at Sonoma Boulevard. The driveway as proposed would be 30 feet wide, with the exit approach stop-controlled. Driveways of this width would be expected to provide ample space to allow two-way access and would also be sufficient for an emergency response vehicle to enter and exit the project site safely.

Sight Distance

Sight distance along Magazine Street at the proposed project driveway was evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance for driveway approaches is based on stopping sight distance and uses the approach travel speed as the basis for determining the recommended sight distance.

The stopping sight distance was field measured and the criterion for private street intersections applied to the driveway locations for evaluation purposes. During the site visit a speed survey was conducted and resulted in an 85th percentile speed of 27 mph. As such, for the purposes of the sight distance review, a design speed of 30 mph, which has a recommended minimum stopping sight distance of 200 feet, was applied.

At the proposed driveway, sight distance to the east is approximately 300 feet. To the west, sight distance is approximately 430 feet. Sight distance to both the east and west is more than the recommended 200 feet.

Finding – Based on field observations and the most recent site plan, sight distances along Magazine Street at the project driveway location are adequate for a design speed of 30 mph.

Access Analysis

Left-Turn Lane Warrants

The need for a left-turn lane at the project driveway on Magazine Street was evaluated based on criteria contained in the *Intersection Channelization Design Guide*, National Cooperative Highway Research Program (NCHRP) Report No. 279, Transportation Research Board, 1985, as well as an update of the methodology developed by the Washington State Department of Transportation and published in the *Method For Prioritizing Intersection Improvements*, January 1997. The NCHRP report references a methodology developed by M. D. Harmelink that includes equations that can be applied to expected or actual traffic volumes in order to determine the need for a left-turn pocket based on safety issues.

It was noted above that Magazine Street includes two travel lanes, including one in each direction accompanied by parking on both sides of the street. For the purposes of this study, project-generated trips were assumed to be routed through the proposed driveway. As such, all inbound and outbound trips are assumed to access the property via the proposed driveway. Although the majority of inbound project trips are anticipated to access the project site by making a westbound right-turn at the project driveway, a sensitivity analysis was conducted to determine if the majority of inbound project trips could be made into the project driveway via an eastbound right-turn without the presence of a dedicated turn-pocket. Further, only the Existing plus Project and the Future plus Project scenarios were analyzed.

Under Existing plus Project and Future plus Project volumes, a left-turn lane is not warranted on Magazine Street at the proposed project driveway during either the a.m. or the p.m. peak hours. It is noted that a turn lane is not

warranted even when 100 percent of inbound trips enter the site by making an eastbound right-turn into the project driveway.

Further, although roadway volumes do not warrant a left-turn lane at the project driveway, it is noted that eastbound traveling motorists would be able to proceed straight, around a vehicle waiting to turn left into the site, using the full 20-foot width of the westbound travel-way without compromising safety or inducing significant delay. To fully utilized the full width of the travel-way, parking along the south side of Magazine Street would need to be prohibited. A red curb would need to be marked for a distance of approximately 40 feet west of the project driveway centerline. Copies of the left-turn lane warrant worksheets are provided in Appendix D.

Finding – Left-turn lanes are not required at the western project driveway under Existing plus Project conditions or Future plus Project conditions. A red curb should be marked for 40 feet along the south side of Magazine Street west of the project driveway center line to make full use of the 20-foot single eastbound lane.

Parking

The project was analyzed to determine whether the proposed parking supply would satisfy the requirements set forth in the City's Municipal Code. The project site as proposed would provide a total of 248 standard parking spaces for the 124 apartment units.

Jurisdiction parking supply requirements are based on the City of Vallejo Municipal Code, Chapter 16.62.050; Off-Street Parking. The municipal code requires multifamily apartment buildings to provide parking at a rate of one and one-half (1.5) spaces per unit for one-bedroom units, two spaces per unit for two or more bedrooms, and one guest space for every five units. Under the City's code, 248 spaces would be required for the 124-unit project. The proposed parking supply would satisfy the requirements set forth in the Municipal Code.

The proposed parking supply, City of Vallejo requirements, and expected demand are shown in Table 12.

Table 12 – Parking Analysis Summary

Land Use	Units	Supply (spaces)	City Requirements	
			Rate	Spaces Required
Low/Mid-Rise Apartment	96 1br 144 2br	248	1.5 for 1 bdr 2.0 for 2+ bdr 0.2 for guests	75 148 25
Total		**248**		**248**

Notes: bdr = bedrooms

Finding – The proposed parking supply for the project meets the requirements listed in the in the City's Municipal Code.

Conclusions and Recommendations

Conclusions

- The proposed project is expected to generate an average of 675 trips per day, including 45 a.m. peak hour trips, and 55 trips during the p.m. peak hour.
- The study intersections operate acceptably overall during both peak hours under Existing conditions with the exception of Magazine Street/Lincoln Road East, which is operating at LOS E during the p.m. peak hour.
- Under Future conditions the study intersections are expected to operate acceptably during both peak hours, with the exception of Magazine Street/Lincoln Road East. The intersection is expected to operate at LOS F during both the a.m. and p.m. peak hours.
- Upon adding project-generated trips to Existing volumes, the study intersections are expected to continue operating acceptably during both peak periods, with the exception of the intersection at Magazine Street/Lincoln Road East which is expected to continue operating at LOS E during the p.m. peak hour.
- Although the Magazine Street/Lincoln Road East is expected to operate at LOS E during the p.m. peak hour under Existing and Existing plus Project conditions, there is no increase in V/C due to adding project-generated traffic and therefore the impact is less-than-significant under the City's guidelines.
- Although the Magazine Street/Lincoln Road East intersection is expected to operate at LOS F under Future and Future plus Project conditions during the a.m. and p.m. peak hours, the increase in V/C due to adding project-generated traffic is expected to be zero and therefore a less-than-significant impact under the City's guidelines.
- Upon the addition of project-generated traffic, the queue on the west leg of the intersection of Magazine Street/Sonoma Boulevard is expected to occasionally extend beyond the project driveway during the a.m. peak period under the Existing plus Project and Future plus Project scenarios.
- The implementation of KEEP CLEAR pavement markings would bifurcate the queue length and also encourage motorists to make left turns out of the project driveway rather than turn right towards Porter Street.
- Sight distance to and from the proposed project driveway is adequate based on the most recent site plan and the surveyed 85th percentile vehicle speeds along Magazine street.
- The proposed driveway which would provide access to and from the project site is expected to adequately serve normal traffic as well as emergency response vehicles.

Recommendations

- KEEP CLEAR pavement markings should be applied to the eastbound travel way of Magazine Street adjacent to the proposed project driveway.

Study Participants and References

Study Participants

Principal in Charge	Mark E. Spencer, TE
Assistant Planner	Andre Huff
Graphics	Katia Wolfe
Editing/Formatting	Hannah Yung-Boxdell, Katia Wolfe
Quality Control	Dalene J. Whitlock, PE, PTOE

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VAL026-10

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Appendix A

Collision Rate Calculations

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Intersection Collision Rate Calculations

Aventis Multi Family Development

Intersection # 1: Magazine Street & Pine Street

Date of Count: Wednesday, November 13, 2019

Number of Collisions: 4
Number of Injuries: 1
Number of Fatalities: 0
ADT: 11200
Start Date: March 30, 2014
End Date: March 31, 2019
Number of Years: 5

Intersection Type: Four-Legged
Control Type: 4 Way Stop
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times 365 \text{ Days per Year} \times \text{Number of Years}}$$

$$\text{collision rate} = \frac{4 \times 1{,}000{,}000}{11{,}200 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.20 c/mve**	**0.0%**	**25.0%**
Statewide Average*	**0.19 c/mve**	**0.4%**	**29.2%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 2: Lincoln Road West & Pine Street

Date of Count: Wednesday, November 13, 2019

Number of Collisions: 1
Number of Injuries: 0
Number of Fatalities: 0
ADT: 7000
Start Date: March 30, 2014
End Date: March 31, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: Stop & Yield Controls
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times 365 \text{ Days per Year} \times \text{Number of Years}}$$

$$\text{collision rate} = \frac{1 \times 1{,}000{,}000}{7{,}000 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.08 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.08 c/mve**	**1.0%**	**45.1%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

Aventis Multi Family Development

Intersection # 3: Interstate 80 Frontage Road & Lincoln Road West

Date of Count: Wednesday, November 13, 2019

Number of Collisions: 3
Number of Injuries: 0
Number of Fatalities: 0
ADT: 7100
Start Date: March 30, 2014
End Date: March 31, 2019
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{3 \times 1{,}000{,}000}{7{,}100 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.23 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.13 c/mve**	**1.1%**	**43.8%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 4: Magazine Street & Lincoln Rd East

Date of Count: Wednesday, November 13, 2019

Number of Collisions: 1
Number of Injuries: 0
Number of Fatalities: 0
ADT: 11700
Start Date: March 30, 2014
End Date: March 31, 2019
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{1 \times 1{,}000{,}000}{11{,}700 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.05 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.24 c/mve**	**0.5%**	**44.6%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

Aventis Multi Family Development

Intersection # 5: Lincoln Road E & Interstate 80 Northbound Ramps

Date of Count: Wednesday, November 13, 2019

Number of Collisions: 2
Number of Injuries: 0
Number of Fatalities: 0
ADT: 8900
Start Date: March 30, 2014
End Date: March 31, 2019
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{2 \times 1{,}000{,}000}{8{,}900 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.12 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.13 c/mve**	**1.1%**	**43.8%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 6: Magazine Street & Sheridan Street

Date of Count: Wednesday, November 13, 2019

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
ADT: 6300
Start Date: March 30, 2014
End Date: March 31, 2019
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{0 \times 1{,}000{,}000}{6{,}300 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.13 c/mve**	**1.1%**	**43.8%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

Aventis Multi Family Development

Intersection # 7: Sonoma Boulevard & Magazine Street

Date of Count: Wednesday, November 13, 2019

Number of Collisions: 10
Number of Injuries: 6
Number of Fatalities: 0
ADT: 15900
Start Date: March 30, 2014
End Date: March 31, 2019
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{10 \times 1{,}000{,}000}{15{,}900 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.34 c/mve**	**0.0%**	**60.0%**
Statewide Average*	**0.24 c/mve**	**0.5%**	**44.6%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 8: Porter Street & Magazine Street

Date of Count: Wednesday, November 13, 2019

Number of Collisions: 1
Number of Injuries: 0
Number of Fatalities: 0
ADT: 2300
Start Date: March 30, 2014
End Date: March 31, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: 4 Way Stop
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{1 \times 1{,}000{,}000}{2{,}300 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.24 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.04 c/mve**	**1.1%**	**16.7%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Appendix B

Intersection Level of Service Calculations

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	278	74	110	74	3	137	4	290	12	0	2
Future Volume (vph)	6	278	74	110	74	3	137	4	290	12	0	2
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
Hourly flow rate (vph)	7	302	80	120	80	3	149	4	315	13	0	2

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	389	203	149	319	15
Volume Left (vph)	7	120	149	0	13
Volume Right (vph)	80	3	0	315	2
Hadj (s)	-0.09	0.14	0.53	-0.66	0.13
Departure Headway (s)	5.4	5.9	6.7	5.5	6.7
Degree Utilization, x	0.59	0.33	0.28	0.49	0.03
Capacity (veh/h)	635	568	512	622	445
Control Delay (s)	15.8	11.9	11.1	12.5	9.9
Approach Delay (s)	15.8	11.9	12.0		9.9
Approach LOS	C	B	B		A

Intersection Summary				
Delay		13.3		
Level of Service		B		
Intersection Capacity Utilization	57.8%	ICU Level of Service	B	
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	5	22	419	184	2
Future Volume (Veh/h)	12	5	22	419	184	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	5	24	455	200	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	704	201	202			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	704	201	202			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	98			
cM capacity (veh/h)	396	840	1370			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	18	479	202
Volume Left	13	24	0
Volume Right	5	0	2
cSH	464	1370	1700
Volume to Capacity	0.04	0.02	0.12
Queue Length 95th (ft)	3	1	0
Control Delay (s)	13.1	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	13.1	0.6	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		0.7		
Intersection Capacity Utilization	46.4%	ICU Level of Service		A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	129	12	83	311	4	14	5	32	1	8	121
Future Volume (Veh/h)	32	129	12	83	311	4	14	5	32	1	8	121
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	35	140	13	90	338	4	15	5	35	1	9	132
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	342			153			873	738	146	774	743	340
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	342			153			873	738	146	774	743	340
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			94			93	98	96	100	97	81
cM capacity (veh/h)	1217			1428			200	314	901	279	312	702

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	188	432	55	54	88
Volume Left	35	90	15	1	0
Volume Right	13	4	35	44	88
cSH	1217	1428	424	568	702
Volume to Capacity	0.03	0.06	0.13	0.10	0.13
Queue Length 95th (ft)	2	5	11	8	11
Control Delay (s)	1.7	2.1	14.8	12.0	10.9
Lane LOS	A	A	B	B	B
Approach Delay (s)	1.7	2.1	14.8	11.3	
Approach LOS			B	B	

Intersection Summary				
Average Delay	4.4			
Intersection Capacity Utilization	45.9%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	45	416	17	23	1	25	27	16	5	177	143
Future Volume (vph)	98	45	416	17	23	1	25	27	16	5	177	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.90			1.00		1.00	0.94		1.00	0.93	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1661			1820		1770	1759		1770	1738	
Flt Permitted		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1661			1820		1770	1759		1770	1738	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	49	452	18	25	1	27	29	17	5	192	155
RTOR Reduction (vph)	0	90	0	0	1	0	0	10	0	0	24	0
Lane Group Flow (vph)	0	518	0	0	43	0	27	36	0	5	323	0
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		24.6			4.5		2.7	29.0		1.1	27.4	
Effective Green, g (s)		24.6			4.5		2.7	29.0		1.1	27.4	
Actuated g/C Ratio		0.33			0.06		0.04	0.39		0.01	0.36	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		5.0			3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		543			108		63	678		25	633	
v/s Ratio Prot		c0.31			c0.02		c0.02	0.02		0.00	c0.19	
v/s Ratio Perm												
v/c Ratio		0.95			0.40		0.43	0.05		0.20	0.51	
Uniform Delay, d1		24.7			34.0		35.5	14.5		36.6	18.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		27.8			2.4		4.6	0.1		3.9	2.9	
Delay (s)		52.5			36.5		40.1	14.6		40.5	21.6	
Level of Service		D			D		D	B		D	C	
Approach Delay (s)		52.5			36.5			24.1			21.8	
Approach LOS		D			D			C			C	

Intersection Summary					
HCM 2000 Control Delay	39.9	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.68				
Actuated Cycle Length (s)	75.2	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	63.1%	ICU Level of Service		B	
Analysis Period (min)	15				

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	1	87	43	88	519
Future Volume (Veh/h)	23	1	87	43	88	519
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	1	95	47	96	564
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					213	
pX, platoon unblocked						
vC, conflicting volume	615	378	96			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	615	378	96			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	100	94			
cM capacity (veh/h)	426	669	1498			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	26	142	660
Volume Left	25	95	0
Volume Right	1	0	564
cSH	432	1498	1700
Volume to Capacity	0.06	0.06	0.39
Queue Length 95th (ft)	5	5	0
Control Delay (s)	13.9	5.2	0.0
Lane LOS	B	A	
Approach Delay (s)	13.9	5.2	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		1.3		
Intersection Capacity Utilization	57.1%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	315	2	7	186	10	2	1	9	16	0	7
Future Volume (Veh/h)	9	315	2	7	186	10	2	1	9	16	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	10	342	2	8	202	11	2	1	10	17	0	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		889										
pX, platoon unblocked												
vC, conflicting volume	213			344			594	592	343	597	588	208
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	213			344			594	592	343	597	588	208
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	99	96	100	99
cM capacity (veh/h)	1357			1215			408	413	700	404	416	833

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	354	221	13	25
Volume Left	10	8	2	17
Volume Right	2	11	10	8
cSH	1357	1215	601	483
Volume to Capacity	0.01	0.01	0.02	0.05
Queue Length 95th (ft)	1	0	2	4
Control Delay (s)	0.3	0.3	11.1	12.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	11.1	12.9
Approach LOS			B	B

Intersection Summary				
Average Delay		1.0		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	149	15	48	61	88	6	265	102	56	270	30
Future Volume (vph)	65	149	15	48	61	88	6	265	102	56	270	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.99			0.94		1.00	0.96		1.00	0.98	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1821			1729		1770	3392		1770	3485	
Flt Permitted		0.83			0.85		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1534			1492		1770	3392		1770	3485	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	162	16	52	66	96	7	288	111	61	293	33
RTOR Reduction (vph)	0	4	0	0	46	0	0	53	0	0	10	0
Lane Group Flow (vph)	0	245	0	0	168	0	7	346	0	61	316	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		15.5			15.5		1.7	23.1		5.1	26.5	
Effective Green, g (s)		15.5			15.5		1.7	23.1		5.1	26.5	
Actuated g/C Ratio		0.25			0.25		0.03	0.37		0.08	0.43	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		385			374		48	1269		146	1496	
v/s Ratio Prot							0.00	c0.10		c0.03	c0.09	
v/s Ratio Perm		c0.16			0.11							
v/c Ratio		0.64			0.45		0.15	0.27		0.42	0.21	
Uniform Delay, d1		20.6			19.5		29.3	13.4		26.9	11.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		4.8			1.8		2.9	0.5		4.0	0.3	
Delay (s)		25.3			21.3		32.2	14.0		30.9	11.4	
Level of Service		C			C		C	B		C	B	
Approach Delay (s)		25.3			21.3			14.3			14.4	
Approach LOS		C			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.42			
Actuated Cycle Length (s)	61.7	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	51.4%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	66	25	28	179	55	27
Future Volume (vph)	66	25	28	179	55	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	72	27	30	195	60	29
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	99	225	89			
Volume Left (vph)	72	0	60			
Volume Right (vph)	27	195	0			
Hadj (s)	0.02	-0.49	0.17			
Departure Headway (s)	4.6	3.8	4.5			
Degree Utilization, x	0.13	0.23	0.11			
Capacity (veh/h)	732	928	761			
Control Delay (s)	8.2	7.9	8.1			
Approach Delay (s)	8.2	7.9	8.1			
Approach LOS	A	A	A			

Intersection Summary				
Delay	8.0			
Level of Service	A			
Intersection Capacity Utilization	32.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	280	59	85	103	4	178	12	342	3	3	6
Future Volume (vph)	8	280	59	85	103	4	178	12	342	3	3	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.96	0.96
Hourly flow rate (vph)	9	304	64	92	112	4	193	13	372	3	3	6

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	377	208	330	248	12
Volume Left (vph)	9	92	193	0	3
Volume Right (vph)	64	4	124	248	6
Hadj (s)	-0.06	0.11	0.06	-0.67	-0.22
Departure Headway (s)	5.7	6.1	6.3	5.5	6.5
Degree Utilization, x	0.59	0.35	0.58	0.38	0.02
Capacity (veh/h)	608	552	548	625	453
Control Delay (s)	16.6	12.4	16.3	10.7	9.7
Approach Delay (s)	16.6	12.4	13.9		9.7
Approach LOS	C	B	B		A

Intersection Summary				
Delay		14.5		
Level of Service		B		
Intersection Capacity Utilization	63.3%	ICU Level of Service	B	
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	12	19	519	144	3
Future Volume (Veh/h)	0	12	19	519	144	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	13	21	564	157	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	764	158	160			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	764	158	160			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	366	887	1419			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	13	585	160
Volume Left	0	21	0
Volume Right	13	0	3
cSH	887	1419	1700
Volume to Capacity	0.01	0.01	0.09
Queue Length 95th (ft)	1	1	0
Control Delay (s)	9.1	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.1	0.4	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization	49.5%	ICU Level of Service	A	
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	25	14	32	373	15	30	12	19	3	12	96
Future Volume (Veh/h)	50	25	14	32	373	15	30	12	19	3	12	96
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.96	0.92	0.96	0.92	0.96	0.96	0.96	0.96	0.92
Hourly flow rate (vph)	54	27	15	33	405	16	33	13	20	3	13	104
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	421			42			732	630	34	648	629	413
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	421			42			732	630	34	648	629	413
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			98			87	97	98	99	97	84
cM capacity (veh/h)	1138			1567			260	372	1039	347	372	639

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	96	454	66	16	104
Volume Left	54	33	33	3	0
Volume Right	15	16	20	0	104
cSH	1138	1567	365	367	639
Volume to Capacity	0.05	0.02	0.18	0.04	0.16
Queue Length 95th (ft)	4	2	16	3	14
Control Delay (s)	4.9	0.7	17.0	15.2	11.7
Lane LOS	A	A	C	C	B
Approach Delay (s)	4.9	0.7	17.0	12.2	
Approach LOS			C	B	

Intersection Summary				
Average Delay	4.6			
Intersection Capacity Utilization	41.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	245	49	343	19	20	6	34	166	24	8	115	138
Future Volume (vph)	245	49	343	19	20	6	34	166	24	8	115	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.93			0.98		1.00	0.98		1.00	0.92	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1695			1791		1770	1828		1770	1710	
Flt Permitted		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1695			1791		1770	1828		1770	1710	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	247	49	346	19	20	6	34	168	24	8	116	139
RTOR Reduction (vph)	0	37	0	0	6	0	0	4	0	0	36	0
Lane Group Flow (vph)	0	605	0	0	39	0	34	188	0	8	219	0
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		24.7			4.4		4.2	31.2		1.2	28.2	
Effective Green, g (s)		24.7			4.4		4.2	31.2		1.2	28.2	
Actuated g/C Ratio		0.32			0.06		0.05	0.40		0.02	0.36	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		5.0			3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		540			101		95	735		27	622	
v/s Ratio Prot		c0.36			c0.02		c0.02	c0.10		0.00	c0.13	
v/s Ratio Perm												
v/c Ratio		1.12			0.39		0.36	0.26		0.30	0.35	
Uniform Delay, d1		26.4			35.3		35.3	15.4		37.7	18.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		76.4			2.5		2.3	0.8		6.1	1.6	
Delay (s)		102.8			37.7		37.7	16.3		43.8	19.5	
Level of Service		F			D		D	B		D	B	
Approach Delay (s)		102.8			37.7			19.5			20.3	
Approach LOS		F			D			B			C	

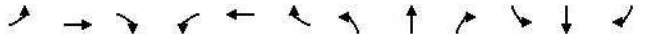
Intersection Summary					
HCM 2000 Control Delay	65.8	HCM 2000 Level of Service		E	
HCM 2000 Volume to Capacity ratio	0.66				
Actuated Cycle Length (s)	77.5	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	72.5%	ICU Level of Service		C	
Analysis Period (min)	15				

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	56	1	170	183	2	119	354
Future Volume (Veh/h)	56	1	170	183	2	119	354
Sign Control	Stop			Free		Free	
Grade	0%			0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	58	1	175	189	0	123	365
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None		None	
Median storage veh)							
Upstream signal (ft)						213	
pX, platoon unblocked					0.00		
vC, conflicting volume	844	306	123		0		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	844	306	123		0		
tC, single (s)	6.4	6.2	4.1		0.0		
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2		0.0		
p0 queue free %	80	100	88		0		
cM capacity (veh/h)	294	734	1464		0		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	59	364	488
Volume Left	58	175	0
Volume Right	1	0	365
cSH	297	1464	1700
Volume to Capacity	0.20	0.12	0.29
Queue Length 95th (ft)	18	10	0
Control Delay (s)	20.1	4.3	0.0
Lane LOS	C	A	
Approach Delay (s)	20.1	4.3	0.0
Approach LOS	C		

Intersection Summary				
Average Delay		3.0		
Intersection Capacity Utilization	60.5%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	329	4	3	257	21	2	1	5	2	1	4
Future Volume (Veh/h)	4	329	4	3	257	21	2	1	5	2	1	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	4	350	4	3	273	22	2	1	5	2	1	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		889										
pX, platoon unblocked												
vC, conflicting volume	295			354			654	661	352	656	652	284
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	295			354			654	661	352	656	652	284
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	99	99	100	99
cM capacity (veh/h)	1266			1205			375	380	692	374	385	755

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	358	298	8	7
Volume Left	4	3	2	2
Volume Right	4	22	5	4
cSH	1266	1205	527	529
Volume to Capacity	0.00	0.00	0.02	0.01
Queue Length 95th (ft)	0	0	1	1
Control Delay (s)	0.1	0.1	11.9	11.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.1	11.9	11.9
Approach LOS			B	B

Intersection Summary				
Average Delay		0.4		
Intersection Capacity Utilization	30.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	70	4	31	60	114	13	725	135	86	257	41
Future Volume (vph)	52	70	4	31	60	114	13	725	135	86	257	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		1.00			0.92		1.00	0.98		1.00	0.98	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1818			1710		1770	3456		1770	3465	
Flt Permitted		0.73			0.93		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1351			1604		1770	3456		1770	3465	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	76	4	34	65	124	14	788	147	93	279	45
RTOR Reduction (vph)	0	2	0	0	74	0	0	20	0	0	14	0
Lane Group Flow (vph)	0	135	0	0	149	0	14	915	0	93	310	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		13.3			13.3		1.7	24.7		7.6	30.6	
Effective Green, g (s)		13.3			13.3		1.7	24.7		7.6	30.6	
Actuated g/C Ratio		0.21			0.21		0.03	0.39		0.12	0.48	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		282			335		47	1342		211	1667	
v/s Ratio Prot							0.01	c0.26		c0.05	c0.09	
v/s Ratio Perm		c0.10			0.09							
v/c Ratio		0.48			0.44		0.30	0.68		0.44	0.19	
Uniform Delay, d1		22.1			21.9		30.4	16.2		26.0	9.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.7			2.0		7.3	2.8		3.1	0.2	
Delay (s)		24.8			23.9		37.7	19.0		29.1	9.6	
Level of Service		C			C		D	B		C	A	
Approach Delay (s)		24.8			23.9			19.3			14.0	
Approach LOS		C			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.57			
Actuated Cycle Length (s)	63.6	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	62.7%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	50	40	14	83	32	8
Future Volume (vph)	50	40	14	83	32	8
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	57	46	16	95	37	9

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	103	111	46
Volume Left (vph)	57	0	37
Volume Right (vph)	46	95	0
Hadj (s)	-0.12	-0.48	0.19
Departure Headway (s)	4.1	3.7	4.4
Degree Utilization, x	0.12	0.11	0.06
Capacity (veh/h)	846	938	788
Control Delay (s)	7.6	7.2	7.7
Approach Delay (s)	7.6	7.2	7.7
Approach LOS	A	A	A

Intersection Summary				
Delay	7.4			
Level of Service	A			
Intersection Capacity Utilization	20.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	340	92	136	91	4	168	5	355	16	0	3
Future Volume (vph)	8	340	92	136	91	4	168	5	355	16	0	3
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
Hourly flow rate (vph)	9	370	100	148	99	4	183	5	386	17	0	3

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	479	251	317	257	20
Volume Left (vph)	9	148	183	0	17
Volume Right (vph)	100	4	129	257	3
Hadj (s)	-0.09	0.14	0.04	-0.67	0.11
Departure Headway (s)	5.9	6.5	6.8	6.0	7.6
Degree Utilization, x	0.78	0.45	0.60	0.43	0.04
Capacity (veh/h)	597	523	510	574	412
Control Delay (s)	26.7	14.8	18.0	12.4	10.9
Approach Delay (s)	26.7	14.8	15.5		10.9
Approach LOS	D	B	C		B

Intersection Summary				
Delay		19.3		
Level of Service		C		
Intersection Capacity Utilization	62.9%	ICU Level of Service		B
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	7	21	512	227	4
Future Volume (Veh/h)	2	7	21	512	227	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	8	23	557	247	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	852	249	251			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	852	249	251			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	98			
cM capacity (veh/h)	324	790	1314			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	10	580	251
Volume Left	2	23	0
Volume Right	8	0	4
cSH	614	1314	1700
Volume to Capacity	0.02	0.02	0.15
Queue Length 95th (ft)	1	1	0
Control Delay (s)	11.0	0.5	0.0
Lane LOS	B	A	
Approach Delay (s)	11.0	0.5	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization	53.6%	ICU Level of Service		A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	158	15	102	380	5	18	7	40	2	10	148
Future Volume (Veh/h)	40	158	15	102	380	5	18	7	40	2	10	148
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	43	172	16	111	413	5	20	8	43	2	11	161
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	418			188			1070	906	180	950	912	416
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	418			188			1070	906	180	950	912	416
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			92			85	97	95	99	95	75
cM capacity (veh/h)	1141			1386			131	244	863	203	243	637

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	231	529	71	67	107
Volume Left	43	111	20	2	0
Volume Right	16	5	43	54	107
cSH	1141	1386	302	478	637
Volume to Capacity	0.04	0.08	0.24	0.14	0.17
Queue Length 95th (ft)	3	7	22	12	15
Control Delay (s)	1.8	2.3	20.6	13.7	11.8
Lane LOS	A	A	C	B	B
Approach Delay (s)	1.8	2.3	20.6	12.5	
Approach LOS			C	B	

Intersection Summary				
Average Delay	5.3			
Intersection Capacity Utilization	53.3%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	55	508	21	29	2	31	33	20	7	216	175
Future Volume (vph)	120	55	508	21	29	2	31	33	20	7	216	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.90			1.00		1.00	0.94		1.00	0.93	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1661			1817		1770	1757		1770	1738	
Flt Permitted		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1661			1817		1770	1757		1770	1738	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	60	552	23	32	2	34	36	22	8	235	190
RTOR Reduction (vph)	0	91	0	0	2	0	0	13	0	0	24	0
Lane Group Flow (vph)	0	651	0	0	55	0	34	45	0	8	401	0
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		24.8			4.8		4.2	31.3		1.2	28.3	
Effective Green, g (s)		24.8			4.8		4.2	31.3		1.2	28.3	
Actuated g/C Ratio		0.32			0.06		0.05	0.40		0.02	0.36	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		5.0			3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		527			111		95	704		27	629	
v/s Ratio Prot		c0.39			c0.03		c0.02	c0.03		0.00	c0.23	
v/s Ratio Perm												
v/c Ratio		1.23			0.50		0.36	0.06		0.30	0.64	
Uniform Delay, d1		26.6			35.5		35.6	14.4		38.0	20.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		121.2			3.5		2.3	0.2		6.1	4.9	
Delay (s)		147.8			38.9		38.0	14.6		44.1	25.5	
Level of Service		F			D		D	B		D	C	
Approach Delay (s)		147.8			38.9			23.2			25.9	
Approach LOS		F			D			C			C	

Intersection Summary				
HCM 2000 Control Delay	94.6	HCM 2000 Level of Service		F
HCM 2000 Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	78.1	Sum of lost time (s)		16.0
Intersection Capacity Utilization	76.3%	ICU Level of Service		D
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	29	2	107	53	108	634
Future Volume (Veh/h)	29	2	107	53	108	634
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	2	116	58	117	689
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					213	
pX, platoon unblocked						
vC, conflicting volume	752	462	117			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	752	462	117			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	100	92			
cM capacity (veh/h)	348	600	1471			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	34	174	806
Volume Left	32	116	0
Volume Right	2	0	689
cSH	357	1471	1700
Volume to Capacity	0.10	0.08	0.47
Queue Length 95th (ft)	8	6	0
Control Delay (s)	16.1	5.3	0.0
Lane LOS	C	A	
Approach Delay (s)	16.1	5.3	0.0
Approach LOS	C		

Intersection Summary				
Average Delay		1.5		
Intersection Capacity Utilization	66.8%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	385	3	9	227	13	3	2	11	20	0	9
Future Volume (Veh/h)	11	385	3	9	227	13	3	2	11	20	0	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	12	418	3	10	247	14	3	2	12	22	0	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		889										
pX, platoon unblocked												
vC, conflicting volume	261			421			728	724	420	730	719	254
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	261			421			728	724	420	730	719	254
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	99	98	93	100	99
cM capacity (veh/h)	1303			1138			330	345	634	325	348	785

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	433	271	17	32
Volume Left	12	10	3	22
Volume Right	3	14	12	10
cSH	1303	1138	503	398
Volume to Capacity	0.01	0.01	0.03	0.08
Queue Length 95th (ft)	1	1	3	7
Control Delay (s)	0.3	0.4	12.4	14.8
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.4	12.4	14.8
Approach LOS			B	B

Intersection Summary				
Average Delay		1.2		
Intersection Capacity Utilization	36.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	182	18	59	74	107	7	323	124	38	329	37
Future Volume (vph)	63	182	18	59	74	107	7	323	124	38	329	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.99			0.94		1.00	0.96		1.00	0.98	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1823			1729		1770	3392		1770	3486	
Flt Permitted		0.83			0.81		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1531			1419		1770	3392		1770	3486	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	198	20	64	80	116	8	351	135	41	358	40
RTOR Reduction (vph)	0	4	0	0	43	0	0	51	0	0	10	0
Lane Group Flow (vph)	0	282	0	0	217	0	8	435	0	41	388	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		15.8			15.8		1.6	23.8		3.2	25.4	
Effective Green, g (s)		15.8			15.8		1.6	23.8		3.2	25.4	
Actuated g/C Ratio		0.26			0.26		0.03	0.39		0.05	0.42	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		397			368		46	1327		93	1456	
v/s Ratio Prot							0.00	c0.13		c0.02	0.11	
v/s Ratio Perm		c0.18			0.15							
v/c Ratio		0.71			0.59		0.17	0.33		0.44	0.27	
Uniform Delay, d1		20.4			19.7		29.0	12.9		27.9	11.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		7.3			3.7		3.8	0.7		6.8	0.4	
Delay (s)		27.7			23.4		32.7	13.6		34.8	12.0	
Level of Service		C			C		C	B		C	B	
Approach Delay (s)		27.7			23.4			13.9			14.2	
Approach LOS		C			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.48			
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	55.0%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	81	31	37	218	67	33
Future Volume (vph)	81	31	37	218	67	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	88	34	40	237	73	36

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	122	277	109
Volume Left (vph)	88	0	73
Volume Right (vph)	34	237	0
Hadj (s)	0.01	-0.48	0.17
Departure Headway (s)	4.7	3.9	4.6
Degree Utilization, x	0.16	0.30	0.14
Capacity (veh/h)	703	901	737
Control Delay (s)	8.6	8.5	8.4
Approach Delay (s)	8.6	8.5	8.4
Approach LOS	A	A	A

Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	37.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	342	73	105	126	5	218	16	418	8	4	5
Future Volume (vph)	10	342	73	105	126	5	218	16	418	8	4	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.96	0.96
Hourly flow rate (vph)	11	372	79	114	137	5	237	17	454	8	4	5

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	462	256	405	303	17
Volume Left (vph)	11	114	237	0	8
Volume Right (vph)	79	5	151	303	5
Hadj (s)	-0.06	0.11	0.07	-0.67	-0.05
Departure Headway (s)	6.2	6.7	6.8	6.1	7.7
Degree Utilization, x	0.79	0.48	0.77	0.51	0.04
Capacity (veh/h)	570	499	515	578	407
Control Delay (s)	28.6	15.8	27.9	14.1	11.0
Approach Delay (s)	28.6	15.8	22.0		11.0
Approach LOS	D	C	C		B

Intersection Summary				
Delay		22.9		
Level of Service		C		
Intersection Capacity Utilization	73.8%	ICU Level of Service		D
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	15	24	635	177	4
Future Volume (Veh/h)	6	15	24	635	177	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	16	26	690	192	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	936	194	196			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	936	194	196			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	98			
cM capacity (veh/h)	289	847	1377			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	23	716	196
Volume Left	7	26	0
Volume Right	16	0	4
cSH	533	1377	1700
Volume to Capacity	0.04	0.02	0.12
Queue Length 95th (ft)	3	1	0
Control Delay (s)	12.1	0.5	0.0
Lane LOS	B	A	
Approach Delay (s)	12.1	0.5	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		0.7		
Intersection Capacity Utilization	57.6%	ICU Level of Service		B
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	71	18	40	456	19	37	15	24	4	15	118
Future Volume (Veh/h)	62	71	18	40	456	19	37	15	24	4	15	118
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.96	0.92	0.96	0.92	0.96	0.96	0.96	0.96	0.92
Hourly flow rate (vph)	67	77	20	42	496	20	40	16	25	4	16	128
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	516			97			947	821	87	844	821	506
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	516			97			947	821	87	844	821	506
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			97			76	94	97	98	94	77
cM capacity (veh/h)	1050			1496			166	281	971	246	281	566

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	164	558	81	63	85
Volume Left	67	42	40	4	0
Volume Right	20	20	25	43	85
cSH	1050	1496	251	422	566
Volume to Capacity	0.06	0.03	0.32	0.15	0.15
Queue Length 95th (ft)	5	2	34	13	13
Control Delay (s)	3.9	0.8	26.1	15.0	12.5
Lane LOS	A	A	D	C	B
Approach Delay (s)	3.9	0.8	26.1	13.6	
Approach LOS			D	B	

Intersection Summary				
Average Delay	5.5			
Intersection Capacity Utilization	46.5%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	299	60	419	24	24	8	42	203	30	10	141	30
Future Volume (vph)	299	60	419	24	24	8	42	203	30	10	141	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.93			0.98		1.00	0.98		1.00	0.97	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1695			1788		1770	1827		1770	1814	
Flt Permitted		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1695			1788		1770	1827		1770	1814	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	302	61	423	24	24	8	42	205	30	10	142	30
RTOR Reduction (vph)	0	37	0	0	8	0	0	4	0	0	6	0
Lane Group Flow (vph)	0	749	0	0	48	0	42	231	0	10	166	0
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		24.8			4.7		4.4	31.5		1.2	28.3	
Effective Green, g (s)		24.8			4.7		4.4	31.5		1.2	28.3	
Actuated g/C Ratio		0.32			0.06		0.06	0.40		0.02	0.36	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		5.0			3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		537			107		99	735		27	656	
v/s Ratio Prot		c0.44			c0.03		c0.02	c0.13		0.01	0.09	
v/s Ratio Perm												
v/c Ratio		1.40			0.45		0.42	0.31		0.37	0.25	
Uniform Delay, d1		26.7			35.5		35.7	16.0		38.1	17.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		188.9			3.0		2.9	1.1		8.4	0.9	
Delay (s)		215.6			38.5		38.6	17.1		46.5	18.4	
Level of Service		F			D		D	B		D	B	
Approach Delay (s)		215.6			38.5			20.3			20.0	
Approach LOS		F			D			C			B	

Intersection Summary					
HCM 2000 Control Delay	139.0	HCM 2000 Level of Service		F	
HCM 2000 Volume to Capacity ratio	0.77				
Actuated Cycle Length (s)	78.2	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	78.8%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	69	2	208	224	3	146	421
Future Volume (Veh/h)	69	2	208	224	3	146	421
Sign Control	Stop			Free		Free	
Grade	0%			0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	71	2	214	231	0	151	434
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None		None	
Median storage veh)							
Upstream signal (ft)						213	
pX, platoon unblocked	0.95	0.95	0.95		0.00		
vC, conflicting volume	1027	368	151		0		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1002	308	80		0		
tC, single (s)	6.4	6.2	4.1		0.0		
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2		0.0		
p0 queue free %	67	100	85		0		
cM capacity (veh/h)	217	695	1442		0		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	73	445	585
Volume Left	71	214	0
Volume Right	2	0	434
cSH	222	1442	1700
Volume to Capacity	0.33	0.15	0.34
Queue Length 95th (ft)	34	13	0
Control Delay (s)	29.0	4.5	0.0
Lane LOS	D	A	
Approach Delay (s)	29.0	4.5	0.0
Approach LOS	D		

Intersection Summary				
Average Delay		3.7		
Intersection Capacity Utilization		71.0%	ICU Level of Service	C
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	402	5	4	314	26	3	2	7	3	2	5
Future Volume (Veh/h)	5	402	5	4	314	26	3	2	7	3	2	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	5	428	5	4	334	28	3	2	7	3	2	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		889										
pX, platoon unblocked												
vC, conflicting volume	362			433			802	810	430	804	799	348
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	362			433			802	810	430	804	799	348
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	99	99	99	99	99
cM capacity (veh/h)	1197			1127			297	311	625	294	316	695

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	438	366	12	10
Volume Left	5	4	3	3
Volume Right	5	28	7	5
cSH	1197	1127	433	422
Volume to Capacity	0.00	0.00	0.03	0.02
Queue Length 95th (ft)	0	0	2	2
Control Delay (s)	0.1	0.1	13.6	13.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.1	13.6	13.7
Approach LOS			B	B

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization		34.4%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	85	5	38	73	139	16	885	165	105	314	50
Future Volume (vph)	63	85	5	38	73	139	16	885	165	105	314	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		1.00			0.92		1.00	0.98		1.00	0.98	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1818			1710		1770	3456		1770	3467	
Flt Permitted		0.67			0.93		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1250			1604		1770	3456		1770	3467	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	92	5	41	79	151	17	962	179	114	341	54
RTOR Reduction (vph)	0	2	0	0	73	0	0	20	0	0	14	0
Lane Group Flow (vph)	0	163	0	0	198	0	17	1121	0	114	381	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		14.5			14.5		1.7	24.0		7.5	29.8	
Effective Green, g (s)		14.5			14.5		1.7	24.0		7.5	29.8	
Actuated g/C Ratio		0.23			0.23		0.03	0.38		0.12	0.47	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		283			363		47	1296		207	1614	
v/s Ratio Prot							0.01	c0.32		c0.06	c0.11	
v/s Ratio Perm		c0.13			0.12							
v/c Ratio		0.58			0.55		0.36	0.86		0.55	0.24	
Uniform Delay, d1		22.0			21.8		30.6	18.5		26.7	10.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		4.5			2.9		9.7	7.9		5.3	0.3	
Delay (s)		26.5			24.8		40.3	26.4		32.0	10.6	
Level of Service		C			C		D	C		C	B	
Approach Delay (s)		26.5			24.8			26.6			15.4	
Approach LOS		C			C			C			B	

Intersection Summary				
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	64.0	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	71.2%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	61	49	17	101	39	10
Future Volume (vph)	61	49	17	101	39	10
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	70	56	20	116	45	11
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	126	136	56			
Volume Left (vph)	70	0	45			
Volume Right (vph)	56	116	0			
Hadj (s)	-0.12	-0.48	0.19			
Departure Headway (s)	4.2	3.8	4.5			
Degree Utilization, x	0.15	0.14	0.07			
Capacity (veh/h)	824	917	770			
Control Delay (s)	7.9	7.4	7.8			
Approach Delay (s)	7.9	7.4	7.8			
Approach LOS	A	A	A			

Intersection Summary				
Delay	7.7			
Level of Service	A			
Intersection Capacity Utilization	22.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	278	74	110	74	3	137	4	290	12	0	2
Future Volume (vph)	6	286	74	110	74	3	140	4	290	12	0	2
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
Hourly flow rate (vph)	7	311	80	120	80	3	152	4	315	13	0	2

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	398	203	261	210	15
Volume Left (vph)	7	120	152	0	13
Volume Right (vph)	80	3	105	210	2
Hadj (s)	-0.08	0.14	0.04	-0.67	0.13
Departure Headway (s)	5.4	5.9	6.3	5.5	6.7
Degree Utilization, x	0.60	0.34	0.45	0.32	0.03
Capacity (veh/h)	637	568	542	618	443
Control Delay (s)	16.2	11.9	13.1	9.9	9.9
Approach Delay (s)	16.2	11.9	11.7		9.9
Approach LOS	C	B	B		A

Intersection Summary				
Delay	13.4			
Level of Service	B			
Intersection Capacity Utilization	52.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	5	22	419	184	2
Future Volume (Veh/h)	12	5	22	419	184	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	5	24	455	200	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	704	201	202			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	704	201	202			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	98			
cM capacity (veh/h)	396	840	1370			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	18	479	202
Volume Left	13	24	0
Volume Right	5	0	2
cSH	464	1370	1700
Volume to Capacity	0.04	0.02	0.12
Queue Length 95th (ft)	3	1	0
Control Delay (s)	13.1	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	13.1	0.6	0.0
Approach LOS	B		

Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	46.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	129	12	83	311	4	14	5	32	1	8	121
Future Volume (Veh/h)	32	129	12	83	314	4	14	5	32	1	8	121
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	35	140	13	90	341	4	15	5	35	1	9	132
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	345			153			876	742	146	777	746	343
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	345			153			876	742	146	777	746	343
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			94			92	98	96	100	97	81
cM capacity (veh/h)	1214			1428			199	313	901	278	311	700

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	188	435	55	54	88
Volume Left	35	90	15	1	0
Volume Right	13	4	35	44	88
cSH	1214	1428	422	566	700
Volume to Capacity	0.03	0.06	0.13	0.10	0.13
Queue Length 95th (ft)	2	5	11	8	11
Control Delay (s)	1.7	2.1	14.8	12.0	10.9
Lane LOS	A	A	B	B	B
Approach Delay (s)	1.7	2.1	14.8	11.3	
Approach LOS			B	B	

Intersection Summary				
Average Delay	4.4			
Intersection Capacity Utilization	45.9%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	45	416	17	23	1	25	27	16	5	177	143
Future Volume (vph)	98	45	424	17	23	1	25	27	16	5	177	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.90			1.00		1.00	0.94		1.00	0.93	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1660			1820		1770	1759		1770	1738	
Flt Permitted		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1660			1820		1770	1759		1770	1738	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	49	461	18	25	1	27	29	17	5	192	155
RTOR Reduction (vph)	0	92	0	0	1	0	0	10	0	0	24	0
Lane Group Flow (vph)	0	525	0	0	43	0	27	36	0	5	323	0
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		24.6			4.5		2.7	29.0		1.1	27.4	
Effective Green, g (s)		24.6			4.5		2.7	29.0		1.1	27.4	
Actuated g/C Ratio		0.33			0.06		0.04	0.39		0.01	0.36	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		5.0			3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		543			108		63	678		25	633	
v/s Ratio Prot		c0.32			c0.02		c0.02	0.02		0.00	c0.19	
v/s Ratio Perm												
v/c Ratio		0.97			0.40		0.43	0.05		0.20	0.51	
Uniform Delay, d1		24.9			34.0		35.5	14.5		36.6	18.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		30.7			2.4		4.6	0.1		3.9	2.9	
Delay (s)		55.6			36.5		40.1	14.6		40.5	21.6	
Level of Service		E			D		D	B		D	C	
Approach Delay (s)		55.6			36.5			24.1			21.8	
Approach LOS		E			D			C			C	

Intersection Summary					
HCM 2000 Control Delay	41.8	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.69				
Actuated Cycle Length (s)	75.2	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	63.1%	ICU Level of Service		B	
Analysis Period (min)	15				

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	1	87	43	88	519
Future Volume (Veh/h)	23	1	87	43	88	527
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	1	95	47	96	573
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					213	
pX, platoon unblocked						
vC, conflicting volume	620	382	96			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	620	382	96			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	100	94			
cM capacity (veh/h)	423	665	1498			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	26	142	669
Volume Left	25	95	0
Volume Right	1	0	573
cSH	429	1498	1700
Volume to Capacity	0.06	0.06	0.39
Queue Length 95th (ft)	5	5	0
Control Delay (s)	13.9	5.2	0.0
Lane LOS	B	A	
Approach Delay (s)	13.9	5.2	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		1.3		
Intersection Capacity Utilization	57.1%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	315	2	7	186	10	2	1	9	16	0	7
Future Volume (Veh/h)	9	323	2	7	189	10	2	1	9	16	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	10	351	2	8	205	11	2	1	10	17	0	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		889										
pX, platoon unblocked												
vC, conflicting volume	216			353			606	604	352	609	600	210
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	216			353			606	604	352	609	600	210
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	99	96	100	99
cM capacity (veh/h)	1354			1206			400	407	692	396	409	830

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	363	224	13	25
Volume Left	10	8	2	17
Volume Right	2	11	10	8
cSH	1354	1206	593	476
Volume to Capacity	0.01	0.01	0.02	0.05
Queue Length 95th (ft)	1	1	2	4
Control Delay (s)	0.3	0.3	11.2	13.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	11.2	13.0
Approach LOS			B	B

Intersection Summary				
Average Delay		1.0		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	149	15	48	61	88	6	265	102	56	270	30
Future Volume (vph)	73	157	32	48	64	88	12	265	102	56	270	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.98			0.94		1.00	0.96		1.00	0.98	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1807			1731		1770	3392		1770	3481	
Flt Permitted		0.83			0.84		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1519			1468		1770	3392		1770	3481	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	171	35	52	70	96	13	288	111	61	293	36
RTOR Reduction (vph)	0	7	0	0	43	0	0	51	0	0	11	0
Lane Group Flow (vph)	0	278	0	0	175	0	13	348	0	61	318	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		16.7			16.7		1.7	24.0		5.2	27.5	
Effective Green, g (s)		16.7			16.7		1.7	24.0		5.2	27.5	
Actuated g/C Ratio		0.26			0.26		0.03	0.38		0.08	0.43	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		396			383		47	1273		144	1498	
v/s Ratio Prot							0.01	c0.10		c0.03	c0.09	
v/s Ratio Perm		c0.18			0.12							
v/c Ratio		0.70			0.46		0.28	0.27		0.42	0.21	
Uniform Delay, d1		21.3			19.8		30.5	13.9		27.9	11.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		6.9			1.8		6.6	0.5		4.2	0.3	
Delay (s)		28.2			21.6		37.1	14.4		32.1	11.7	
Level of Service		C			C		D	B		C	B	
Approach Delay (s)		28.2			21.6			15.1			14.9	
Approach LOS		C			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.45			
Actuated Cycle Length (s)	63.9	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	51.4%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	66	25	28	179	55	27
Future Volume (vph)	66	25	28	179	55	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	72	27	30	195	60	29
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	99	225	89			
Volume Left (vph)	72	0	60			
Volume Right (vph)	27	195	0			
Hadj (s)	0.02	-0.49	0.17			
Departure Headway (s)	4.6	3.8	4.5			
Degree Utilization, x	0.13	0.23	0.11			
Capacity (veh/h)	732	928	761			
Control Delay (s)	8.2	7.9	8.1			
Approach Delay (s)	8.2	7.9	8.1			
Approach LOS	A	A	A			

Intersection Summary				
Delay	8.0			
Level of Service	A			
Intersection Capacity Utilization	32.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	280	59	85	103	4	178	12	342	3	3	6
Future Volume (vph)	8	286	59	85	111	4	178	12	342	3	3	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.96	0.96
Hourly flow rate (vph)	9	311	64	92	121	4	193	13	372	3	3	6

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	384	217	330	248	12
Volume Left (vph)	9	92	193	0	3
Volume Right (vph)	64	4	124	248	6
Hadj (s)	-0.06	0.11	0.06	-0.67	-0.22
Departure Headway (s)	5.7	6.2	6.3	5.6	6.6
Degree Utilization, x	0.61	0.37	0.58	0.39	0.02
Capacity (veh/h)	606	551	544	619	444
Control Delay (s)	17.1	12.7	16.5	10.9	9.8
Approach Delay (s)	17.1	12.7	14.1		9.8
Approach LOS	C	B	B		A

Intersection Summary				
Delay		14.8		
Level of Service		B		
Intersection Capacity Utilization	63.3%	ICU Level of Service	B	
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	12	19	519	144	3
Future Volume (Veh/h)	0	12	19	519	144	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	13	21	564	157	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	764	158	160			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	764	158	160			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	366	887	1419			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	13	585	160
Volume Left	0	21	0
Volume Right	13	0	3
cSH	887	1419	1700
Volume to Capacity	0.01	0.01	0.09
Queue Length 95th (ft)	1	1	0
Control Delay (s)	9.1	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.1	0.4	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization	49.5%	ICU Level of Service		A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	25	14	32	373	15	30	12	19	3	12	96
Future Volume (Veh/h)	50	25	14	32	373	15	30	12	19	3	12	96
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.96	0.92	0.96	0.92	0.96	0.96	0.96	0.96	0.92
Hourly flow rate (vph)	54	27	15	33	405	16	33	13	20	3	13	104
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	421			42			732	630	34	648	629	413
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	421			42			732	630	34	648	629	413
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			98			87	97	98	99	97	84
cM capacity (veh/h)	1138			1567			260	372	1039	347	372	639

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	96	454	66	16	104
Volume Left	54	33	33	3	0
Volume Right	15	16	20	0	104
cSH	1138	1567	365	367	639
Volume to Capacity	0.05	0.02	0.18	0.04	0.16
Queue Length 95th (ft)	4	2	16	3	14
Control Delay (s)	4.9	0.7	17.0	15.2	11.7
Lane LOS	A	A	C	C	B
Approach Delay (s)	4.9	0.7	17.0	12.2	
Approach LOS			C	B	

Intersection Summary				
Average Delay	4.6			
Intersection Capacity Utilization	41.6%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	245	49	343	19	20	6	34	166	24	8	115	138
Future Volume (vph)	245	49	349	19	20	6	42	166	24	8	115	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.93			0.98		1.00	0.98		1.00	0.92	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1694			1791		1770	1828		1770	1710	
Flt Permitted		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1694			1791		1770	1828		1770	1710	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	247	49	353	19	20	6	42	168	24	8	116	139
RTOR Reduction (vph)	0	38	0	0	6	0	0	4	0	0	36	0
Lane Group Flow (vph)	0	611	0	0	39	0	42	188	0	8	219	0
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		24.7			4.4		4.4	31.5		1.2	28.3	
Effective Green, g (s)		24.7			4.4		4.4	31.5		1.2	28.3	
Actuated g/C Ratio		0.32			0.06		0.06	0.40		0.02	0.36	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		5.0			3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		537			101		100	740		27	622	
v/s Ratio Prot		c0.36			c0.02		c0.02	c0.10		0.00	c0.13	
v/s Ratio Perm												
v/c Ratio		1.14			0.39		0.42	0.25		0.30	0.35	
Uniform Delay, d1		26.5			35.4		35.5	15.4		37.9	18.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		83.1			2.5		2.8	0.8		6.1	1.6	
Delay (s)		109.6			37.9		38.3	16.2		43.9	19.6	
Level of Service		F			D		D	B		D	B	
Approach Delay (s)		109.6			37.9			20.2			20.4	
Approach LOS		F			D			C			C	

Intersection Summary				
HCM 2000 Control Delay	69.6	HCM 2000 Level of Service		E
HCM 2000 Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	77.8	Sum of lost time (s)		16.0
Intersection Capacity Utilization	72.5%	ICU Level of Service		C
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	56	1	170	183	2	119	354
Future Volume (Veh/h)	64	1	170	183	2	119	360
Sign Control	Stop			Free		Free	
Grade	0%			0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	66	1	175	189	0	123	371
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None		None	
Median storage veh)							
Upstream signal (ft)						213	
pX, platoon unblocked					0.00		
vC, conflicting volume	848	308	123		0		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	848	308	123		0		
tC, single (s)	6.4	6.2	4.1		0.0		
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2		0.0		
p0 queue free %	77	100	88		0		
cM capacity (veh/h)	292	732	1464		0		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	67	364	494
Volume Left	66	175	0
Volume Right	1	0	371
cSH	295	1464	1700
Volume to Capacity	0.23	0.12	0.29
Queue Length 95th (ft)	21	10	0
Control Delay (s)	20.8	4.3	0.0
Lane LOS	C	A	
Approach Delay (s)	20.8	4.3	0.0
Approach LOS	C		

Intersection Summary				
Average Delay		3.2		
Intersection Capacity Utilization	60.5%	ICU Level of Service		B
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	329	4	3	257	21	2	1	5	2	1	4
Future Volume (Veh/h)	4	335	4	3	265	21	2	1	5	2	1	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	4	356	4	3	282	22	2	1	5	2	1	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		889										
pX, platoon unblocked												
vC, conflicting volume	304			360			670	676	358	670	667	293
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	304			360			670	676	358	670	667	293
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	99	99	100	99
cM capacity (veh/h)	1257			1199			367	373	686	365	377	746

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	364	307	8	7
Volume Left	4	3	2	2
Volume Right	4	22	5	4
cSH	1257	1199	519	519
Volume to Capacity	0.00	0.00	0.02	0.01
Queue Length 95th (ft)	0	0	1	1
Control Delay (s)	0.1	0.1	12.0	12.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.1	12.0	12.0
Approach LOS			B	B

Intersection Summary				
Average Delay		0.4		
Intersection Capacity Utilization	30.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	70	4	31	60	114	13	725	135	86	257	41
Future Volume (vph)	58	76	14	31	68	114	30	725	135	86	257	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.99			0.93		1.00	0.98		1.00	0.98	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1804			1716		1770	3456		1770	3454	
Flt Permitted		0.74			0.93		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1361			1614		1770	3456		1770	3454	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	63	83	15	34	74	124	33	788	147	93	279	53
RTOR Reduction (vph)	0	6	0	0	67	0	0	20	0	0	19	0
Lane Group Flow (vph)	0	155	0	0	165	0	33	915	0	93	313	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		13.9			13.9		3.6	22.9		7.5	26.8	
Effective Green, g (s)		13.9			13.9		3.6	22.9		7.5	26.8	
Actuated g/C Ratio		0.22			0.22		0.06	0.37		0.12	0.43	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		303			360		102	1270		213	1485	
v/s Ratio Prot							0.02	c0.26		c0.05	c0.09	
v/s Ratio Perm		c0.11			0.10							
v/c Ratio		0.51			0.46		0.32	0.72		0.44	0.21	
Uniform Delay, d1		21.2			20.9		28.2	16.9		25.4	11.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.9			1.9		3.8	3.5		3.0	0.3	
Delay (s)		24.1			22.9		32.0	20.5		28.4	11.4	
Level of Service		C			C		C	C		C	B	
Approach Delay (s)		24.1			22.9			20.9			15.2	
Approach LOS		C			C			C			B	

Intersection Summary				
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	62.3	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	62.7%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	50	40	14	83	32	8
Future Volume (vph)	50	40	14	83	32	8
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	57	46	16	95	37	9
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	103	111	46			
Volume Left (vph)	57	0	37			
Volume Right (vph)	46	95	0			
Hadj (s)	-0.12	-0.48	0.19			
Departure Headway (s)	4.1	3.7	4.4			
Degree Utilization, x	0.12	0.11	0.06			
Capacity (veh/h)	846	938	788			
Control Delay (s)	7.6	7.2	7.7			
Approach Delay (s)	7.6	7.2	7.7			
Approach LOS	A	A	A			

Intersection Summary				
Delay	7.4			
Level of Service	A			
Intersection Capacity Utilization	20.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	340	92	136	91	4	168	5	355	16	0	3
Future Volume (vph)	8	348	92	136	91	4	171	5	355	16	0	3
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
Hourly flow rate (vph)	9	378	100	148	99	4	186	5	386	17	0	3

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	487	251	320	257	20
Volume Left (vph)	9	148	186	0	17
Volume Right (vph)	100	4	129	257	3
Hadj (s)	-0.09	0.14	0.04	-0.67	0.11
Departure Headway (s)	5.9	6.5	6.8	6.1	7.7
Degree Utilization, x	0.80	0.46	0.60	0.43	0.04
Capacity (veh/h)	596	511	508	571	412
Control Delay (s)	28.0	14.9	18.4	12.5	11.0
Approach Delay (s)	28.0	14.9	15.8		11.0
Approach LOS	D	B	C		B

Intersection Summary				
Delay		20.0		
Level of Service		C		
Intersection Capacity Utilization	62.9%	ICU Level of Service	B	
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	7	21	512	227	4
Future Volume (Veh/h)	2	7	21	512	227	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	8	23	557	247	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	852	249	251			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	852	249	251			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	98			
cM capacity (veh/h)	324	790	1314			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	10	580	251
Volume Left	2	23	0
Volume Right	8	0	4
cSH	614	1314	1700
Volume to Capacity	0.02	0.02	0.15
Queue Length 95th (ft)	1	1	0
Control Delay (s)	11.0	0.5	0.0
Lane LOS	B	A	
Approach Delay (s)	11.0	0.5	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization	53.6%	ICU Level of Service		A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	158	15	102	380	5	18	7	40	2	10	148
Future Volume (Veh/h)	40	158	15	102	383	5	18	7	40	2	10	148
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	43	172	16	111	416	5	20	8	43	2	11	161
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	421			188			1073	909	180	954	914	418
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	421			188			1073	909	180	954	914	418
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			92			85	97	95	99	95	75
cM capacity (veh/h)	1138			1386			130	243	863	202	242	635

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	231	532	71	67	107
Volume Left	43	111	20	2	0
Volume Right	16	5	43	54	107
cSH	1138	1386	300	476	635
Volume to Capacity	0.04	0.08	0.24	0.14	0.17
Queue Length 95th (ft)	3	7	23	12	15
Control Delay (s)	1.8	2.3	20.7	13.8	11.8
Lane LOS	A	A	C	B	B
Approach Delay (s)	1.8	2.3	20.7	12.6	
Approach LOS			C	B	

Intersection Summary				
Average Delay	5.3			
Intersection Capacity Utilization	53.3%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	55	508	21	29	2	31	33	20	7	216	175
Future Volume (vph)	120	55	516	21	29	2	31	33	20	7	216	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.90			1.00		1.00	0.94		1.00	0.93	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1661			1817		1770	1757		1770	1738	
Flt Permitted		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1661			1817		1770	1757		1770	1738	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	60	561	23	32	2	34	36	22	8	235	190
RTOR Reduction (vph)	0	93	0	0	2	0	0	13	0	0	24	0
Lane Group Flow (vph)	0	658	0	0	55	0	34	45	0	8	401	0
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		24.8			4.8		4.2	31.3		1.2	28.3	
Effective Green, g (s)		24.8			4.8		4.2	31.3		1.2	28.3	
Actuated g/C Ratio		0.32			0.06		0.05	0.40		0.02	0.36	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		5.0			3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		527			111		95	704		27	629	
v/s Ratio Prot		c0.40			c0.03		c0.02	c0.03		0.00	c0.23	
v/s Ratio Perm												
v/c Ratio		1.25			0.50		0.36	0.06		0.30	0.64	
Uniform Delay, d1		26.6			35.5		35.6	14.4		38.0	20.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		127.1			3.5		2.3	0.2		6.1	4.9	
Delay (s)		153.8			38.9		38.0	14.6		44.1	25.5	
Level of Service		F			D		D	B		D	C	
Approach Delay (s)		153.8			38.9			23.2			25.9	
Approach LOS		F			D			C			C	

Intersection Summary					
HCM 2000 Control Delay	98.3	HCM 2000 Level of Service		F	
HCM 2000 Volume to Capacity ratio	0.84				
Actuated Cycle Length (s)	78.1	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	76.3%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	29	2	107	53	108	634
Future Volume (Veh/h)	29	2	107	53	108	642
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	2	116	58	117	698
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					213	
pX, platoon unblocked						
vC, conflicting volume	756	466	117			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	756	466	117			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	100	92			
cM capacity (veh/h)	346	597	1471			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	34	174	815
Volume Left	32	116	0
Volume Right	2	0	698
cSH	355	1471	1700
Volume to Capacity	0.10	0.08	0.48
Queue Length 95th (ft)	8	6	0
Control Delay (s)	16.2	5.3	0.0
Lane LOS	C	A	
Approach Delay (s)	16.2	5.3	0.0
Approach LOS	C		

Intersection Summary				
Average Delay			1.4	
Intersection Capacity Utilization			66.8%	ICU Level of Service C
Analysis Period (min)			15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	385	3	9	227	13	3	2	11	20	0	9
Future Volume (Veh/h)	11	393	3	9	230	13	3	2	11	20	0	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	12	427	3	10	250	14	3	2	12	22	0	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		889										
pX, platoon unblocked												
vC, conflicting volume	264			430			740	736	428	742	731	257
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	264			430			740	736	428	742	731	257
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	99	98	93	100	99
cM capacity (veh/h)	1300			1129			324	340	626	319	342	782

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	442	274	17	32
Volume Left	12	10	3	22
Volume Right	3	14	12	10
cSH	1300	1129	496	392
Volume to Capacity	0.01	0.01	0.03	0.08
Queue Length 95th (ft)	1	1	3	7
Control Delay (s)	0.3	0.4	12.5	15.0
Lane LOS	A	A	B	C
Approach Delay (s)	0.3	0.4	12.5	15.0
Approach LOS			B	C

Intersection Summary				
Average Delay			1.2	
Intersection Capacity Utilization			36.2%	ICU Level of Service A
Analysis Period (min)			15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	182	18	59	74	107	7	323	124	38	329	37
Future Volume (vph)	87	190	35	59	77	107	13	323	124	38	329	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.98			0.94		1.00	0.96		1.00	0.98	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1809			1731		1770	3392		1770	3482	
Flt Permitted		0.81			0.81		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1481			1428		1770	3392		1770	3482	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	207	38	64	84	116	14	351	135	41	358	43
RTOR Reduction (vph)	0	6	0	0	42	0	0	51	0	0	11	0
Lane Group Flow (vph)	0	334	0	0	222	0	14	435	0	41	390	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		18.0			18.0		1.6	21.8		3.2	23.4	
Effective Green, g (s)		18.0			18.0		1.6	21.8		3.2	23.4	
Actuated g/C Ratio		0.30			0.30		0.03	0.36		0.05	0.38	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		437			421		46	1212		92	1335	
v/s Ratio Prot							0.01	c0.13		c0.02	0.11	
v/s Ratio Perm		c0.23			0.16							
v/c Ratio		0.76			0.53		0.30	0.36		0.45	0.29	
Uniform Delay, d1		19.6			18.0		29.2	14.4		28.0	13.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		9.1			2.3		7.7	0.8		7.0	0.6	
Delay (s)		28.6			20.2		36.8	15.3		35.1	13.6	
Level of Service		C			C		D	B		D	B	
Approach Delay (s)		28.6			20.2			15.9			15.6	
Approach LOS		C			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.53			
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	57.4%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	81	31	37	218	67	33
Future Volume (vph)	81	31	37	218	67	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	88	34	40	237	73	36
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	122	277	109			
Volume Left (vph)	88	0	73			
Volume Right (vph)	34	237	0			
Hadj (s)	0.01	-0.48	0.17			
Departure Headway (s)	4.7	3.9	4.6			
Degree Utilization, x	0.16	0.30	0.14			
Capacity (veh/h)	703	901	737			
Control Delay (s)	8.6	8.5	8.4			
Approach Delay (s)	8.6	8.5	8.4			
Approach LOS	A	A	A			

Intersection Summary			
Delay	8.5		
Level of Service	A		
Intersection Capacity Utilization	37.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	342	73	105	126	5	218	16	418	8	4	5
Future Volume (vph)	10	348	73	105	126	5	226	16	418	8	4	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.96	0.96
Hourly flow rate (vph)	11	378	79	114	137	5	246	17	454	8	4	5

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	468	256	414	303	17
Volume Left (vph)	11	114	246	0	8
Volume Right (vph)	79	5	151	303	5
Hadj (s)	-0.06	0.11	0.08	-0.67	-0.05
Departure Headway (s)	6.2	6.8	6.9	6.1	7.8
Degree Utilization, x	0.81	0.48	0.79	0.51	0.04
Capacity (veh/h)	568	496	513	576	408
Control Delay (s)	29.9	16.0	30.0	14.2	11.1
Approach Delay (s)	29.9	16.0	23.3		11.1
Approach LOS	D	C	C		B

Intersection Summary				
Delay		24.0		
Level of Service		C		
Intersection Capacity Utilization	73.8%	ICU Level of Service		D
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	15	24	635	177	4
Future Volume (Veh/h)	6	15	24	635	177	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	16	26	690	192	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	936	194	196			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	936	194	196			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	98			
cM capacity (veh/h)	289	847	1377			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	23	716	196
Volume Left	7	26	0
Volume Right	16	0	4
cSH	533	1377	1700
Volume to Capacity	0.04	0.02	0.12
Queue Length 95th (ft)	3	1	0
Control Delay (s)	12.1	0.5	0.0
Lane LOS	B	A	
Approach Delay (s)	12.1	0.5	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		0.7		
Intersection Capacity Utilization	57.6%	ICU Level of Service		B
Analysis Period (min)		15		

Movement	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER	NER2
Lane Configurations												
Traffic Volume (veh/h)	40	456	19	37	15	24	4	15	118	62	71	18
Future Volume (Veh/h)	40	456	19	37	15	24	4	15	118	62	71	18
Sign Control		Free			Stop			Stop		Free		
Grade		0%			0%			0%		0%		
Peak Hour Factor	0.96	0.92	0.96	0.92	0.96	0.96	0.96	0.96	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	496	20	40	16	25	4	16	128	67	77	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None								None		
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	97			947	821	87	844	821	506	516		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	97			947	821	87	844	821	506	516		
tC, single (s)	4.1			7.1	6.5	6.2	7.1	6.5	6.2	4.1		
tC, 2 stage (s)												
tF (s)	2.2			3.5	4.0	3.3	3.5	4.0	3.3	2.2		
p0 queue free %	97			76	94	97	98	94	77	94		
cM capacity (veh/h)	1496			166	281	971	246	281	566	1050		

Direction, Lane #	WB 1	NB 1	SB 1	SB 2	NE 1
Volume Total	558	81	63	85	164
Volume Left	42	40	4	0	67
Volume Right	20	25	43	85	20
cSH	1496	251	422	566	1050
Volume to Capacity	0.03	0.32	0.15	0.15	0.06
Queue Length 95th (ft)	2	34	13	13	5
Control Delay (s)	0.8	26.1	15.0	12.5	3.9
Lane LOS	A	D	C	B	A
Approach Delay (s)	0.8	26.1	13.6		3.9
Approach LOS		D	B		

Intersection Summary				
Average Delay	5.5			
Intersection Capacity Utilization	Err%	ICU Level of Service	H	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	299	60	419	24	24	8	42	203	30	10	141	30
Future Volume (vph)	299	60	425	24	24	8	42	203	30	10	141	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.93			0.98		1.00	0.98		1.00	0.97	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1694			1788		1770	1827		1770	1814	
Flt Permitted		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1694			1788		1770	1827		1770	1814	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	302	61	429	24	24	8	42	205	30	10	142	30
RTOR Reduction (vph)	0	38	0	0	8	0	0	4	0	0	6	0
Lane Group Flow (vph)	0	754	0	0	48	0	42	231	0	10	166	0
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		24.8			4.7		4.4	31.5		1.2	28.3	
Effective Green, g (s)		24.8			4.7		4.4	31.5		1.2	28.3	
Actuated g/C Ratio		0.32			0.06		0.06	0.40		0.02	0.36	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		5.0			3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		537			107		99	735		27	656	
v/s Ratio Prot		c0.45			c0.03		c0.02	c0.13		0.01	0.09	
v/s Ratio Perm												
v/c Ratio		1.40			0.45		0.42	0.31		0.37	0.25	
Uniform Delay, d1		26.7			35.5		35.7	16.0		38.1	17.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		193.2			3.0		2.9	1.1		8.4	0.9	
Delay (s)		219.9			38.5		38.6	17.1		46.5	18.4	
Level of Service		F			D		D	B		D	B	
Approach Delay (s)		219.9			38.5			20.3			20.0	
Approach LOS		F			D			C			B	

Intersection Summary				
HCM 2000 Control Delay	142.0	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	0.77			
Actuated Cycle Length (s)	78.2	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	78.8%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	69	2	208	224	3	146	421
Future Volume (Veh/h)	69	2	208	224	3	146	427
Sign Control	Stop			Free		Free	
Grade	0%			0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	71	2	214	231	0	151	440
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None		None	
Median storage veh)							
Upstream signal (ft)						213	
pX, platoon unblocked	0.95	0.95	0.95		0.00		
vC, conflicting volume	1030	371	151		0		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1005	311	80		0		
tC, single (s)	6.4	6.2	4.1		0.0		
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2		0.0		
p0 queue free %	67	100	85		0		
cM capacity (veh/h)	216	692	1442		0		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	73	445	591
Volume Left	71	214	0
Volume Right	2	0	440
cSH	221	1442	1700
Volume to Capacity	0.33	0.15	0.35
Queue Length 95th (ft)	35	13	0
Control Delay (s)	29.2	4.5	0.0
Lane LOS	D	A	
Approach Delay (s)	29.2	4.5	0.0
Approach LOS	D		

Intersection Summary				
Average Delay		3.7		
Intersection Capacity Utilization		71.0%	ICU Level of Service	C
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	402	5	4	314	26	3	2	7	3	2	5
Future Volume (Veh/h)	5	408	5	4	322	26	3	2	7	3	2	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	5	434	5	4	343	28	3	2	7	3	2	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		889										
pX, platoon unblocked												
vC, conflicting volume	371			439			818	826	436	820	814	357
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	371			439			818	826	436	820	814	357
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	99	99	99	99	99
cM capacity (veh/h)	1188			1121			290	305	620	288	310	687

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	444	375	12	10
Volume Left	5	4	3	3
Volume Right	5	28	7	5
cSH	1188	1121	425	414
Volume to Capacity	0.00	0.00	0.03	0.02
Queue Length 95th (ft)	0	0	2	2
Control Delay (s)	0.1	0.1	13.7	13.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.1	13.7	13.9
Approach LOS			B	B

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization		34.4%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	85	5	38	73	139	16	885	165	105	314	50
Future Volume (vph)	69	91	15	38	81	139	33	885	165	105	314	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.99			0.93		1.00	0.98		1.00	0.98	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1806			1715		1770	3456		1770	3456	
Flt Permitted		0.68			0.93		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1257			1608		1770	3456		1770	3456	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	99	16	41	88	151	36	962	179	114	341	63
RTOR Reduction (vph)	0	5	0	0	67	0	0	20	0	0	19	0
Lane Group Flow (vph)	0	185	0	0	213	0	36	1121	0	114	385	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		15.3			15.3		3.6	22.9		7.5	26.8	
Effective Green, g (s)		15.3			15.3		3.6	22.9		7.5	26.8	
Actuated g/C Ratio		0.24			0.24		0.06	0.36		0.12	0.42	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		301			386		100	1242		208	1454	
v/s Ratio Prot							0.02	c0.32		c0.06	c0.11	
v/s Ratio Perm		c0.15			0.13							
v/c Ratio		0.61			0.55		0.36	0.90		0.55	0.27	
Uniform Delay, d1		21.6			21.2		28.9	19.3		26.5	12.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.3			2.9		4.6	10.7		5.1	0.4	
Delay (s)		26.8			24.1		33.5	30.1		31.6	12.5	
Level of Service		C			C		C	C		C	B	
Approach Delay (s)		26.8			24.1			30.2			16.7	
Approach LOS		C			C			C			B	

Intersection Summary				
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	63.7	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	71.2%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	61	49	17	101	39	10
Future Volume (vph)	61	49	17	101	39	10
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	70	56	20	116	45	11
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	126	136	56			
Volume Left (vph)	70	0	45			
Volume Right (vph)	56	116	0			
Hadj (s)	-0.12	-0.48	0.19			
Departure Headway (s)	4.2	3.8	4.5			
Degree Utilization, x	0.15	0.14	0.07			
Capacity (veh/h)	824	917	770			
Control Delay (s)	7.9	7.4	7.8			
Approach Delay (s)	7.9	7.4	7.8			
Approach LOS	A	A	A			

Intersection Summary				
Delay	7.7			
Level of Service	A			
Intersection Capacity Utilization	22.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Appendix C

95th Percentile Queue Projections

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Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	285	218	13	399	61	329
v/c Ratio	0.66	0.48	0.04	0.31	0.20	0.20
Control Delay	27.7	18.2	26.3	13.8	27.4	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.7	18.2	26.3	13.8	27.4	11.3
Queue Length 50th (ft)	101	54	5	52	23	30
Queue Length 95th (ft)	178	113	19	90	56	85
Internal Link Dist (ft)	66	809		630		560
Turn Bay Length (ft)			145		270	
Base Capacity (vph)	567	579	311	1305	311	1621
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	0.50	0.38	0.04	0.31	0.20	0.20

Intersection Summary

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	340	264	14	486	41	401
v/c Ratio	0.71	0.53	0.04	0.37	0.13	0.28
Control Delay	27.8	17.8	25.0	14.2	25.2	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	17.8	25.0	14.2	25.2	12.8
Queue Length 50th (ft)	77	43	3	41	10	37
Queue Length 95th (ft)	#242	140	20	116	42	106
Internal Link Dist (ft)	66	809		630		560
Turn Bay Length (ft)			145		270	
Base Capacity (vph)	605	614	325	1299	325	1452
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	0.56	0.43	0.04	0.37	0.13	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Appendix D

Left-turn Lane Warrant Worksheet

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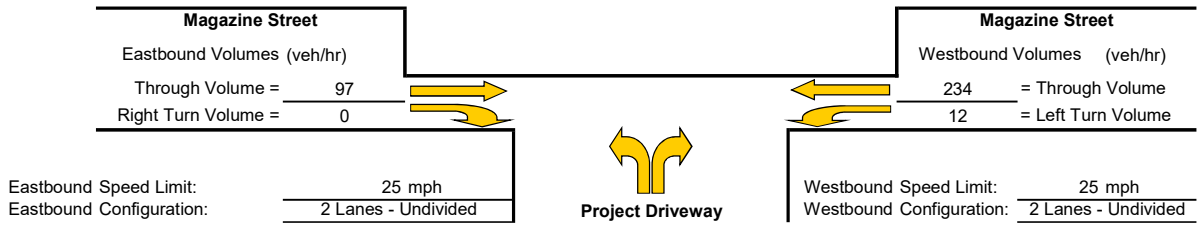
Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: Magazine Street Avenue/Project Driveway
Study Scenario: AM Existing + Project Conditions

Direction of Analysis Street: East/West

Cross Street Intersects: From the South



Eastbound Speed Limit:	25 mph	Westbound Speed Limit:	25 mph
Eastbound Configuration:	2 Lanes - Undivided	Westbound Configuration:	2 Lanes - Undivided

---

Eastbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	1050.1
Advancing Volume	Va =	97
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

Eastbound Right Turn Taper Warrants
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

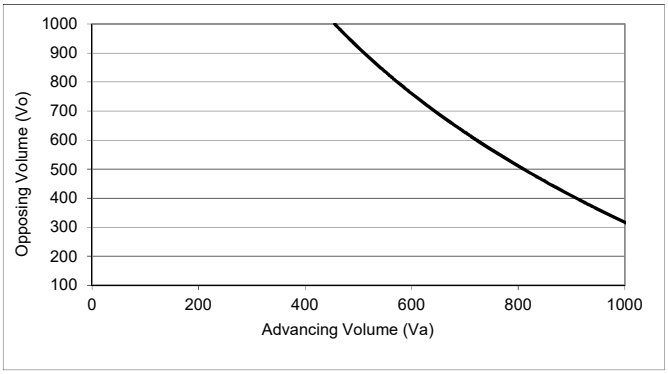
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	97
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Westbound Left Turn Lane Warrants

Percentage Left Turns	%lt	4.9 %
Advancing Volume Threshold	AV	1288 veh/hr

If AV<Va then warrant is met



◆ Study Intersection

Two lane roadway warrant threshold for: 25 mph

Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

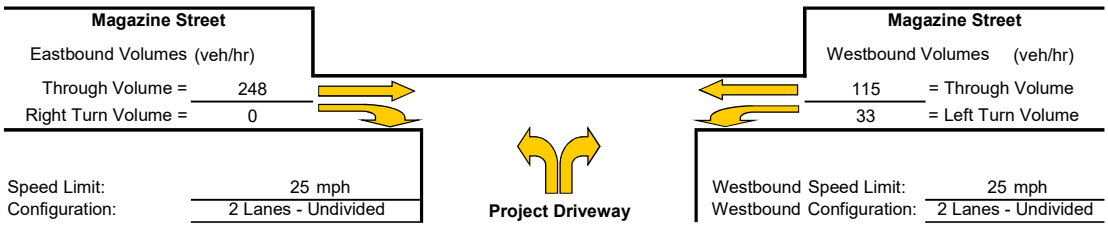
Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: Magazine Street Avenue/Project Driveway
Study Scenario: PM Existing + Project Conditions

Direction of Analysis Street: East/West

Cross Street Intersects: From the South



Eastbound Speed Limit:	25 mph	Westbound Speed Limit:	25 mph
Eastbound Configuration:	2 Lanes - Undivided	Westbound Configuration:	2 Lanes - Undivided

---

Eastbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	1050.1
Advancing Volume	Va =	248
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

Eastbound Right Turn Taper Warrants
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

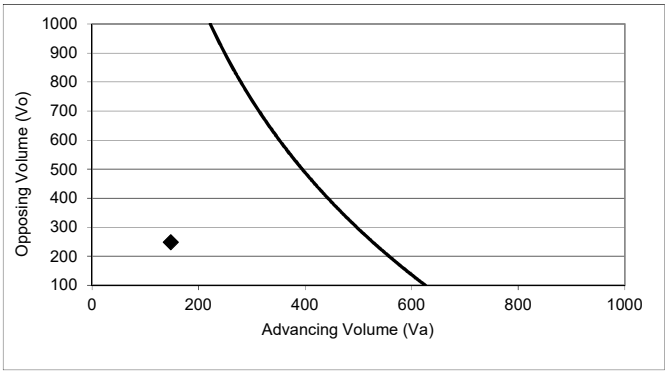
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	248
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Westbound Left Turn Lane Warrants

Percentage Left Turns	%lt	22.3 %
Advancing Volume Threshold	AV	527 veh/hr

If AV<Va then warrant is met



◆ Study Intersection

Two lane roadway warrant threshold for: 25 mph

Turn lane warranted if point falls to right of warrant threshold line

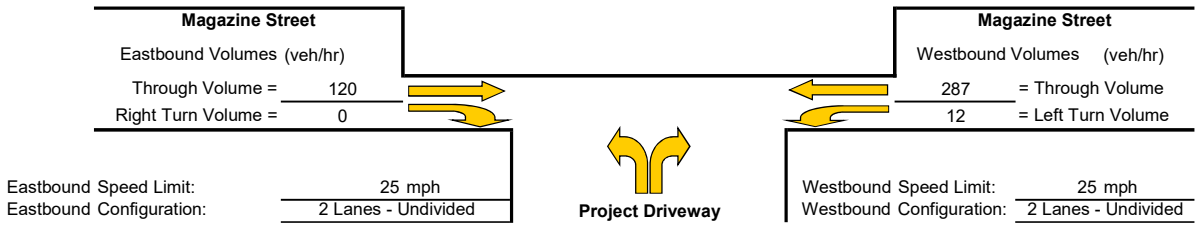
Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: Magazine Street Avenue/Project Driveway
Study Scenario: AM Cumulative + Project Conditions

Direction of Analysis Street: East/West
Cross Street Intersects: From the South



Eastbound Speed Limit: 25 mph
Eastbound Configuration: 2 Lanes - Undivided

Westbound Speed Limit: 25 mph
Westbound Configuration: 2 Lanes - Undivided

Eastbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	1050.1
Advancing Volume	Va =	120
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

Eastbound Right Turn Taper Warrants
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

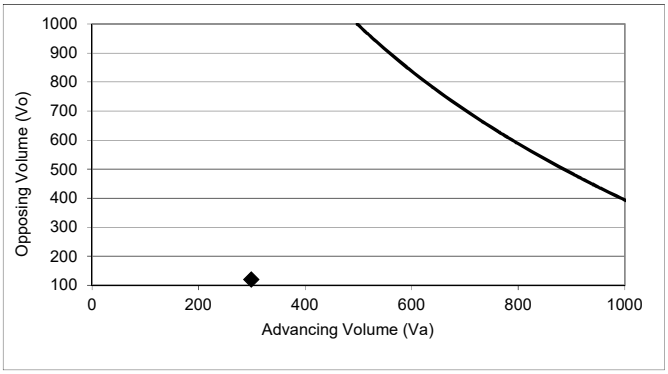
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	120
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Westbound Left Turn Lane Warrants

Percentage Left Turns	%lt	4.0 %
Advancing Volume Threshold	AV	1371 veh/hr

If AV<Va then warrant is met



◆ Study Intersection
Two lane roadway warrant threshold for: 25 mph
Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

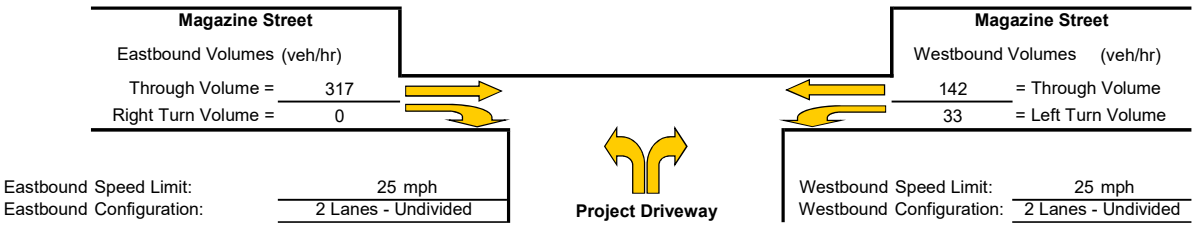
Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

Turn Lane Warrant Analysis - Tee Intersections

Study Intersection: Magazine Street Avenue/Project Driveway
Study Scenario: PM Existing + Project Conditions

Direction of Analysis Street: East/West

Cross Street Intersects: From the South



Eastbound Speed Limit:	25 mph	Westbound Speed Limit:	25 mph
Eastbound Configuration:	2 Lanes - Undivided	Westbound Configuration:	2 Lanes - Undivided

---

Eastbound Right Turn Lane Warrants

1. Check for right turn volume criteria

Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV =	1050.1
Advancing Volume	Va =	317
If AV<Va then warrant is met		No

Right Turn Lane Warranted: **NO**

Eastbound Right Turn Taper Warrants
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria

NOT WARRANTED - Less than 20 vehicles

2. Check advance volume threshold criteria for taper

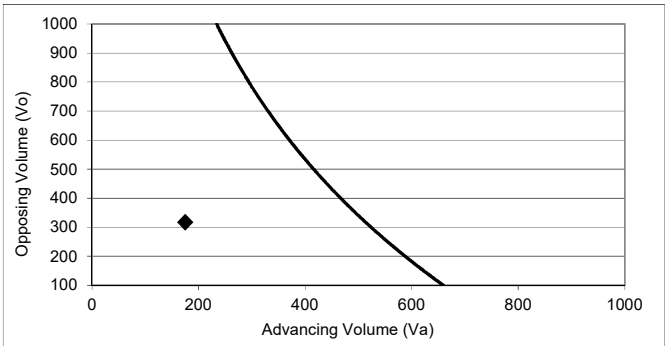
Advancing Volume Threshold	AV =	-
Advancing Volume	Va =	317
If AV<Va then warrant is met		-

Right Turn Taper Warranted: **NO**

Westbound Left Turn Lane Warrants

Percentage Left Turns	%lt	18.9 %
Advancing Volume Threshold	AV	514 veh/hr

If AV<Va then warrant is met



◆ Study Intersection

Two lane roadway warrant threshold for: 25 mph

Turn lane warranted if point falls to right of warrant threshold line

Left Turn Lane Warranted: **NO**

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997.
The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.
The left turn lane analysis is based on work conducted by M.D. Harmelink in 1967, and modified by Kikuchi and Chakroborty in 1991.

March 9, 2020

Mr. Stephen Schwartz
Aventis – Sonoma, LLC
1148 Alpine Road, Suite 100
Walnut Creek, CA 94596

Addendum to Traffic Impact Study for the Aventis-Vallejo Multifamily Community Project

Dear Mr. Schwartz;

This letter is an addendum to the February 26,2020 Traffic Impact Study for the Aventis-Vallejo Multifamily Community project. The traffic study was based on a proposal of 124 residential units; the currently proposed project is 132 residential units with a slightly different unit mix. This letter addresses the change in trip generation and parking associated with the proposed project, and whether the findings of the traffic study would change as a result of the eight additional units.

Trip Generation

The addition of eight multifamily residential units would result in an increase of 43 daily trips, including an additional three a.m. and three p.m. peak hour trips. Table 1 provides a summary of the project's trip generation.

Table 1 Trip Generation Summary

Land Use	Units	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Multifamily Housing	124 du	5.44	675	0.36	45	12	33	0.44	55	33	22
Multifamily Housing	132 du	5.44	718	0.36	48	13	35	0.44	58	35	23
Difference	8 du	5.44	43	0.36	3	1	2	0.44	3	2	1

Note: du = dwelling unit

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 10th Edition, 2017 for Multifamily Housing (Land Use #221), as this description most closely matches the proposed project. The addition of three peak hour trips would not be enough to trigger a change the analysis findings, conclusions or recommendations of the February 26, 2020 traffic study.

Parking

The project was analyzed to determine whether the proposed parking supply would satisfy the requirements set forth in the City's Municipal Code. The project site as proposed would provide a total of 248 standard parking spaces for the 132 multifamily apartment units.

Jurisdiction parking supply requirements are based on the City of Vallejo Municipal Code, Chapter 16.62.050; Off-Street Parking. The municipal code requires multifamily apartment buildings to provide parking at a rate of one (1.0) spaces per unit for studio units, one and one-half (1.5) spaces per unit for one-bedroom units, two spaces per unit for two or more bedrooms, and one guest space for every five units. Under the City's code, 248 spaces would be required for the 124-unit project, and 249 spaces for 132-unit project.

The proposed parking supply and City of Vallejo requirements are shown in Table 2.

Table 2 – Parking Analysis Summary

Land Use	Units	Supply (spaces)	City Requirements	
			Rate	Spaces Required
Low/Mid-Rise Apartment	50 1br 74 2br 124 units	248	1.5 for 1 bdr 2.0 for 2+ bdr 0.2 for guests	75 148 25
Low/Mid-Rise Apartment	6 studio 72 1br 54 2br 132 units	248	1.0 for studio 1.5 for 1 bdr 2.0 for 2+ bdr 0.2 for guests	6 108 108 27
Difference		**248**		**249**

Notes: bdr = bedrooms

The proposed parking supply of 248 spaces would be one space short of the 249 spaces required as set forth in the Municipal Code.

Summary

The increase from 124 to 132 units would result in three additional a.m. and p.m. peak hour trips, but this would not be enough to not trigger any change to the traffic analysis findings, conclusions or recommendations of the February 26, 2020 traffic study. The increase from 124 to 132 units would result in an increase in parking space requirements per the Municipal Code, from 248 to 249 spaces.

Sincerely,

Mark E. Spencer, PE
Senior Principal

MES/VAL26-10.L1

March 9, 2020

Mr. Stephen Schwartz
Aventis – Sonoma, LLC
1148 Alpine Road, Suite 100
Walnut Creek, CA 94596

Addendum to Traffic Impact Study for the Aventis-Vallejo Multifamily Community Project

Dear Mr. Schwartz;

This letter is an addendum to the February 26,2020 Traffic Impact Study for the Aventis-Vallejo Multifamily Community project. The traffic study was based on a proposal of 124 residential units; the currently proposed project is 132 residential units with a slightly different unit mix. This letter addresses the change in trip generation and parking associated with the proposed project, and whether the findings of the traffic study would change as a result of the eight additional units.

Trip Generation

The addition of eight multifamily residential units would result in an increase of 43 daily trips, including an additional three a.m. and three p.m. peak hour trips. Table 1 provides a summary of the project's trip generation.

Table 1 Trip Generation Summary

Land Use	Units	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Multifamily Housing	124 du	5.44	675	0.36	45	12	33	0.44	55	33	22
Multifamily Housing	132 du	5.44	718	0.36	48	13	35	0.44	58	35	23
Difference	8 du	5.44	43	0.36	3	1	2	0.44	3	2	1

Note: du = dwelling unit

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 10th Edition, 2017 for Multifamily Housing (Land Use #221), as this description most closely matches the proposed project. The addition of three peak hour trips would not be enough to trigger a change the analysis findings, conclusions or recommendations of the February 26, 2020 traffic study.

Parking

The project was analyzed to determine whether the proposed parking supply would satisfy the requirements set forth in the City's Municipal Code. The project site as proposed would provide a total of 248 standard parking spaces for the 132 multifamily apartment units.

Jurisdiction parking supply requirements are based on the City of Vallejo Municipal Code, Chapter 16.62.050; Off-Street Parking. The municipal code requires multifamily apartment buildings to provide parking at a rate of one (1.0) spaces per unit for studio units, one and one-half (1.5) spaces per unit for one-bedroom units, two spaces per unit for two or more bedrooms, and one guest space for every five units. Under the City's code, 248 spaces would be required for the 124-unit project, and 249 spaces for 132-unit project.

The proposed parking supply and City of Vallejo requirements are shown in Table 2.

Table 2 – Parking Analysis Summary

Land Use	Units	Supply (spaces)	City Requirements	
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Low/Mid-Rise Apartment	50 1br 74 2br 124 units	248	1.5 for 1 bdr 2.0 for 2+ bdr 0.2 for guests	75 148 25
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Difference		**248**		**249**

Notes: bdr = bedrooms

The proposed parking supply of 248 spaces would be one space short of the 249 spaces required as set forth in the Municipal Code.

Summary

The increase from 124 to 132 units would result in three additional a.m. and p.m. peak hour trips, but this would not be enough to not trigger any change to the traffic analysis findings, conclusions or recommendations of the February 26, 2020 traffic study. The increase from 124 to 132 units would result in an increase in parking space requirements per the Municipal Code, from 248 to 249 spaces.

Sincerely,

Mark E. Spencer, PE
Senior Principal

MES/VAL26-10.L1

Appendix C

Vehicle Miles Traveled Technical Memorandum

November 4, 2020

Ms. Kari Zajac
Rincon Consultants, Inc.
4825 J Street, Suite 200
Sacramento, CA 95819

VMT Analysis - Sonoma Boulevard/Magazine Street Multi-Family Development Project

Dear Ms. Zajac;

This letter summarizes the Vehicle Miles Traveled (VMT) analysis for the proposed Sonoma Boulevard/Magazine Street project, also referred to as the Aventis-Vallejo Multifamily Community Project. The analysis incorporates work prepared by W-Trans as well as travel forecast modeling runs prepared by Elite Transportation Group (ETG).

The project is currently proposed to include 132 multifamily residential units to be located on a currently undeveloped parcel at the northeast corner of Magazine Street and Sonoma Boulevard in the City of Vallejo. A Traffic Impact Study for the project was previously prepared (W-Trans, February 26, 2020) as well as an addendum (W-Trans, March 9, 2020). Based on SB743 taking effect on July 1, 2020, a VMT analysis was subsequently prepared and presented in this letter. Together, these three documents comprise the full traffic impact analysis for the proposed project.

The VMT analysis was conducted in accordance with the new City of Vallejo CEQA Transportation Impact Analysis Guidelines, and required running the Countywide travel forecast model (the Solano Napa Activity-Based Model) to compare VMT per capita results with and without the proposed project, and a comparison to the citywide average VMT per capita for residential land uses. The project was found to be at or below the citywide average under both the baseline 2015 and cumulative 2040 analysis scenario, and as such there would be no significant VMT impact associated with the proposed project.

The VMT analysis prepared by ETG is attached to this letter for reference. Please do not hesitate to contact me with any questions regarding this project.

Sincerely,

Mark Spencer, PE
Senior Principal

MES/VAL036.L1

Attachment: VMT Analysis Memo (ETG)

Technical Memorandum

Date: 11/4/2020

To: Mark Spencer, W-Trans

From: Lawrence Liao, ETG

Subject: **SB743 VMT Analysis for Sonoma Boulevard and Magazine Street Multifamily Development Project**

OVERVIEW

This technical memorandum includes the following sections:

- Project Description
- SB743 VMT Analysis
- Summary of Results

PROJECT DESCRIPTION

The proposed Aventis-Vallejo Multifamily Community project includes the development of 132 multifamily residential units to be located on a currently undeveloped parcel at the northeast corner of Magazine Street and Sonoma Boulevard in the City of Vallejo.

SB743 VMT ANALYSIS

The SB743 VMT analysis for this project was conducted in accordance with the new City of Vallejo CEQA Transportation Impact Analysis Guidelines (Guidelines).

The Solano Napa Activity-Based Model (SNABM), adopted by Technical Advisory Committee (TAC) of Solano Transportation Authority on April 24, 2019, and the California Statewide Travel Demand Model (CSTDM) were used in this analysis. The model years included in the SNABM are 2015 and 2040. The SNABM covers the entire nine-county Bay Area. The VMT of internal-internal (I-I) trips, with respect to the SNABM model area, was calculated using the SNABM. The VMT due to additional average trip length for trips beyond the SNABM model area, namely internal-external/external-internal (I-X/X-I) trips, was estimated using the CSTDM.

In addition to project land use data, the SNABM also requires new households and population generated by the project land use to be synthesized and added to the input household and population files. The additional project households and population were generated by sampling the existing multifamily household and population records of the project TAZ. As a result, 283 residents were added to the model based on the proposed 132 multifamily households.

The I-I Residential Tour VMT per resident for the project TAZ and citywide total were calculated using the SNABM for the following scenarios:

- Baseline Conditions – the 2015 SNABM was used to represent the baseline condition.
- Baseline Plus Project - The project land use and additional project-generated households and population were added to 2015 SNABM. A full model run was conducted and VMT changes were isolated for the project TAZ and across the full model network.
- Cumulative No Project– the 2040 SNABM was used to represent the cumulative no project condition.
- Cumulative Plus Project - The project land use and additional project-generated households and population were added to the 2040 SNABM. A full model run was conducted and VMT changes were isolated for the project TAZ and across the full model network.

To account for the average trip length of trips traveling to/from outside of the SNABM model area, the CSTDM was used to estimate a factor between the VMT from I-I trips only and total VMT that includes both I-I and I-X/X-I trips. The city total and project TAZ adjustment factors were calculated for both 2015 and 2040 scenarios. It was found that the average external trip length added about 6% to 9% to the I-I VMT.

SUMMARY OF RESULTS

The citywide average VMT metrics from the Guidelines are shown below, as a reference.

Table 1: City of Vallejo VMT Metrics

Land Use	City of Vallejo Baseline Year (2015)	City of Vallejo Cumulative Year (2040)[1]
Residential (Home based tour trips)	26.0 VMT/resident	26.6 VMT/resident
Office/Employment (Home based-work tour trips)	31.5 VMT/employee	32.4 VMT/employee

Source: Solano-Napa Activity Based Travel Demand Model (September 2019 version); Fehr & Peers, October 2020.

The results of the project-specific VMT analysis are summarized below:

		SNABM			CSTDM	
		TOTAL VMT	**TOTAL POP**	**I-I VMT per Capita**	**Adj Factor for External Trip Length**	**Total VMT per Capita**
City Baseline	**2015 NB**	2,823,379	117,494	24.0	1.06	25.5
	2040 NB	3,209,247	130,702	24.6	1.07	26.3
Project TAZ	**2015 NB**	30,645	1,290	23.8	1.07	25.4
	2040 NB	25,947	1,102	23.5	1.09	25.7
Project TAZ	**2015 WP**	37,316	1,596	23.4	1.07	25.0
	2040 WP	30,966	1,370	22.6	1.09	24.6

SNABM = Solano Napa Activity-Based Model; CSTDM= California Statewide Travel Demand Model

NB = No Build; WP = With Project

The 2015 and 2040 citywide VMT per capita calculated for the proposed project are consistent with those reported in the City's Guidelines.

The 2015 and 2040 total VMT per capita, with and without project, of the Project TAZ are both lower than the citywide baselines, respectively. Thus, there would be no significant VMT impacts associated with the proposed project.

Appendix D

CalEEMod Output File

Sonoma-Magazine Residential Project

Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	132.00	Dwelling Unit	4.95	132,000.00	378

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	4			**Operational Year**	2030
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	298.65	**CH4 Intensity (lb/MWhr)**	0.014	**N2O Intensity (lb/MWhr)**	0.003

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Utility Intensity per RPS 2030

Land Use - Lot acreage per site plan

Construction Phase - Arch coating begins halfway through building construction

Trips and VMT -

Grading - Assume balanced cut/fill

Vehicle Trips - Trip rate per TIS

Woodstoves - No fireplaces/woodstoves per site plan

Energy Use -

Water And Wastewater - Water use redeuced by 20 percent per 2016 Title 24 standards.

Architectural Coating - 100 g/L per BAAQMD rule

Area Coating - 100 g/l per BAAQMD rule

Mobile Land Use Mitigation - Density: 27 units per acre, 350 feet from Salono Transit Route 3, sidewalks/paths on the site and connecting to site

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	100.00
tblArchitecturalCoating	EF_Parking	150.00	100.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	100.00
tblAreaCoating	Area_EF_Nonresidential_Exterior	150	100
tblAreaCoating	Area_EF_Parking	150	100
tblAreaCoating	Area_EF_Residential_Exterior	150	100
tblConstructionPhase	NumDays	18.00	115.00
tblConstructionPhase	PhaseEndDate	10/22/2021	10/7/2022
tblConstructionPhase	PhaseStartDate	9/29/2021	5/2/2022
tblFireplaces	FireplaceDayYear	11.14	0.00
tblFireplaces	FireplaceHourDay	3.50	0.00
tblFireplaces	FireplaceWoodMass	228.80	0.00
tblFireplaces	NumberGas	19.80	0.00

tblFireplaces	NumberNoFireplace	5.28	0.00
tblFireplaces	NumberWood	22.44	0.00
tblLandUse	LotAcreage	3.47	4.95
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.014
tblProjectCharacteristics	CO2IntensityFactor	641.35	298.65
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.003
tblVehicleTrips	ST_TR	6.39	5.44
tblVehicleTrips	SU_TR	5.86	5.44
tblVehicleTrips	WD_TR	6.65	5.44
tblWater	IndoorWaterUseRate	8,600,331.38	6,880,265.10
tblWoodstoves	NumberCatalytic	2.64	0.00
tblWoodstoves	NumberNoncatalytic	2.64	0.00
tblWoodstoves	WoodstoveDayYear	14.12	0.00
tblWoodstoves	WoodstoveWoodMass	582.40	0.00

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					
2020	0.1223	1.1224	0.8805	1.6700e-003	0.0966	0.0583	0.1548	0.0451	0.0544	0.0995	0.0000	146.4037	146.4037	0.0322	0.0000	147.2090
2021	0.2061	1.7688	1.7831	3.4800e-003	0.0751	0.0898	0.1649	0.0202	0.0843	0.1045	0.0000	305.9149	305.9149	0.0564	0.0000	307.3239
2022	0.8408	0.0831	0.1268	2.5000e-004	8.6300e-003	4.7500e-003	0.0134	2.3000e-003	4.7500e-003	7.0500e-003	0.0000	21.7115	21.7115	1.1000e-003	0.0000	21.7390
Maximum	**0.8408**	**1.7688**	**1.7831**	**3.4800e-003**	**0.0966**	**0.0898**	**0.1649**	**0.0451**	**0.0843**	**0.1045**	**0.0000**	**305.9149**	**305.9149**	**0.0564**	**0.0000**	**307.3239**

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					
2020	0.1223	1.1224	0.8805	1.6700e-003	0.0966	0.0583	0.1548	0.0451	0.0544	0.0995	0.0000	146.4036	146.4036	0.0322	0.0000	147.2089
2021	0.2061	1.7688	1.7831	3.4800e-003	0.0751	0.0898	0.1649	0.0202	0.0843	0.1045	0.0000	305.9146	305.9146	0.0564	0.0000	307.3236
2022	0.8408	0.0831	0.1268	2.5000e-004	8.6300e-003	4.7500e-003	0.0134	2.3000e-003	4.7500e-003	7.0500e-003	0.0000	21.7114	21.7114	1.1000e-003	0.0000	21.7390
Maximum	**0.8408**	**1.7688**	**1.7831**	**3.4800e-003**	**0.0966**	**0.0898**	**0.1649**	**0.0451**	**0.0843**	**0.1045**	**0.0000**	**305.9146**	**305.9146**	**0.0564**	**0.0000**	**307.3236**

Sonoma-Magazine Residential Project - Bay Area AQMD Air District, Annual

	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

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	9-1-2020	11-30-2020	0.9730	0.9730
2	12-1-2020	2-28-2021	0.7115	0.7115
3	3-1-2021	5-31-2021	0.7009	0.7009
4	6-1-2021	8-31-2021	0.7001	0.7001
5	9-1-2021	11-30-2021	0.1270	0.1270
7	3-1-2022	5-31-2022	0.1721	0.1721
8	6-1-2022	8-31-2022	0.5279	0.5279
9	9-1-2022	9-30-2022	0.1721	0.1721
		Highest	0.9730	0.9730

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	0.6274	0.0113	0.9775	5.0000e-005		5.4400e-003	5.4400e-003		5.4400e-003	5.4400e-003	0.0000	1.6010	1.6010	1.5300e-003	0.0000	1.6391
Energy	6.1500e-003	0.0526	0.0224	3.4000e-004		4.2500e-003	4.2500e-003		4.2500e-003	4.2500e-003	0.0000	134.6773	134.6773	4.6300e-003	1.8600e-003	135.3464
Mobile	0.1148	0.5951	1.2769	5.7700e-003	0.6168	3.8300e-003	0.6206	0.1655	3.5600e-003	0.1690	0.0000	532.5520	532.5520	0.0169	0.0000	532.9736
Waste						0.0000	0.0000		0.0000	0.0000	12.3256	0.0000	12.3256	0.7284	0.0000	30.5362
Water						0.0000	0.0000		0.0000	0.0000	2.1828	7.6140	9.7968	0.2246	5.3700e-003	17.0108
Total	**0.7484**	**0.6589**	**2.2768**	**6.1600e-003**	**0.6168**	**0.0135**	**0.6303**	**0.1655**	**0.0133**	**0.1787**	**14.5084**	**676.4442**	**690.9526**	**0.9760**	**7.2300e-003**	**717.5061**

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	0.6274	0.0113	0.9775	5.0000e-005		5.4400e-003	5.4400e-003		5.4400e-003	5.4400e-003	0.0000	1.6010	1.6010	1.5300e-003	0.0000	1.6391
Energy	6.1500e-003	0.0526	0.0224	3.4000e-004		4.2500e-003	4.2500e-003		4.2500e-003	4.2500e-003	0.0000	134.6773	134.6773	4.6300e-003	1.8600e-003	135.3464
Mobile	0.0988	0.5085	0.9254	3.8300e-003	0.3910	2.6300e-003	0.3936	0.1049	2.4500e-003	0.1073	0.0000	353.7224	353.7224	0.0123	0.0000	354.0307
Waste						0.0000	0.0000		0.0000	0.0000	12.3256	0.0000	12.3256	0.7284	0.0000	30.5362
Water						0.0000	0.0000		0.0000	0.0000	2.1828	7.6140	9.7968	0.2246	5.3700e-003	17.0108
Total	**0.7323**	**0.5723**	**1.9253**	**4.2200e-003**	**0.3910**	**0.0123**	**0.4033**	**0.1049**	**0.0121**	**0.1170**	**14.5084**	**497.6146**	**512.1230**	**0.9715**	**7.2300e-003**	**538.5633**

	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	**2.15**	**13.14**	**15.44**	**31.49**	**36.61**	**8.88**	**36.01**	**36.61**	**8.38**	**34.52**	**0.00**	**26.44**	**25.88**	**0.46**	**0.00**	**24.94**

3.0 Construction Detail

Construction Phase

Sonoma-Magazine Residential Project - Bay Area AQMD Air District, Annual

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	9/1/2020	9/28/2020	5	20	
2	Site Preparation	Site Preparation	9/29/2020	10/5/2020	5	5	
3	Grading	Grading	10/6/2020	10/15/2020	5	8	
4	Building Construction	Building Construction	10/16/2020	9/2/2021	5	230	
5	Paving	Paving	9/3/2021	9/28/2021	5	18	
6	Architectural Coating	Architectural Coating	5/2/2022	10/7/2022	5	115	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 267,300; Residential Outdoor: 89,100; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Sonoma-Magazine Residential Project - Bay Area AQMD Air District, Annual

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	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
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	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	6.00	132	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	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	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	95.00	14.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	19.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2020

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	0.0331	0.3320	0.2175	3.9000e-004		0.0166	0.0166		0.0154	0.0154	0.0000	33.9986	33.9986	9.6000e-003	0.0000	34.2386
Total	**0.0331**	**0.3320**	**0.2175**	**3.9000e-004**		**0.0166**	**0.0166**		**0.0154**	**0.0154**	**0.0000**	**33.9986**	**33.9986**	**9.6000e-003**	**0.0000**	**34.2386**

3.2 Demolition - 2020

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	5.0000e-004	3.6000e-004	3.6800e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0384	1.0384	3.0000e-005	0.0000	1.0391
Total	**5.0000e-004**	**3.6000e-004**	**3.6800e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**1.0384**	**1.0384**	**3.0000e-005**	**0.0000**	**1.0391**

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	0.0331	0.3320	0.2175	3.9000e-004		0.0166	0.0166		0.0154	0.0154	0.0000	33.9986	33.9986	9.6000e-003	0.0000	34.2385
Total	**0.0331**	**0.3320**	**0.2175**	**3.9000e-004**		**0.0166**	**0.0166**		**0.0154**	**0.0154**	**0.0000**	**33.9986**	**33.9986**	**9.6000e-003**	**0.0000**	**34.2385**

3.2 Demolition - 2020

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	5.0000e-004	3.6000e-004	3.6800e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0384	1.0384	3.0000e-005	0.0000	1.0391
Total	**5.0000e-004**	**3.6000e-004**	**3.6800e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**1.0384**	**1.0384**	**3.0000e-005**	**0.0000**	**1.0391**

3.3 Site Preparation - 2020

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					0.0452	0.0000	0.0452	0.0248	0.0000	0.0248	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0102	0.1060	0.0538	1.0000e-004		5.4900e-003	5.4900e-003		5.0500e-003	5.0500e-003	0.0000	8.3577	8.3577	2.7000e-003	0.0000	8.4253
Total	**0.0102**	**0.1060**	**0.0538**	**1.0000e-004**	**0.0452**	**5.4900e-003**	**0.0507**	**0.0248**	**5.0500e-003**	**0.0299**	**0.0000**	**8.3577**	**8.3577**	**2.7000e-003**	**0.0000**	**8.4253**

3.3 Site Preparation - 2020

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	1.5000e-004	1.1000e-004	1.1100e-003	0.0000	3.6000e-004	0.0000	3.6000e-004	9.0000e-005	0.0000	1.0000e-004	0.0000	0.3115	0.3115	1.0000e-005	0.0000	0.3117
Total	**1.5000e-004**	**1.1000e-004**	**1.1100e-003**	**0.0000**	**3.6000e-004**	**0.0000**	**3.6000e-004**	**9.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**	**0.3115**	**0.3115**	**1.0000e-005**	**0.0000**	**0.3117**

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					0.0452	0.0000	0.0452	0.0248	0.0000	0.0248	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0102	0.1060	0.0538	1.0000e-004		5.4900e-003	5.4900e-003		5.0500e-003	5.0500e-003	0.0000	8.3577	8.3577	2.7000e-003	0.0000	8.4252
Total	**0.0102**	**0.1060**	**0.0538**	**1.0000e-004**	**0.0452**	**5.4900e-003**	**0.0507**	**0.0248**	**5.0500e-003**	**0.0299**	**0.0000**	**8.3577**	**8.3577**	**2.7000e-003**	**0.0000**	**8.4252**

3.3 Site Preparation - 2020

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	1.5000e-004	1.1000e-004	1.1100e-003	0.0000	3.6000e-004	0.0000	3.6000e-004	9.0000e-005	0.0000	1.0000e-004	0.0000	0.3115	0.3115	1.0000e-005	0.0000	0.3117
Total	**1.5000e-004**	**1.1000e-004**	**1.1100e-003**	**0.0000**	**3.6000e-004**	**0.0000**	**3.6000e-004**	**9.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**	**0.3115**	**0.3115**	**1.0000e-005**	**0.0000**	**0.3117**

3.4 Grading - 2020

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					0.0262	0.0000	0.0262	0.0135	0.0000	0.0135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.7200e-003	0.1055	0.0642	1.2000e-004		5.0900e-003	5.0900e-003		4.6900e-003	4.6900e-003	0.0000	10.4235	10.4235	3.3700e-003	0.0000	10.5078
Total	**9.7200e-003**	**0.1055**	**0.0642**	**1.2000e-004**	**0.0262**	**5.0900e-003**	**0.0313**	**0.0135**	**4.6900e-003**	**0.0182**	**0.0000**	**10.4235**	**10.4235**	**3.3700e-003**	**0.0000**	**10.5078**

3.4 Grading - 2020

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	2.0000e-004	1.4000e-004	1.4700e-003	0.0000	4.7000e-004	0.0000	4.8000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4154	0.4154	1.0000e-005	0.0000	0.4156
Total	**2.0000e-004**	**1.4000e-004**	**1.4700e-003**	**0.0000**	**4.7000e-004**	**0.0000**	**4.8000e-004**	**1.3000e-004**	**0.0000**	**1.3000e-004**	**0.0000**	**0.4154**	**0.4154**	**1.0000e-005**	**0.0000**	**0.4156**

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					0.0262	0.0000	0.0262	0.0135	0.0000	0.0135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.7200e-003	0.1055	0.0642	1.2000e-004		5.0900e-003	5.0900e-003		4.6900e-003	4.6900e-003	0.0000	10.4235	10.4235	3.3700e-003	0.0000	10.5078
Total	**9.7200e-003**	**0.1055**	**0.0642**	**1.2000e-004**	**0.0262**	**5.0900e-003**	**0.0313**	**0.0135**	**4.6900e-003**	**0.0182**	**0.0000**	**10.4235**	**10.4235**	**3.3700e-003**	**0.0000**	**10.5078**

3.4 Grading - 2020

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	2.0000e-004	1.4000e-004	1.4700e-003	0.0000	4.7000e-004	0.0000	4.8000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4154	0.4154	1.0000e-005	0.0000	0.4156
Total	**2.0000e-004**	**1.4000e-004**	**1.4700e-003**	**0.0000**	**4.7000e-004**	**0.0000**	**4.8000e-004**	**1.3000e-004**	**0.0000**	**1.3000e-004**	**0.0000**	**0.4154**	**0.4154**	**1.0000e-005**	**0.0000**	**0.4156**

3.5 Building Construction - 2020

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	0.0583	0.5276	0.4633	7.4000e-004		0.0307	0.0307		0.0289	0.0289	0.0000	63.6928	63.6928	0.0155	0.0000	64.0812
Total	**0.0583**	**0.5276**	**0.4633**	**7.4000e-004**		**0.0307**	**0.0307**		**0.0289**	**0.0289**	**0.0000**	**63.6928**	**63.6928**	**0.0155**	**0.0000**	**64.0812**

3.5 Building Construction - 2020

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	1.4900e-003	0.0444	0.0112	1.0000e-004	2.5200e-003	2.2000e-004	2.7400e-003	7.3000e-004	2.1000e-004	9.4000e-004	0.0000	10.0801	10.0801	5.2000e-004	0.0000	10.0931
Worker	8.6600e-003	6.2000e-003	0.0642	2.0000e-004	0.0206	1.4000e-004	0.0208	5.4900e-003	1.3000e-004	5.6200e-003	0.0000	18.0858	18.0858	4.4000e-004	0.0000	18.0968
Total	**0.0102**	**0.0506**	**0.0753**	**3.0000e-004**	**0.0232**	**3.6000e-004**	**0.0235**	**6.2200e-003**	**3.4000e-004**	**6.5600e-003**	**0.0000**	**28.1659**	**28.1659**	**9.6000e-004**	**0.0000**	**28.1898**

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	0.0583	0.5276	0.4633	7.4000e-004		0.0307	0.0307		0.0289	0.0289	0.0000	63.6927	63.6927	0.0155	0.0000	64.0811
Total	**0.0583**	**0.5276**	**0.4633**	**7.4000e-004**		**0.0307**	**0.0307**		**0.0289**	**0.0289**	**0.0000**	**63.6927**	**63.6927**	**0.0155**	**0.0000**	**64.0811**

3.5 Building Construction - 2020

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	1.4900e-003	0.0444	0.0112	1.0000e-004	2.5200e-003	2.2000e-004	2.7400e-003	7.3000e-004	2.1000e-004	9.4000e-004	0.0000	10.0801	10.0801	5.2000e-004	0.0000	10.0931
Worker	8.6600e-003	6.2000e-003	0.0642	2.0000e-004	0.0206	1.4000e-004	0.0208	5.4900e-003	1.3000e-004	5.6200e-003	0.0000	18.0858	18.0858	4.4000e-004	0.0000	18.0968
Total	**0.0102**	**0.0506**	**0.0753**	**3.0000e-004**	**0.0232**	**3.6000e-004**	**0.0235**	**6.2200e-003**	**3.4000e-004**	**6.5600e-003**	**0.0000**	**28.1659**	**28.1659**	**9.6000e-004**	**0.0000**	**28.1898**

3.5 Building Construction - 2021

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	0.1663	1.5253	1.4503	2.3600e-003		0.0839	0.0839		0.0789	0.0789	0.0000	202.6826	202.6826	0.0489	0.0000	203.9051
Total	**0.1663**	**1.5253**	**1.4503**	**2.3600e-003**		**0.0839**	**0.0839**		**0.0789**	**0.0789**	**0.0000**	**202.6826**	**202.6826**	**0.0489**	**0.0000**	**203.9051**

3.5 Building Construction - 2021

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	3.8900e-003	0.1280	0.0319	3.3000e-004	8.0300e-003	2.8000e-004	8.3100e-003	2.3200e-003	2.7000e-004	2.5900e-003	0.0000	31.7696	31.7696	1.5600e-003	0.0000	31.8087
Worker	0.0255	0.0176	0.1864	6.1000e-004	0.0657	4.3000e-004	0.0661	0.0175	4.0000e-004	0.0179	0.0000	55.5267	55.5267	1.2500e-003	0.0000	55.5578
Total	**0.0294**	**0.1456**	**0.2184**	**9.4000e-004**	**0.0737**	**7.1000e-004**	**0.0744**	**0.0198**	**6.7000e-004**	**0.0205**	**0.0000**	**87.2963**	**87.2963**	**2.8100e-003**	**0.0000**	**87.3665**

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	0.1663	1.5253	1.4503	2.3600e-003		0.0839	0.0839		0.0789	0.0789	0.0000	202.6824	202.6824	0.0489	0.0000	203.9048
Total	**0.1663**	**1.5253**	**1.4503**	**2.3600e-003**		**0.0839**	**0.0839**		**0.0789**	**0.0789**	**0.0000**	**202.6824**	**202.6824**	**0.0489**	**0.0000**	**203.9048**

3.5 Building Construction - 2021

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	3.8900e-003	0.1280	0.0319	3.3000e-004	8.0300e-003	2.8000e-004	8.3100e-003	2.3200e-003	2.7000e-004	2.5900e-003	0.0000	31.7696	31.7696	1.5600e-003	0.0000	31.8087
Worker	0.0255	0.0176	0.1864	6.1000e-004	0.0657	4.3000e-004	0.0661	0.0175	4.0000e-004	0.0179	0.0000	55.5267	55.5267	1.2500e-003	0.0000	55.5578
Total	**0.0294**	**0.1456**	**0.2184**	**9.4000e-004**	**0.0737**	**7.1000e-004**	**0.0744**	**0.0198**	**6.7000e-004**	**0.0205**	**0.0000**	**87.2963**	**87.2963**	**2.8100e-003**	**0.0000**	**87.3665**

3.6 Paving - 2021

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	9.8500e-003	0.0976	0.1103	1.7000e-004		5.2100e-003	5.2100e-003		4.8100e-003	4.8100e-003	0.0000	14.7336	14.7336	4.6300e-003	0.0000	14.8493
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**9.8500e-003**	**0.0976**	**0.1103**	**1.7000e-004**		**5.2100e-003**	**5.2100e-003**		**4.8100e-003**	**4.8100e-003**	**0.0000**	**14.7336**	**14.7336**	**4.6300e-003**	**0.0000**	**14.8493**

3.6 Paving - 2021

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	5.5000e-004	3.8000e-004	4.0400e-003	1.0000e-005	1.4200e-003	1.0000e-005	1.4300e-003	3.8000e-004	1.0000e-005	3.9000e-004	0.0000	1.2024	1.2024	3.0000e-005	0.0000	1.2031
Total	**5.5000e-004**	**3.8000e-004**	**4.0400e-003**	**1.0000e-005**	**1.4200e-003**	**1.0000e-005**	**1.4300e-003**	**3.8000e-004**	**1.0000e-005**	**3.9000e-004**	**0.0000**	**1.2024**	**1.2024**	**3.0000e-005**	**0.0000**	**1.2031**

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	9.8500e-003	0.0976	0.1103	1.7000e-004		5.2100e-003	5.2100e-003		4.8100e-003	4.8100e-003	0.0000	14.7335	14.7335	4.6300e-003	0.0000	14.8493
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**9.8500e-003**	**0.0976**	**0.1103**	**1.7000e-004**		**5.2100e-003**	**5.2100e-003**		**4.8100e-003**	**4.8100e-003**	**0.0000**	**14.7335**	**14.7335**	**4.6300e-003**	**0.0000**	**14.8493**

3.6 Paving - 2021

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	5.5000e-004	3.8000e-004	4.0400e-003	1.0000e-005	1.4200e-003	1.0000e-005	1.4300e-003	3.8000e-004	1.0000e-005	3.9000e-004	0.0000	1.2024	1.2024	3.0000e-005	0.0000	1.2031
Total	**5.5000e-004**	**3.8000e-004**	**4.0400e-003**	**1.0000e-005**	**1.4200e-003**	**1.0000e-005**	**1.4300e-003**	**3.8000e-004**	**1.0000e-005**	**3.9000e-004**	**0.0000**	**1.2024**	**1.2024**	**3.0000e-005**	**0.0000**	**1.2031**

3.7 Architectural Coating - 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					
Archit. Coating	0.8260					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0118	0.0810	0.1043	1.7000e-004		4.7000e-003	4.7000e-003		4.7000e-003	4.7000e-003	0.0000	14.6812	14.6812	9.6000e-004	0.0000	14.7051
Total	**0.8377**	**0.0810**	**0.1043**	**1.7000e-004**		**4.7000e-003**	**4.7000e-003**		**4.7000e-003**	**4.7000e-003**	**0.0000**	**14.6812**	**14.6812**	**9.6000e-004**	**0.0000**	**14.7051**

3.7 Architectural Coating - 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	3.1300e-003	2.0700e-003	0.0225	8.0000e-005	8.6300e-003	6.0000e-005	8.6900e-003	2.3000e-003	5.0000e-005	2.3500e-003	0.0000	7.0302	7.0302	1.5000e-004	0.0000	7.0339
Total	**3.1300e-003**	**2.0700e-003**	**0.0225**	**8.0000e-005**	**8.6300e-003**	**6.0000e-005**	**8.6900e-003**	**2.3000e-003**	**5.0000e-005**	**2.3500e-003**	**0.0000**	**7.0302**	**7.0302**	**1.5000e-004**	**0.0000**	**7.0339**

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	0.8260					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0118	0.0810	0.1043	1.7000e-004		4.7000e-003	4.7000e-003		4.7000e-003	4.7000e-003	0.0000	14.6812	14.6812	9.6000e-004	0.0000	14.7051
Total	**0.8377**	**0.0810**	**0.1043**	**1.7000e-004**		**4.7000e-003**	**4.7000e-003**		**4.7000e-003**	**4.7000e-003**	**0.0000**	**14.6812**	**14.6812**	**9.6000e-004**	**0.0000**	**14.7051**

3.7 Architectural Coating - 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	3.1300e-003	2.0700e-003	0.0225	8.0000e-005	8.6300e-003	6.0000e-005	8.6900e-003	2.3000e-003	5.0000e-005	2.3500e-003	0.0000	7.0302	7.0302	1.5000e-004	0.0000	7.0339
Total	**3.1300e-003**	**2.0700e-003**	**0.0225**	**8.0000e-005**	**8.6300e-003**	**6.0000e-005**	**8.6900e-003**	**2.3000e-003**	**5.0000e-005**	**2.3500e-003**	**0.0000**	**7.0302**	**7.0302**	**1.5000e-004**	**0.0000**	**7.0339**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Density

Increase Transit Accessibility

Improve Pedestrian Network

	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	0.0988	0.5085	0.9254	3.8300e-003	0.3910	2.6300e-003	0.3936	0.1049	2.4500e-003	0.1073	0.0000	353.7224	353.7224	0.0123	0.0000	354.0307
Unmitigated	0.1148	0.5951	1.2769	5.7700e-003	0.6168	3.8300e-003	0.6206	0.1655	3.5600e-003	0.1690	0.0000	532.5520	532.5520	0.0169	0.0000	532.9736

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	718.08	718.08	718.08	1,658,483	1,051,377
Total	718.08	718.08	718.08	1,658,483	1,051,377

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
Apartments Mid Rise	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.585795	0.036515	0.193581	0.106455	0.012789	0.005274	0.019465	0.028415	0.002699	0.001789	0.005626	0.000921	0.000676

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	73.8208	73.8208	3.4600e-003	7.4000e-004	74.1283
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	73.8208	73.8208	3.4600e-003	7.4000e-004	74.1283
NaturalGas Mitigated	6.1500e-003	0.0526	0.0224	3.4000e-004		4.2500e-003	4.2500e-003		4.2500e-003	4.2500e-003	0.0000	60.8565	60.8565	1.1700e-003	1.1200e-003	61.2181
NaturalGas Unmitigated	6.1500e-003	0.0526	0.0224	3.4000e-004		4.2500e-003	4.2500e-003		4.2500e-003	4.2500e-003	0.0000	60.8565	60.8565	1.1700e-003	1.1200e-003	61.2181

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					
Apartments Mid Rise	1.14041e+006	6.1500e-003	0.0526	0.0224	3.4000e-004		4.2500e-003	4.2500e-003		4.2500e-003	4.2500e-003	0.0000	60.8565	60.8565	1.1700e-003	1.1200e-003	61.2181
Total		**6.1500e-003**	**0.0526**	**0.0224**	**3.4000e-004**		**4.2500e-003**	**4.2500e-003**		**4.2500e-003**	**4.2500e-003**	**0.0000**	**60.8565**	**60.8565**	**1.1700e-003**	**1.1200e-003**	**61.2181**

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					
Apartments Mid Rise	1.14041e+006	6.1500e-003	0.0526	0.0224	3.4000e-004		4.2500e-003	4.2500e-003		4.2500e-003	4.2500e-003	0.0000	60.8565	60.8565	1.1700e-003	1.1200e-003	61.2181
Total		**6.1500e-003**	**0.0526**	**0.0224**	**3.4000e-004**		**4.2500e-003**	**4.2500e-003**		**4.2500e-003**	**4.2500e-003**	**0.0000**	**60.8565**	**60.8565**	**1.1700e-003**	**1.1200e-003**	**61.2181**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	544942	73.8208	3.4600e-003	7.4000e-004	74.1283
Total		**73.8208**	**3.4600e-003**	**7.4000e-004**	**74.1283**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	544942	73.8208	3.4600e-003	7.4000e-004	74.1283
Total		**73.8208**	**3.4600e-003**	**7.4000e-004**	**74.1283**

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	0.6274	0.0113	0.9775	5.0000e-005		5.4400e-003	5.4400e-003		5.4400e-003	5.4400e-003	0.0000	1.6010	1.6010	1.5300e-003	0.0000	1.6391
Unmitigated	0.6274	0.0113	0.9775	5.0000e-005		5.4400e-003	5.4400e-003		5.4400e-003	5.4400e-003	0.0000	1.6010	1.6010	1.5300e-003	0.0000	1.6391

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	0.0826					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.5155					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0292	0.0113	0.9775	5.0000e-005		5.4400e-003	5.4400e-003		5.4400e-003	5.4400e-003	0.0000	1.6010	1.6010	1.5300e-003	0.0000	1.6391
Total	**0.6274**	**0.0113**	**0.9775**	**5.0000e-005**		**5.4400e-003**	**5.4400e-003**		**5.4400e-003**	**5.4400e-003**	**0.0000**	**1.6010**	**1.6010**	**1.5300e-003**	**0.0000**	**1.6391**

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	0.0826					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.5155					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0292	0.0113	0.9775	5.0000e-005		5.4400e-003	5.4400e-003		5.4400e-003	5.4400e-003	0.0000	1.6010	1.6010	1.5300e-003	0.0000	1.6391
Total	**0.6274**	**0.0113**	**0.9775**	**5.0000e-005**		**5.4400e-003**	**5.4400e-003**		**5.4400e-003**	**5.4400e-003**	**0.0000**	**1.6010**	**1.6010**	**1.5300e-003**	**0.0000**	**1.6391**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	9.7968	0.2246	5.3700e-003	17.0108
Unmitigated	9.7968	0.2246	5.3700e-003	17.0108

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	6.88027 / 5.42195	9.7968	0.2246	5.3700e-003	17.0108
Total		**9.7968**	**0.2246**	**5.3700e-003**	**17.0108**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	6.88027 / 5.42195	9.7968	0.2246	5.3700e-003	17.0108
Total		**9.7968**	**0.2246**	**5.3700e-003**	**17.0108**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	12.3256	0.7284	0.0000	30.5362
Unmitigated	12.3256	0.7284	0.0000	30.5362

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	60.72	12.3256	0.7284	0.0000	30.5362
Total		**12.3256**	**0.7284**	**0.0000**	**30.5362**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	60.72	12.3256	0.7284	0.0000	30.5362
Total		**12.3256**	**0.7284**	**0.0000**	**30.5362**

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

Appendix E

Noise Measurement Files

Freq Weight : A
Time Weight : SLOW
Level Range : 40-100
Max dB : 71.2 - 2019/12/30 14:56:29
Level Range : 40-100
SEL : 84.8
Leq : 55.3

Noise Measurement 1

No.s	Date Time	(dB)				
1	2019/12/30 14:45:03	49.6	59.9	60.3	53.6	53.1
6	2019/12/30 14:45:18	52.5	54.5	50.6	49.3	49.8
11	2019/12/30 14:45:33	48.7	47.3	44.5	43.1	44.9
16	2019/12/30 14:45:48	48.8	59.1	58.4	50.2	45.0
21	2019/12/30 14:46:03	44.7	45.2	47.5	46.3	52.3
26	2019/12/30 14:46:18	56.8	53.5	53.6	46.9	50.4
31	2019/12/30 14:46:33	46.2	45.9	47.6	53.7	59.3
36	2019/12/30 14:46:48	52.1	52.1	51.9	52.7	48.2
41	2019/12/30 14:47:03	45.9	44.9	47.0	44.1	46.7
46	2019/12/30 14:47:18	45.3	48.9	58.7	52.2	46.7
51	2019/12/30 14:47:33	47.8	49.1	51.3	49.8	46.7
56	2019/12/30 14:47:48	48.6	44.9	44.7	49.4	56.7
61	2019/12/30 14:48:03	61.9	55.6	55.5	56.2	62.5
66	2019/12/30 14:48:18	60.3	58.2	59.2	58.1	54.7
71	2019/12/30 14:48:33	54.4	51.9	50.7	50.5	54.0
76	2019/12/30 14:48:48	46.4	44.9	45.4	45.3	43.7
81	2019/12/30 14:49:03	50.0	58.5	60.0	52.4	49.1
86	2019/12/30 14:49:18	47.4	46.9	51.2	59.6	61.5
91	2019/12/30 14:49:33	54.8	51.7	56.5	61.8	58.8
96	2019/12/30 14:49:48	53.0	54.0	54.2	51.7	53.1
101	2019/12/30 14:50:03	48.3	46.8	47.3	46.3	47.8
106	2019/12/30 14:50:18	50.0	48.2	61.7	61.7	50.5
111	2019/12/30 14:50:33	52.0	55.7	57.9	54.4	51.3
116	2019/12/30 14:50:48	52.6	60.2	62.4	58.2	63.1
121	2019/12/30 14:51:03	56.8	52.7	49.7	47.9	45.8
126	2019/12/30 14:51:18	44.0	44.0	43.1	44.4	45.1
131	2019/12/30 14:51:33	51.7	51.2	52.8	50.2	47.2
136	2019/12/30 14:51:48	49.7	54.0	61.4	55.3	54.0
141	2019/12/30 14:52:03	54.2	54.0	57.3	57.3	57.2
146	2019/12/30 14:52:18	65.5	58.5	53.4	50.9	48.9
151	2019/12/30 14:52:33	50.7	54.7	53.4	53.1	50.3
156	2019/12/30 14:52:48	48.3	48.9	49.0	50.9	51.0
161	2019/12/30 14:53:03	51.9	53.2	53.7	52.5	49.7
166	2019/12/30 14:53:18	49.1	47.4	45.8	47.7	48.2
171	2019/12/30 14:53:33	45.8	45.1	45.1	44.0	43.3
176	2019/12/30 14:53:48	45.5	44.9	46.4	45.6	46.9
181	2019/12/30 14:54:03	46.9	46.4	47.0	46.0	46.4
186	2019/12/30 14:54:18	46.3	44.7	43.2	46.8	45.7
191	2019/12/30 14:54:33	45.9	45.7	44.2	43.4	53.9
196	2019/12/30 14:54:48	61.9	57.1	49.9	48.5	50.4
201	2019/12/30 14:55:03	52.1	58.0	60.8	51.7	51.3
206	2019/12/30 14:55:18	48.8	47.0	47.3	43.7	43.3
211	2019/12/30 14:55:33	43.2	43.6	44.0	47.0	51.9
216	2019/12/30 14:55:48	60.7	59.2	51.2	51.4	51.0
221	2019/12/30 14:56:03	52.8	56.7	59.6	62.7	61.0
226	2019/12/30 14:56:18	54.8	58.9	64.0	71.0	62.2
231	2019/12/30 14:56:33	54.5	54.5	52.7	51.2	46.7
236	2019/12/30 14:56:48	46.4	46.4	45.4	47.5	48.7
241	2019/12/30 14:57:03	47.6	46.7	49.6	49.4	50.6
246	2019/12/30 14:57:18	50.1	49.8	45.5	47.9	48.2
251	2019/12/30 14:57:33	52.2	52.5	50.1	48.4	49.8
256	2019/12/30 14:57:48	58.5	53.9	48.6	49.8	46.9
261	2019/12/30 14:58:03	45.6	45.3	45.2	46.6	45.8
266	2019/12/30 14:58:18	44.7	49.9	50.2	52.2	50.8
271	2019/12/30 14:58:33	49.7	59.8	59.4	58.5	62.8
276	2019/12/30 14:58:48	56.7	51.6	51.1	49.6	47.9
281	2019/12/30 14:59:03	46.3	52.6	57.9	59.2	55.9
286	2019/12/30 14:59:18	55.2	52.0	50.9	48.5	51.5
291	2019/12/30 14:59:33	53.8	52.4	49.2	46.9	45.1
296	2019/12/30 14:59:48	47.7	46.1	49.7	60.2	63.9

Freq Weight : A
Time Weight : SLOW
Level Range : 40-100
Max dB : 82.5 - 2019/12/30 15:19:39
Level Range : 40-100
SEL : 97.2
Leq : 67.7

Noise Measurement 2

No.s	Date Time	(dB)				
1	2019/12/30 15:08:08	65.6	58.1	57.3	68.1	71.6
6	2019/12/30 15:08:23	71.8	72.2	69.5	64.6	55.8
11	2019/12/30 15:08:38	56.3	57.7	69.9	63.2	61.6
16	2019/12/30 15:08:53	65.3	57.8	54.0	53.2	52.7
21	2019/12/30 15:09:08	53.4	54.8	57.8	63.7	59.0
26	2019/12/30 15:09:23	55.8	55.1	56.3	59.5	67.3
31	2019/12/30 15:09:38	64.4	66.0	60.1	71.3	79.1
36	2019/12/30 15:09:53	81.5	75.8	75.0	73.9	69.8
41	2019/12/30 15:10:08	62.9	59.7	63.4	63.3	68.8
46	2019/12/30 15:10:23	62.7	59.0	58.6	59.3	61.6
51	2019/12/30 15:10:38	60.1	59.3	65.2	62.6	60.7
56	2019/12/30 15:10:53	59.5	59.6	62.6	64.4	58.0
61	2019/12/30 15:11:08	58.5	56.2	61.8	67.7	70.9
66	2019/12/30 15:11:23	64.3	71.2	73.8	70.2	69.9
71	2019/12/30 15:11:38	63.2	60.0	64.8	60.6	68.5
76	2019/12/30 15:11:53	70.2	60.8	55.9	56.3	55.0
81	2019/12/30 15:12:08	55.2	61.4	59.6	66.5	60.0
86	2019/12/30 15:12:23	58.2	66.1	55.8	50.7	52.3
91	2019/12/30 15:12:38	57.1	67.4	66.0	62.3	57.2
96	2019/12/30 15:12:53	53.7	53.2	56.1	61.2	55.8
101	2019/12/30 15:13:08	53.6	52.0	51.5	57.7	61.3
106	2019/12/30 15:13:23	57.3	58.0	63.4	62.5	66.3
111	2019/12/30 15:13:38	66.7	60.9	66.0	56.5	53.4
116	2019/12/30 15:13:53	60.5	61.9	64.4	67.2	71.4
121	2019/12/30 15:14:08	73.1	71.6	68.5	72.0	63.9
126	2019/12/30 15:14:23	63.5	70.8	65.1	63.9	57.7
131	2019/12/30 15:14:38	56.3	53.0	54.5	55.2	60.8
136	2019/12/30 15:14:53	67.1	59.1	52.9	49.3	48.9
141	2019/12/30 15:15:08	48.6	50.5	51.3	56.8	62.9
146	2019/12/30 15:15:23	59.3	63.9	67.6	65.9	61.6
151	2019/12/30 15:15:38	64.0	69.5	69.6	65.0	61.6
156	2019/12/30 15:15:53	56.9	53.1	51.9	52.4	57.2
161	2019/12/30 15:16:08	61.4	65.9	69.9	61.7	56.5
166	2019/12/30 15:16:23	55.0	56.1	57.7	67.4	67.1
171	2019/12/30 15:16:38	61.3	61.6	65.3	56.8	52.6
176	2019/12/30 15:16:53	56.3	63.4	69.2	72.9	76.6
181	2019/12/30 15:17:08	81.4	72.4	66.6	61.8	57.2
186	2019/12/30 15:17:23	62.5	70.9	70.1	61.6	67.0
191	2019/12/30 15:17:38	66.1	67.8	62.1	58.7	57.9
196	2019/12/30 15:17:53	64.5	66.4	57.9	61.3	69.1
201	2019/12/30 15:18:08	65.9	60.9	67.2	65.2	67.5
206	2019/12/30 15:18:23	72.2	70.6	65.5	61.0	60.9
211	2019/12/30 15:18:38	57.9	54.8	57.8	64.4	62.6
216	2019/12/30 15:18:53	57.6	53.2	57.0	63.6	65.2
221	2019/12/30 15:19:08	64.5	58.5	67.7	62.7	57.1
226	2019/12/30 15:19:23	62.0	62.6	62.5	63.3	69.6
231	2019/12/30 15:19:38	82.3	72.5	64.1	63.4	59.8
236	2019/12/30 15:19:53	55.6	52.6	50.9	50.4	53.2
241	2019/12/30 15:20:08	55.6	63.2	66.6	62.7	67.8
246	2019/12/30 15:20:23	65.6	66.0	61.7	57.2	61.3
251	2019/12/30 15:20:38	69.6	64.8	61.5	55.5	52.2
256	2019/12/30 15:20:53	51.3	50.5	50.4	50.4	52.5
261	2019/12/30 15:21:08	60.4	67.1	73.0	75.4	72.8
266	2019/12/30 15:21:23	68.4	65.2	69.5	75.3	67.7
271	2019/12/30 15:21:38	67.9	73.6	70.3	64.5	59.1
276	2019/12/30 15:21:53	60.3	61.7	70.4	66.9	67.1
281	2019/12/30 15:22:08	61.3	57.8	61.8	58.5	57.0
286	2019/12/30 15:22:23	58.3	64.0	65.5	70.4	68.3
291	2019/12/30 15:22:38	73.3	63.6	60.4	71.0	65.6
296	2019/12/30 15:22:53	70.3	73.4	69.3	67.5	65.2