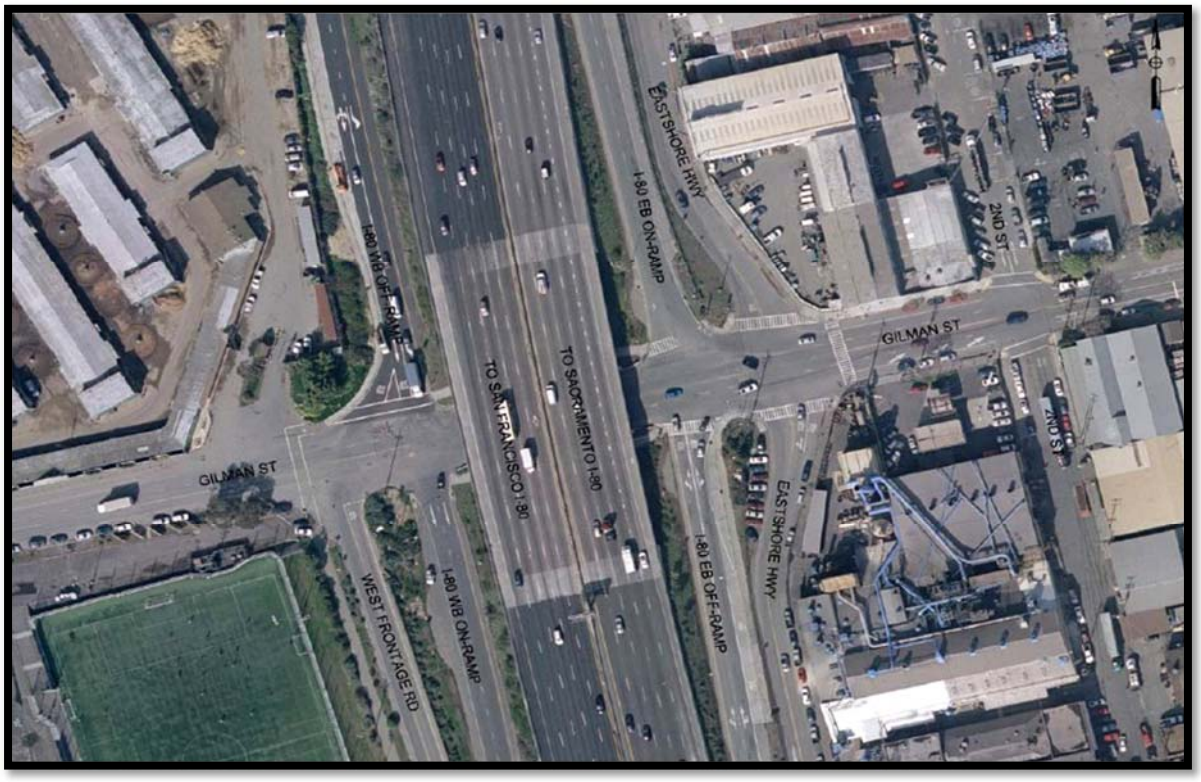
Interstate 80 / Gilman Street Interchange Improvement Project



Noise Study Report

Interstate 80 / Gilman Street Interchange Improvement Project
Caltrans District 04
04-ALA-80 - PM 6.38/6.95
EA 04-0A7700
Project ID 0400020155

July 2018

I-80 GILMAN
INTERCHANGE IMPROVEMENT PROJECT

Caltrans

ALAMEDA County Transportation Commission

CITY OF BERKELEY

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July 2018

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Executive Summary

The purpose of this Noise Study Report (NSR) is to evaluate traffic noise impacts and potential abatement measures under the requirements of Title 23, Part 772 of the Code of Federal Regulations (Title 23 CFR 772) "Procedures for Abatement of Highway Traffic Noise." Title 23 CFR 772 provides procedures for preparing operational and construction noise studies as well as evaluating noise abatement considered for federal and federal-aid highway projects. According to Title 23 CFR 772.3, all highway projects that are developed in conformance with this regulation are deemed to be in conformance with Federal Highway Administration (FHWA) noise standards.

The project is located in Alameda County at the Interstate 80 (I-80)/Gilman Street interchange in the cities of Berkeley and Albany. The purpose of the project is to simplify and improve navigation, mobility and traffic operations, reduce congestion, vehicle queues and conflicts, improve local and regional bicycle connections and pedestrian facilities, and improve safety at the I-80/Gilman Street interchange. This is a Type I project as defined under 23 CFR 772.

The No-Build Alternative and Roundabout Alternative are under consideration. The No-Build Alternative consists of the future traffic conditions with transportation improvements only as currently planned and programmed for funding.

The Roundabout Alternative includes the reconfiguration of I-80 ramps and intersections at Gilman Street. The existing non-signalized intersection configuration with stop-controlled ramp terminuses would be replaced with two hybrid single-lane roundabouts with multilane portions on Gilman Street at the I-80 ramp terminals. There are no proposed improvements to the freeway mainline.

The Project would also include a new bicycle/pedestrian overcrossing which would be located south of Gilman Street with two staircases incorporated into the overcrossing, one on each side of I-80, and a two-way cycle track on the south side of Gilman Street between the eastern I-80/Gilman Street ramps and 4th Street. Furthermore, the existing San Francisco Bay Trail (Bay Trail) would be extended west of the I-80/Gilman Street interchange along the south side of Gilman Street from its current terminus at the intersection of West Frontage Road and Gilman Street to just beyond Berkeley's city limits.

Land uses within the project area includes the Tom Bates Regional Sports Complex and San Francisco Bay Trail identified as Activity Category C land uses as well as the horse stable area of Golden Gate Fields, several commercial buildings and a restaurant identified as Activity Category E land uses. There are also industrial facilities and a retail establishment identified as Activity Category F land uses within the project area. The terrain throughout the noise study area is generally flat.

Traffic on I-80, Gilman Street, West Frontage Road, and Eastshore Highway are the dominant sources of traffic noise in the noise study area. Trains traveling on the Union Pacific Railroad (UPRR) tracks are the dominant source of train noise in the noise study area. This NSR analyzes six areas:

- Area A –West of I-80 and south of Gilman Street
- Area B – West of I-80 and north of Gilman Street
- Area C – East of I-80, south of Gilman Street, and west of 2nd Street
- Area D – South of Gilman Street between 2nd Street and 4th Street
- Area E – North of Gilman Street between 2nd Street and 4th Street
- Area F – East of I-80, north of Gilman Street, and west of 2nd Street

Short-term noise measurements were conducted at two sites in August 2016 for a total duration of 20 minutes each and a long-term measurement was conducted at one site in April 2018 for a duration of 72 hours. Train pass-by measurements were conducted in April 2018. Meteorological conditions (i.e., temperature, wind speed and direction, relative humidity) were logged for each measurement session using a hand-held weather station. Measured hourly averaged noise levels from the short-term sites ranged from 64 to 65 A-weighted decibels (dBA) and the measured hourly averaged peak-noise hour noise level of the long-term site was 68 A-weighted decibels (dBA).

Level of service (LOS) C and year 2040 forecasted traffic volumes were used to predict traffic noise levels and analyze noise impacts at receptors located with the noise study area. Modeled future build noise levels were generally the same as existing peak hour noise levels.

Train noise levels were predicted using FTA procedures based on provided daily train operations for the project area and maximum speeds as well as field observations. It is assumed that the peak-hour train operations will not change in the future.

Because of the constrained configuration and urban location of the project, abatement in the form of noise barriers is the only abatement measure considered to be practical. Noise barrier analysis was conducted by placing soundwalls at the shoulder of I-80.

This report analyzes noise barriers with heights from 8 to 16 feet to determine feasible noise abatement for the Build Alternative. Soundwalls are considered feasible when they provide at least 5 dB of noise reduction at an impacted receptor. The Noise Reduction Design Goal, which is one measure in determining whether a soundwall is reasonable, is achieved when a barrier is predicted to provide a noise reduction of at least 7 dB at one or more benefitted receptors. The following summarizes the range of existing and predicted future traffic and train noise levels, number of impacts, number of soundwalls, number of benefitted land uses, and their reasonable allowances per area for the Build Alternative.

Area A:

Existing Traffic Noise Level Range: 59 to 69 dBA
Future Traffic Noise Level Range: 59 to 69 dBA
Number of Impacts: Three
Number of Proposed Soundwalls: Two
Number of Benefitted Land Uses: Three
Reasonable Allowance: $285,000

Area B:

Existing Traffic Noise Level Range: 56 to 71 dBA
Future Traffic Noise Level Range: 56 to 71 dBA
Number of Impacts: One (not considered)
Number of Proposed Soundwalls: None
Number of Benefitted Land Uses: N/A
Reasonable Allowance: N/A

Area C:

Existing Traffic Noise Level Range: 64 to 72 dBA
Existing Combined Traffic and Train Noise Level Range: 66 to 72 dBA
Future Traffic Noise Level Range: 65 to 72 dBA
Future Combined Traffic and Train Noise Level Range: 67 to 72 dBA
Number of Impacts: None
Number of Proposed Soundwalls: None
Number of Benefitted Land Uses: N/A
Reasonable Allowance: N/A

Area D:

Existing Traffic Noise Level Range: 66 to 68 dBA
Existing Combined Traffic and Train Noise Level Range: 70 to 73 dBA
Future Traffic Noise Level Range: 65 to 68 dBA
Future Combined Traffic and Train Noise Level Range: 69 to 73 dBA
Number of Impacts: N/A
Number of Proposed Soundwalls: None
Number of Benefitted Land Uses: N/A
Reasonable Allowance: N/A

Area E:

Existing Traffic Noise Level Range: 64 to 67 dBA
Existing Combined Traffic and Train Noise Level Range: 69 to 75 dBA
Future Traffic Noise Level Range: 64 to 67 dBA
Future Combined Traffic and Train Noise Level Range: 69 to 75 dBA
Number of Impacts: N/A
Number of Proposed Soundwalls: None
Number of Benefitted Land Uses: N/A
Reasonable Allowance: N/A

Area F:

Existing Traffic Noise Level Range: 64 to 70 dBA
Existing Combined Traffic and Train Noise Level Range: 65 to 70 dBA
Future Traffic Noise Level Range: 64 to 70 dBA
Future Combined Traffic and Train Noise Level Range: 65 to 70 dBA
Number of Impacts: None
Number of Proposed Soundwalls: None
Number of Benefitted Land Uses: N/A
Reasonable Allowance: N/A

The total reasonable allowance is $285,000.

Noise associated with construction is controlled by Caltrans Standard Specifications Section 14-8.02 "Noise Control. The requirement states that noise resulting from work activities is to be controlled and monitored, construction noise levels are not to exceed 86 dBA L_{max} at 50 feet from the job site activities from 9:00 p.m. to 6:00 a.m., and all equipment shall be fitted with adequate mufflers and operated according to the manufacturers' specifications. Construction noise varies greatly depending on the construction process, type and condition of equipment used, as well as layout of the construction site. Temporary construction noise impacts would be unavoidable at areas located immediately adjacent to the proposed project alignment; however, construction noise control measures should be implemented to reduce noise impacts during project construction.

Table of Contents

List of Figures

List of Tables

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List of Abbreviated Terms

°F	degrees Fahrenheit
CA/T	Central Artery/Tunnel
CAD	computer-assisted drafting
Caltrans	California Department of Transportation
CCJPA	Capitol Corridor Joint Powers Authority
CEQA	California Environmental Quality Act
CFR	*Code of Federal Regulations*
CNEL	Community Noise Equivalent Level
CPUC	California Public Utilities Commission
dB	Decibels
dBA	A-weighted decibels
EBMUD	East Bay Municipal Utility District
EBRPD	East Bay Regional Parks District
FHWA	Federal Highway Administration
GSRD	gross solids removal device
HOT	High-occupancy toll
HOV	High-occupancy vehicle
Hz	Hertz
IS/EA	the Initial Study/Environmental Assessment
kHz	Kilohertz
L_{dn}	Day-Night Level
L_{eq}	Equivalent Sound Level
$L_{eq}(h)$	Equivalent Sound Level over one hour
L_{max}	Maximum Sound Level
LOS	Level of Service
L_n	Percentile-Exceeded Sound Level
µPa	micro-Pascals
mph	miles per hour
NAC	Noise Abatement Criteria
NADR	Noise Abatement Decision Report
NEPA	National Environmental Policy Act
NSR	Noise Study Report
PCBs	Polychlorinated biphenyls
Protocol	Caltrans Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects

List of Abbreviated Terms

RCNM	Roadway Construction Noise Model Version 1.1
ROW	right-of-way
SPL	sound pressure level
TeNS	Caltrans' Technical Noise Supplement
TNM 2.5	Traffic Noise Model Version 2.5
TMP	Transportation Management Plan
UPRR	Union Pacific Railroad
vph	Vehicles per hour

Chapter 1. Introduction

1.1 Purpose of the Noise Study Report

The purpose of this Noise Study Report (NSR) is to evaluate noise impacts and abatement measures under the requirements of Title 23, Part 772 of the Code of Federal Regulations (Title 23 CFR 772) "Procedures for Abatement of Highway Traffic Noise and Construction Noise" for the Interstate (I-80)/Gilman Street Interchange Improvement Project. Title 23 CFR 772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and Federal-aid highway projects. According to Title 23 CFR 772.3, all highway projects that are developed in conformance with this regulation are deemed to be in conformance with Federal Highway Administration (FHWA) noise standards. Compliance with 23 CFR 772 provides compliance with the noise impact assessment requirements of the National Environmental Policy Act (NEPA).

The California Department of Transportation (Caltrans) Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects (Protocol) (Caltrans, 2011) provides Caltrans policy for implementing Title 23 CFR 772 in California. The Protocol outlines the requirements for preparing NSRs in support of State highway projects. Noise impacts associated with this project under the California Environmental Quality Act (CEQA) are evaluated separately in the Initial Study/Environmental Assessment (IS/EA).

The study includes (a) short-term noise measurements; (b) roadway traffic noise modeling using FHWA's Traffic Noise Model version 2.5 (TNM 2.5) (c) feasible noise abatement measures; and (d) construction noise.

1.2 Project Purpose and Need

1.2.1 Purpose

The purpose of the project is to simplify and improve navigation, mobility, and traffic operations; reduce congestion, vehicle queues, and conflicts; improve local and regional bicycle connections and pedestrian facilities; and improve safety at the I 80/Gilman Street interchange. Current conditions, along with an overall increase in vehicle traffic, have created poor, confusing, and unsafe operations in the interchange area for vehicles, pedestrians, and bicyclists.

1.2.2 Need

The project is located in Alameda County at the I-80/Gilman Street interchange in the cities of Berkeley and Albany (Post Miles 6.38 to 6.95). I-80 is a 10-lane freeway that extends through the Berkeley/Gilman Street area. Gilman Street is classified as a major arterial with a posted speed limit of 25 miles per hour and is designated as a truck route. Vehicular traffic on Gilman Street is comprised of commuter, local and commercial truck traffic. Traffic controls along Gilman Street include pavement markings, with turn

channelization at the 6th, 8th, and 9th Street intersections only. The I-80/Gilman Street Interchange is a four lane arterial roadway (Gilman Street), with two lanes in the east/west direction that are intersected with four I-80 on- and off-ramps, an existing frontage road, and the Eastshore Highway. Traffic controls on all approaches to Gilman Street consist of stop signs and pavement markings. These conditions, along with an overall increase in vehicle traffic, have created poor and confusing operations in the interchange area.

In addition, other needs related to modal interrelationships and social considerations have been identified, including closing the gap in the local (Gilman Street) and regional (San Francisco Bay Trail) bikeway system in the area, and providing safe pedestrian access to and from the project area.

Chapter 2. Project Description

The project is located in Alameda County at the Interstate 80 (I-80)/Gilman Street interchange in the cities of Berkeley and Albany (Post Miles [PM] 6.38 to 6.95). Within the limits of the proposed project, I-80 is a conventional 10-lane freeway with 12-foot-wide lanes and 11-foot-wide shoulders. Gilman Street is a 4-lane major arterial with 11 foot-wide lanes and 6-foot-wide shoulders that passes underneath I-80. The I-80/Gilman Street interchange is a four-lane arterial roadway (Gilman Street), with two lanes in the east/west direction that are intersected with four I-80 on- and off-ramps, West Frontage Road, and Eastshore Highway. This is a Type I project as defined under 23 CFR 772. Figures 2-1 and 2-2 show the project vicinity and project location, respectively.

The No-Build Alternative and Roundabout Alternative are under consideration.

2.1 No-Build Alternative

The No Build Alternative consists of the future conditions with transportation improvements only as currently planned and programmed for funding. The No Build Alternative provides a basis for comparing the build alternatives. Under NEPA, the No Build Alternative can be used as the baseline for comparing environmental impacts; under CEQA, the baseline for environmental impact analysis consists of the existing conditions at the time the environmental studies began.

2.2 Build Alternative

The Roundabout Alternative includes the reconfiguration of I-80 ramps and intersections at Gilman Street. The existing nonsignalized intersection configuration with stop-controlled ramp termini would be replaced with two hybrid single-lane roundabouts with multilane portions on Gilman Street at the I-80 ramp terminals. The I-80 ramps and frontage road intersections at each ramp intersection would be combined to form a single roundabout intersection on each side of I-80. Gilman Street would be reconstructed on the west from the parking lots at Tom Bates Regional Sports Complex along Gilman Street to the eastern side of the 4th Street intersection. Work would also include reconstruction of West Frontage Road and Eastshore Highway within the project limits. In addition, the northern and southern legs of the eastern roundabout will be reduced from two lanes to one lane entering the roundabout. The southbound and northbound movements onto Eastshore Highway would instead be made via 2nd Street to Page Street or 2nd Street to Harrison Street.

Improvements associated with installation of the roundabouts would extend approximately 280 feet south on West Frontage Road from the Gilman Street interchange and approximately 250 feet north and 1,010 feet south on Eastshore Highway from the Gilman Street interchange. Work associated with reconfiguration of the eastbound I 80 off-ramp and on-ramp would extend approximately 820 feet south and 280 feet north of the interchange. Work associated with reconfiguration of the westbound I-80 off-ramp and on-ramp would extend approximately 370 feet north and 230 feet south of the

interchange. There are no proposed improvements to the freeway mainline. A metering light would be installed on West Frontage Road to regulate the volume of northbound traffic that enters the western roundabout.

The western roundabout intersection would consist of four approaching legs: eastbound and westbound Gilman Street, West Frontage Road, and I-80 westbound off-ramp. The eastern roundabout intersection would include five approaching legs: I 80 eastbound off-ramp, northbound and southbound Eastshore Highway, and eastbound and westbound Gilman Street. A left-turn pocket would be provided on Gilman Street for vehicles traveling eastbound turning onto northbound 2nd Street. Left turns will be restricted from westbound Gilman Street turning onto southbound 2nd Street.

Improvements on 2nd Street north of Gilman Street include reduced crossing distances, new striping, signing, new pavement, additional landscaping, and new light poles. South of Gilman Street, improvements on 2nd Street include a bulb-out on the southeast corner of the intersection and converting the road to one-lane southbound, while the other lane would be used as a designated parking/loading zone for businesses.

All modified roadways including ramps, frontage roads, and arterials would be improved. Improvements would include mill and overlay of pavement, striping, relocation of drainage inlets, lighting, and signage.

Several operational improvements would be incorporated in to the project. A metering signal would be installed on the northbound leg of the western roundabout to limit the volume of traffic that is bypassing the freeway using West Frontage Road. A queue cutting signal will be placed on the eastbound leg of the Union Pacific Railroad (UPRR) crossing at 3rd Street to prevent traffic from extending across the UPRR tracks.

. Project Vicinity Map

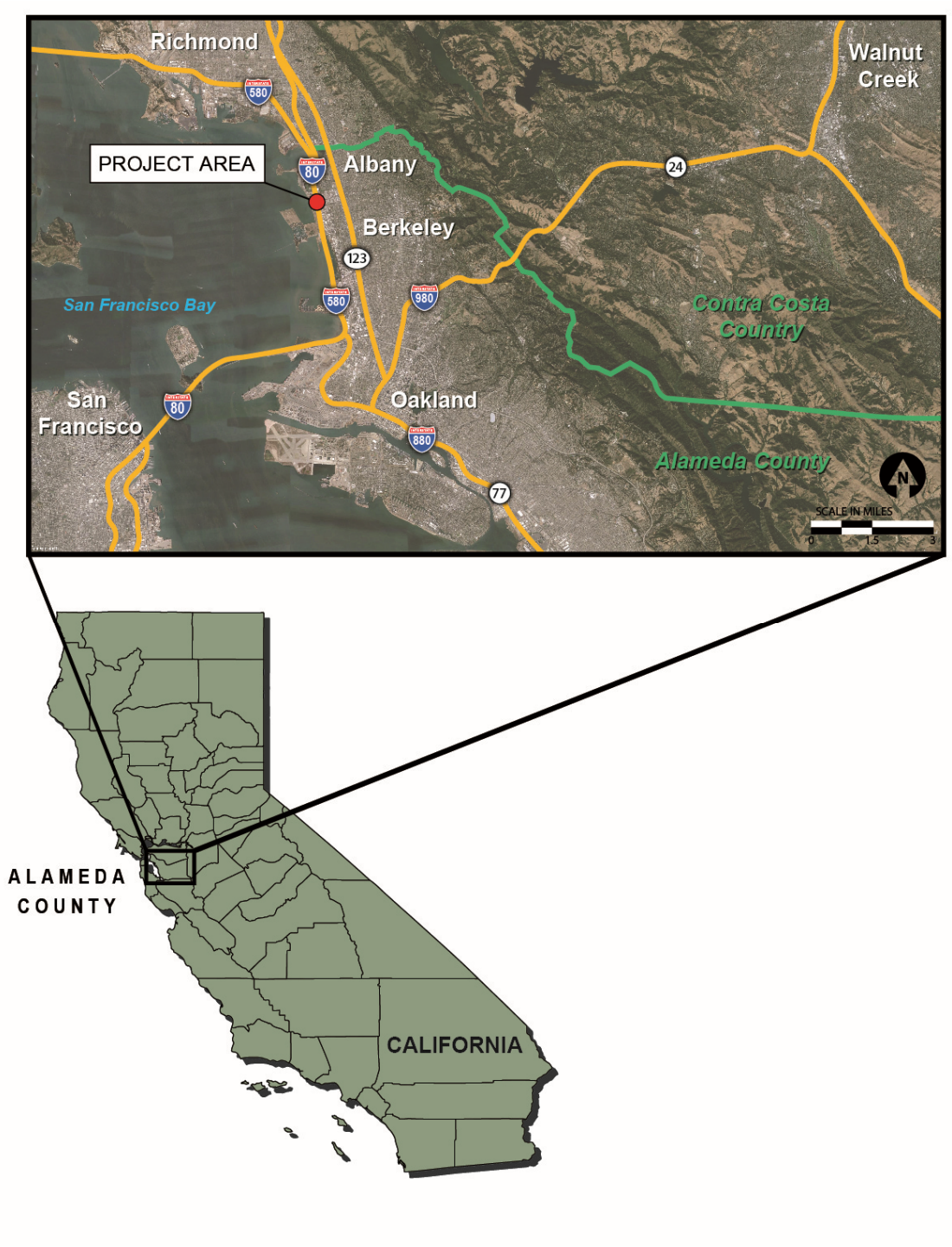
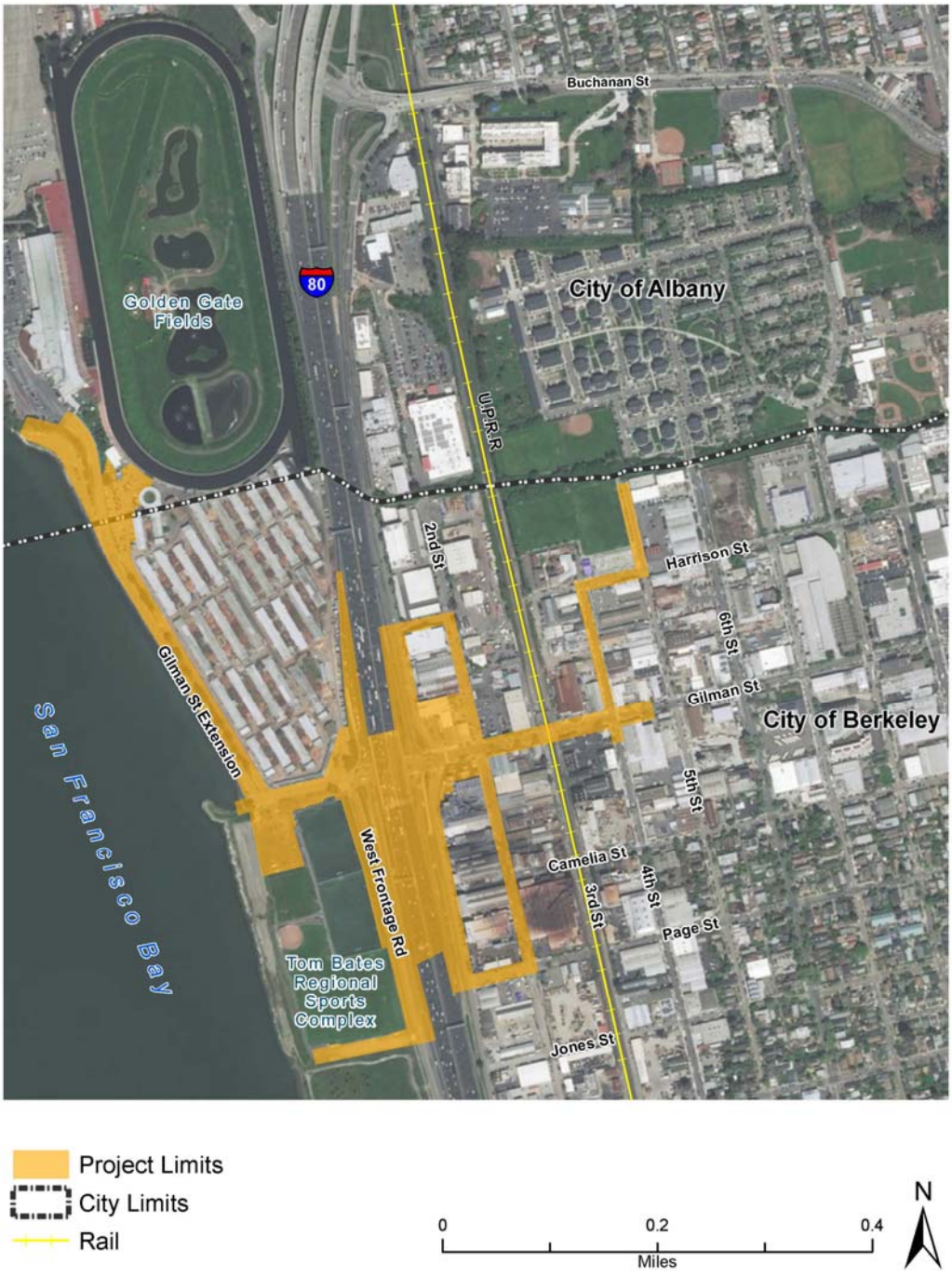


Figure 2-1

Figure 2-2. Project Location Map



Pedestrian and Bicycle Facilities

A shared-use Class I path consisting of 10-foot-wide travel way with a 2-foot-wide shoulder for pedestrians and bicyclists would be constructed on the south side of Gilman Street from 2nd Street to the eastern roundabout. The shared-use path would extend south along Eastshore Highway, where it would then connect to a proposed bicycle/pedestrian overcrossing. The overcrossing would be constructed over I-80, merging into the existing San Francisco Bay Trail (Bay Trail) that runs parallel to West Frontage Road. The at-grade shared-use path would continue on the south side of Gilman Street under I-80 and terminate at the Bay Trail on the west side of the interchange.

The bicycle/pedestrian overcrossing would be similar to the existing bicycle/pedestrian overcrossing over I-80 at University Avenue. The structure would be located south of Gilman Street and have a minimum of three spans with a maximum span length of approximately 230 feet over I-80. The foundations for the pedestrian bridge would be located on 2-foot diameter Cast-In-Drilled-Hole piles 120 feet below the existing ground surface. There would be two staircases incorporated into the overcrossing, one on each side of I-80. They would be approximately 45 feet long with a height of 25 feet to connect to the overcrossing. There would also be retaining walls on the east and west side of the overcrossing; they would be approximately 6 feet tall at the highest point and taper down to zero. The maximum depth of the retaining wall piles are expected to be 50 feet below the ground surface.

Improvements would be made along 4th Street to Harrison Street to 5th Street to provide bicycle connectivity between the Codornices Creek Path and the two-way cycle track on Gilman Street. These improvements would consist of painted shared-lane markings, also known as sharrows, on the pavement throughout this corridor. Bicycle signage and pedestrian scale lighting would be constructed as part of the improvements.

Approximately 125 feet of new curb, gutter, and sidewalk beginning at the corner of Harrison Street and 4th Street and ending half-way down the block towards 5th Street would be constructed. Parallel parking would be added along this new section of curb and sidewalk. The bus stop located at the corner of 4th Street and Gilman Street would be removed.

The Build Alternative includes a two-way cycle track on the south side of Gilman Street between the eastern I-80/Gilman Street ramps and 4th Street. The two-way cycle track is separated from vehicle traffic with a minimum 3-foot-wide striped buffer and a parking lane in some locations. The addition of the two-way cycle track would require installation of a traffic signal at the intersection of 4th Street and Gilman Street. The northern curb line on Gilman Street would also be shifted 2 to 5 feet north. Along Eastshore Highway, the sidewalk, curb, and gutter would be replaced between Page Street and Gilman Street.

West of the I-80/Gilman Street interchange, the existing Bay Trail would be extended approximately 660 feet west along the south side of Gilman Street from its current terminus at the intersection of West Frontage Road and Gilman Street to just beyond Berkeley city limits. The proposed Bay Trail extension would be 10 feet wide, unstriped, with 2-foot-wide unpaved shoulders on either side of the trail. On-street parking would be reduced by approximately 18 spaces at the end of Gilman Street as a result of the new trail extension.

Additional pedestrian and bicycle improvements include upgrading the 3rd Street/UPRR crossing at Gilman Street to accommodate the cycle track. Improvements would include relocating the gate, flashing beacons, addition of a bicycle signal, installation of medians, and improved striping and signage. All improvements will be approved by the UPRR and the California Public Utilities Commission (CPUC).

Utilities, Landscaping, and Drainage

Existing PG&E overhead electric lines along Gilman Street, West Frontage Road, and Eastshore Highway would be relocated as part of the Roundabout Alternative. Some of these overhead lines may be placed underground. Minor drainage modifications would also be required to conform to the new roundabout alignment and drainage improvements associated with the two-way cycle track along Gilman Street would also be required. Utility relocations and new drainage systems may require trenching to a depth of approximately 6 feet.

A separation device would be installed underground along Gilman Street to separate trash, mercury, and polychlorinated biphenyls (PCBs). A tidal flap gate would be installed at the existing headwall of the 60" reinforced concrete pipe at the west end terminus of Gilman Street. Replacement of the existing headwall and associated rip rap may include in-water work. Work below the ordinary mean high water mark may be required. Dewatering or a coffer dam may also be required.

New light pole foundations and ramp metering poles would be 2 feet in diameter and would range from 5 to 13 feet deep near the roundabout. An existing East Bay Municipal Utility District (EBMUD) recycled water transmission line would be relocated and extended as part of the project. Approximately 1,100 feet of a new 12-inch recycled water transmission pipeline within Eastshore Highway from Page Street to Gilman Street and approximately 1,050 feet of pipeline within Gilman Street from 2nd Street to the Buchanan Street extension are part of the Roundabout Alternative. The maximum excavations for the pipe trench would be approximately 24 inches wide by 60 inches deep. Approximately 1,100 feet of an existing 10-inch EBMUD recycled water pipeline located within California Department of Transportation (Caltrans) ROW along the eastbound Gilman Street off-ramp shoulder would be abandoned in place or removed. A new City of Berkeley sewer line would be installed underneath Gilman Street beginning at a point east of the Interchange and ending on the west side I-80 at the approximate entrance to the Tom Bates Sports Complex parking lots.

Existing vegetation is sparse in the project footprint and consists of ornamental plantings or ruderal vegetation. The Roundabout Alternative would remove existing landscaping and trees on the sidewalk along Eastshore Highway from Page Street to Gilman Street. In addition, trees and/or shrubs would be removed at the I-80 off-ramps, westbound I-80 on-ramp, and along the Bay Trail. Opportunities for new landscaping or artwork would be available in the center of each roundabout. Opportunities for tree replacements on site will be available.

Golden Gate Fields Access

The existing driveway entrance to Golden Gate Fields is located immediately adjacent to the westbound I-80 off-ramp at the end of the curb return on Gilman Street. Construction of the roundabout would expand the ramp intersection to the north and would require relocation of the Golden Gate Fields entrance and exit gate to their stables.

Alternate entrance and exit gate options for Golden Gate Fields were evaluated and discussed with Golden Gate Fields management in a series of meetings.

The Build Alternative would relocate the entrance and exit gate to the Gilman Street Extension. The existing gate would be connected to Golden Gate Fields Access Road allowing for the existing security shed to remain in place. The intersection of Gilman Street Extension with Golden Gate Fields Access Road would be improved and Gilman Street would be widened to the south to provide space for two – two lane roads separated by a median. The Golden Gate Fields north east parking lot would be re-sized and re-striped to allow room for the Gilman Street Extension/Golden Gate Fields Access Road intersection. The existing security shed leading to the north east and northwest parking lots would be moved north and reconstructed with new gates. The Golden Gate Fields north west parking lot would be restriped to maximize the parking spaces. Both parking lots would be repaved, restriped, and lighting and landscaping elements would be added. Golden Gate Fields internal access road and the Gilman Street Extension would be repaved and restriped between Gilman Street and the north east and north west parking lots. Fifteen new parallel parking spaces would be striped along the Gilman Street access road. There would be no net loss of parking for Golden Gate Fields.

Partial Property Acquisitions

Partial acquisitions will be required for ROW from Golden Gate Fields and EBRPD. Relocation of the driveway would be required from a property located on the south side of Gilman and 2nd Streets. Additionally, a permit to construct from Golden Gate Fields would be required to complete improvements on their property. TCEs would be required for construction equipment storage, staging, and laydown from EBRPD and various property owners along Gilman Street, 4th Street, Harrison Street, and 5th Street.

Construction Activities

Construction work for the Roundabout Alternative would be done primarily during daylight hours from 7:00 a.m. to 6:00 p.m.; however, there may be some work during night-time hours to avoid temporary roadway closures for tasks that could interfere with traffic or create safety hazards. Work hours along the internal access road in Golden Gate Field property will be limited to after 10:00 am to 5:00 pm. and night work will be restricted within or adjacent to Golden Gate Fields property. Examples of work activities include striping operations, traffic control setup, installation of storm drain crossings, and asphalt pavement mill and overlay.

Temporary lane and ramp closures and detours would occur. It is anticipated that temporary closure of existing bicycle or pedestrian facilities would occur at times and may require

temporary rerouting of transit service due to intersection work. A Transportation Management Plan (TMP) would be developed and implemented as part of the project construction planning phase. The TMP would address potential impacts to circulation of all modes of travel (i.e., transit, bicycles, pedestrians, and private vehicles). Roadway and/or pedestrian access to all occupied businesses and respective parking lots would be maintained during project construction. The TMP would include an evaluation of potential impacts because of diverting traffic to alternate routes, and it would also include measures to minimize, avoid, and/or mitigate impacts to alternate routes, such as agreements with local agencies to provide enhanced infrastructure on arterial roads or intersections to deal with detoured traffic. The TMP may provide for contracting with local agencies for traffic personnel, especially for special event traffic through or near the construction zone.

The anticipated construction staging areas available include areas within the existing roadway ROW construction limits. An additional staging area may be required west of the project on Gilman Street in one or two parking lots owned by EBRPD. Staging areas are shown on Figure 3.

The following equipment is anticipated to be used during construction: auger drill rig, backhoe, compactor, concrete pump, crane, dozer, excavator, front end loader, grader, heavy duty dump trucks, jackhammer, vibratory roller, and pavement breaker.

Chapter 3. Fundamentals of Traffic Noise

The following is a brief discussion of fundamental traffic noise concepts. For a detailed discussion, please refer to Caltrans' Technical Noise Supplement (TeNS) (Caltrans, 2013), a technical supplement to the Protocol, which is available on the Caltrans Web site (http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf).

3.1 Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receptor, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receptor determines the sound level and characteristics of the noise perceived by the receptor. The field of acoustics deals primarily with the propagation and control of sound.

3.2 Frequency and Hertz

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

3.3 Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (µPa). One µPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 µPa. Because of this huge range of values, sound is rarely expressed in terms of µPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 µPa.

3.4 Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces an

SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB - rather, they would combine to produce 73 dB, a difference of 3 dB. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dB louder than one source.

3.5 A-Weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz, and perceive sounds within that range better than sounds of the same amplitude in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an "A-weighted" sound level (expressed in units of dBA) can be computed based on this information.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When judgments are made of the relative loudness or annoyance of a sound, these judgments correlate well with the A-weighted levels of those sounds. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with highway-traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels or dBA. Table 3-1 describes typical A-weighted noise levels for various noise sources.

3.6 Human Response to Changes in Noise Levels

As discussed above, doubling sound energy results in a 3 dB increase in sound. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different than what is measured.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dB changes in sound levels, when exposed to steady, single-frequency ("pure-tone") signals in the mid-frequency (1,000 Hz–8,000 Hz) range. In typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5 dB increase is generally perceived as a distinctly noticeable increase, and a 10 dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3 dB increase in sound, would generally be perceived as barely detectable by the average person.

Table 3-1. Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	**— 70 —**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**— 60 —**	
		Large business office
Quiet urban daytime	**— 50 —**	Dishwasher next room
Quiet urban nighttime	**— 40 —**	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	**— 0 —**	Lowest threshold of human hearing

Source: Caltrans, 2013.

3.7 Noise Descriptors

Noise in our daily environment fluctuates over time. Some fluctuations are minor, but some are substantial. Some noise levels occur in regular patterns, but others are random. Some noise levels fluctuate rapidly, but others slowly. Some noise levels vary widely, but others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors most commonly used in traffic noise analysis:

- **Equivalent Sound Level (L_{eq}):** L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour A-weighted equivalent sound level ($L_{eq}[h]$) is the energy average of A-weighted sound levels occurring during a one-hour period, and is the basis for noise abatement criteria (NAC) used by Caltrans and FHWA.

- **Percentile-Exceeded Sound Level (L_n):** L_n represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10% of the time, and L_{90} is the sound level exceeded 90% of the time).

- **Maximum Sound Level (L_{max}):** L_{max} is the highest instantaneous sound level measured during a specified period.

- **Day-Night Level (L_{dn}):** L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A-weighted sound levels occurring during nighttime hours between 10 p.m. and 7 a.m.

- **Community Noise Equivalent Level (CNEL):** Similar to L_{dn}, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10 p.m. and 7 a.m., and a 5 dB penalty applied to the A-weighted sound levels occurring during evening hours between 7 p.m. and 10 p.m.

3.8 Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on the following factors.

3.8.1 Geometric Spreading

Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path, and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source.

3.8.2 Ground Absorption

The propagation path of noise from a highway to a receptor is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 feet. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water,), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receptor, such as soft dirt, grass, or scattered bushes and trees), an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance.

3.8.3 Atmospheric Effects

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) from the highway due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects.

3.8.4 Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receptor specifically to reduce noise. A barrier that breaks the line of sight between a source and a receptor will typically result in at least 5 dB of noise reduction. Taller barriers provide increased noise reduction. Vegetation between the highway and receptor is rarely effective in reducing noise because it does not create a solid barrier.

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Chapter 4. Federal Regulations and State Policies

This report focuses on the requirements of Title 23 CFR 772, as discussed below.

4.1 Federal Regulations

4.1.1 Title 23 CFR 772

Title 23 CFR 772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. Under Title 23 CFR 772.7, projects are categorized as Type I, Type II, or Type III projects.

- FHWA defines a Type I project as a proposed federal or federal-aid highway project for the construction of a highway on a new location or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment of the highway. The following projects are also considered to be Type I projects:
- The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a high-occupancy vehicle (HOV) lane, high-occupancy toll (HOT) lane, bus lane, or truck climbing lane,
- The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane,
- The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange,
- Restriping existing pavement for the purpose of adding a through traffic lane or an auxiliary lane,
- The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza.

If a project is determined to be a Type I project under this definition, the entire project area as defined in the environmental document is a Type I project.

A Type II project is a noise barrier retrofit project that involves no changes to highway capacity or alignment. A Type III project is a project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis.

Under Title 23 CFR 772.11, noise abatement must be considered for Type I projects if the project is predicted to result in a traffic noise impact. In such cases, Title 23 CFR 772 requires that the project sponsor "consider" noise abatement before adoption of the final NEPA document. This process involves identification of noise abatement measures that are reasonable, feasible, and likely to be incorporated into the project, and of noise impacts for which no apparent solution is available.

Traffic noise impacts, as defined in Title 23 CFR 772.5, occur when the predicted noise level in the design year approaches or exceeds the Noise Abatement Criteria (NAC) specified in Title 23 CFR 772, or a predicted noise level substantially exceeds the existing noise level (a "substantial" noise increase). Title 23 CFR 772 does not specifically define the terms "substantial increase" or "approach"; these criteria are defined in the Protocol, as described in the next subsection.

Table 4-1 summarizes NAC corresponding to various land use activity categories. Activity categories and related traffic noise impacts are determined based on the actual or permitted land use in a given area.

Table 4-1. Activity Categories and Noise Abatement Criteria

Activity Category	Activity $L_{eq}[h]$[1]	Evaluation Location	Description of Activities
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	Exterior	Residential.
C[2]	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A-D or F.
F	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	--	Undeveloped lands that are not permitted (without building permits)

[1] The $L_{eq}(h)$ activity criteria values are for impact determination only and are not design standards for noise abatement measures. All values are A-weighted decibels (dBA).
[2] Includes undeveloped lands permitted for this activity category.

Source: 23 CFR Part 772, 2010

4.1.2 Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects

The Caltrans Traffic Noise Analysis Protocol (Protocol) for New Highway Construction, Reconstruction, and Retrofit Barrier Projects (Caltrans, 2011) specifies the policies, procedures, and practices to be used by agencies that sponsor new construction or reconstruction of federal or Federal-aid highway projects The Protocol defines a noise increase as substantial when the predicted noise levels with project implementation exceed existing noise levels by 12 dB or more. The Protocol also states that a sound level is considered to approach an NAC level when the sound level is within 1 dB of the NAC identified in Title 23 CFR 772 (e.g., 66 dBA is considered to approach the NAC of 67 dBA, but 65 dBA is not).

The Technical Noise Supplement to the Protocol provides detailed technical guidance for the evaluation of highway traffic noise. This includes field measurement methods, noise modeling methods, and report preparation guidance.

4.2 State Regulations and Policies

4.2.1 California Environmental Quality Act (CEQA)

Noise analysis under the California Environmental Quality Act (CEQA) may be required regardless of whether or not the project is a Type I project. The CEQA noise analysis is completely independent of the 23 CFR 772 analysis done for NEPA. Under CEQA, the baseline noise level is compared to the build noise level. The assessment entails looking at the setting of the noise impact and then how large or perceptible any noise increase would be in the given area. Key considerations include: the uniqueness of the setting, the sensitive nature of the noise receptors, the magnitude of the noise increase, the number of residences affected, and the absolute noise level.

The significance of noise impacts under CEQA are addressed in the environmental document rather than the NSR. Even though the NSR (or noise technical memorandum) does not specifically evaluate the significance of noise impacts under CEQA, it must contain the technical information that is needed to make that determination in the environmental document.

4.2.2 Section 216 of the California Streets and Highways Code

Section 216 of the California Streets and Highways Code relates to the noise effects of a proposed freeway project on public and private elementary and secondary schools. Under this code, a noise impact occurs if, as a result of a proposed freeway project, noise levels exceed an $L_{eq}(h)$ of 52 dBA in the interior of public or private elementary or secondary classrooms, libraries, multipurpose rooms, or spaces. This requirement does not replace the “approach or exceed” NAC criterion for FHWA Activity Category C for classroom exteriors, but it is a requirement that must be addressed in addition to the requirements of Title 23 CFR 772.

If a project results in a noise impact under this code, noise abatement must be provided to reduce classroom noise to a level that is at or below an $L_{eq}(h)$ of 52 dBA. If the noise levels generated from freeway and roadway sources exceed an $L_{eq}(h)$ of 52 dBA prior to construction of the proposed freeway project, then noise abatement must be provided to reduce the noise to the level that existed prior to construction of the project.

Chapter 5. Study Methods and Procedures

5.1 Methods for Identifying Land Uses and Selecting Noise Measurement and Modeling Locations

Frequent outdoor use areas that could be subject to traffic and construction noise impacts from the proposed project were identified using aerial photography, Google Street View, and field site visit. Existing land uses in the noise study area were categorized by land use type and Activity Category as defined in the Activity Category of Table 4-1 and the extent of frequent human use. As stated in the Protocol, noise abatement is only considered where frequent human use occurs and where a lowered noise level would be a benefit. Accordingly, this impact analysis focuses on locations with defined outdoor use activity areas, such as the outdoor sports complex.

The geometry of the project relative to nearby existing and planned land uses was also identified.

Two short-term outdoor noise measurements were conducted at the Tom Bates Regional Sports Complex and near the stable area of Golden Gate Fields on August 31, 2016 by Parsons personnel to calibrate the TNM 2.5 computer noise model. An additional long-term outdoor noise measurement was conducted near the stable area of Golden Gate Fields between April 17 and 20, 2018 to establish the peak-noise hour hourly noise distribution of the noise study area. These measurement sites were selected to represent the existing outdoor use area within the noise study area as well as possible areas of concern, i.e. the stable area of Golden Gate Fields. Measurement locations were also selected to serve as representative modeling locations. Other non-measurement locations were also selected as modeling locations. Train pass-by noise measurements were conducted between April 18 and 20, 2018 to capture train noise characteristics. The measurement locations are identified in Figure 5-1

5.2 Field Measurement Procedures

Noise measurements were conducted at selected locations to evaluate the existing noise environment. Noise measurements were conducted in conformance with the TeNS and with the guidelines outlined in FHWA's "Measuring of Highway Related Noise," FHWA-DP-96-046. The following is a brief description of the measurement procedures used for this project:

- Microphones were primarily placed approximately 5 feet above the ground and were positioned more than 10 feet from any wall or building to prevent reflections or unrepresentative shielding of the noise.
- Sound level meters were calibrated before and after each set of measurements.
- Following the calibration of equipment, a windscreen was placed over the microphone.

- Frequency weighting was set on "A", and the slow detector response was selected.
- Results of the measurements were recorded on data sheets in the field. This information is located in Appendix C.
- During the noise measurements, any noise contaminations such as barking dogs, power tools, etc. that could affect measured results were avoided or minimized.
- Traffic was counted for model calibration measurements simultaneously when the short-term noise measurements were recorded. Vehicle types were separated into three vehicle groups: automobiles, medium trucks (two-axle with six-wheels but not including dually pick-up trucks), and heavy trucks (three or more axle vehicles). Traffic speeds were measured by clocking vehicles over a known distance on the video. Traffic data is located in Appendix A.
- Wind speed, temperature, humidity, and sky conditions were observed and documented during the short-term noise measurements. This information is located in Appendix C.

Instruments used for the noise measurements included the following:

- Sound Level Meters – Larson Davis model 812 and 820.
- Microphone System: - Larson Davis model PRM 828 microphone preamp; Larson Davis model 2560, ½-inch pressure microphone.
- Acoustic Field Calibrators – Larson Davis model CA250 constant pressure microphone calibrators.
- 4-inch diameter windscreen; and tripods.
- Drone with video camera – Diji Phantom 3 Standard
- Wind Monitor/Temperature and Humidity Gauge – Kestrel 3000 Pocket Weather Meter.

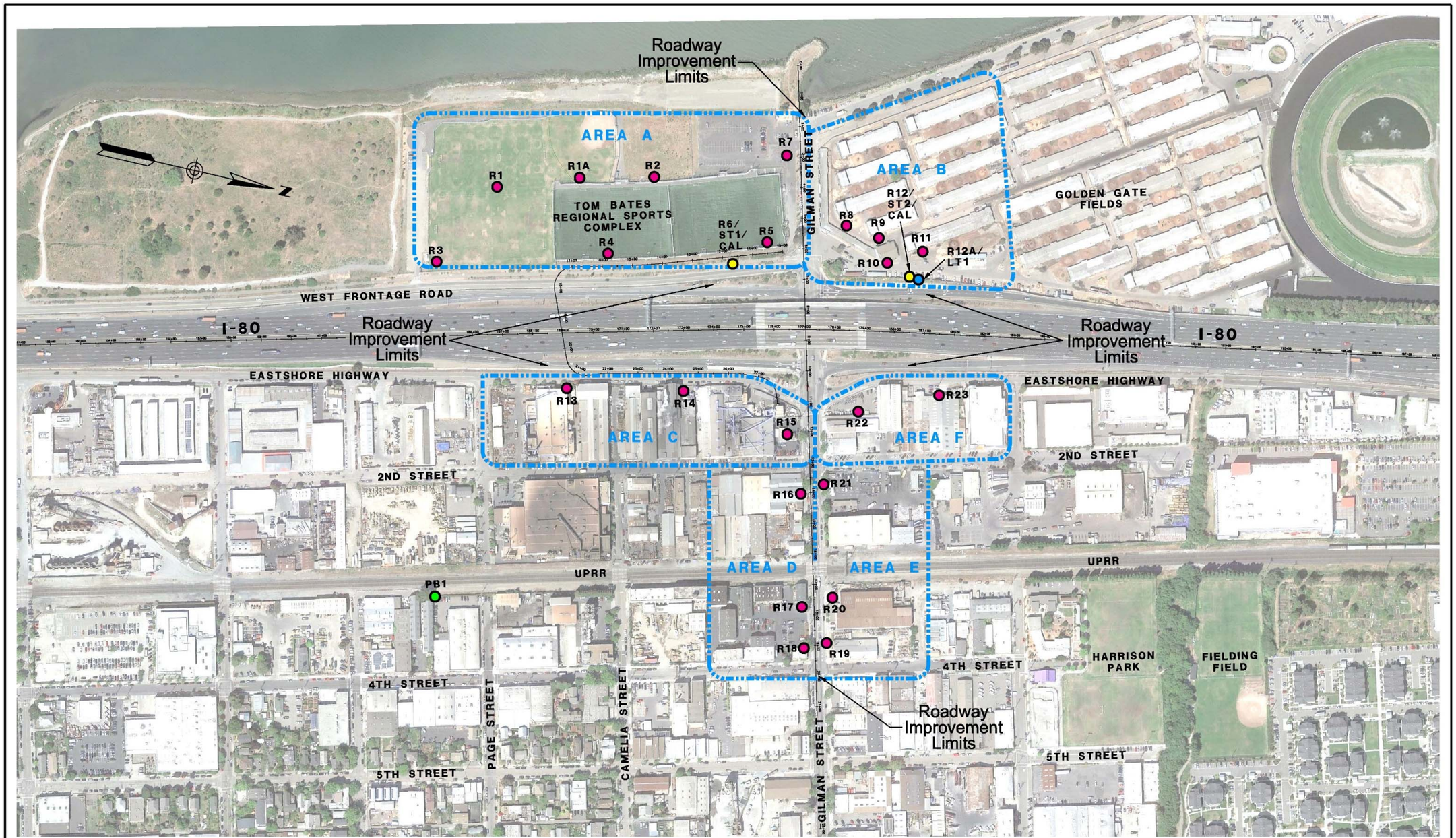
Instrumentation serial numbers, calibration data, noise measurement dates and times, noise measurement data, meteorological data, and measurement locations are noted on the noise measurement field forms located in Appendix C.

5.2.1 Short-Term Measurements

Short-term noise measurements, ST1 and ST2, were conducted at two sites on August 31, 2016 using Larson-Davis model 812 Precision Type 1 sound level meter. Measurements were taken for two consecutive 10-minute intervals at each site for a total of 20 minutes. The repetition of the measurement is to ensure consistency. The short-term measurement locations are identified in Figure 5-1 and in Appendix F, and addresses are listed in Table 6-1 of Chapter 6 Existing Noise Environment. Noise measurement field notes are located in Appendix C and measurement site photographs are presented in Appendix D.

Field staff attended the meter during the short-term measurements (20 total minutes in duration). Any non traffic noise sources (e.g., car alarms and dogs barking) that could potentially contaminate the measured noise levels were avoided or minimized.

Figure 5-1. Analysis Areas, Noise Monitoring, and Analysis Positions



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The calibration of the meter was checked before and after the measurement using Larson-Davis Model CAL250 calibrator. Temperature, wind speed, and humidity were recorded manually during the short-term monitoring session using a Kestrel 3000 portable weather station. During the short-term measurements, the temperature was 72 degrees Fahrenheit (°F), the wind speed was 3 miles per hour (mph), with a relative humidity of 67 percent.

Traffic on I-80 and West Frontage Road were recorded with a video camera during the short-term noise measurements and later classified and counted. The video for I-80 and ramps were recorded by a drone as this was the best method for capturing all the traffic required to calibrate the traffic noise model. Vehicles were classified as automobiles, medium-duty trucks, or heavy-duty trucks. An automobile was defined as a vehicle with two axles and four tires that are designed primarily to carry passengers. Small vans and light trucks were included in this category. Medium-duty trucks included all cargo vehicles with two axles and six tires. Heavy-duty trucks included all vehicles with three or more axles.

5.2.2 Long-Term Measurements

Long-term monitoring was conducted at one site between April 17 and 20, 2018 using Larson-Davis model 812 Precision Type 1 sound level meter. The measurements were taken over a period of 72 hours. The calibration of the meter was checked before and after the measurements using Larson-Davis Model CAL250 calibrator. The long-term measurement location is identified in Figure 5-1 and in Appendix F, and addresses are listed in Table 6-2 of Chapter 6 Existing Noise Environment. Noise measurement field notes are located in Appendix C and measurement site photographs are presented in Appendix D.

5.2.3 Train Pass-By Measurements

Train pass-by monitoring was conducted on April 18, 19, and 20, 2018 using Larson-Davis model 820 Precision Type 1 sound level meter. The calibration of the meter was checked before and after the measurements using Larson-Davis Model CAL250 calibrator. The pass-by measurement location is identified in Figure 5-1 and in Appendix F. Noise measurement field notes are located in Appendix C and measurement site photographs are presented in Appendix D.

The pass-by measurement location was chosen to be away from crossing gates and signals so that the measurements primarily contained the train noise, and not crossing signal noise. Field staff attended the meter during the measurements to note the type of train, which track the train was traveling on, number of locomotives and cars, speed, and direction as well as any observable differences in noise characteristics such as if the train horn was louder than other events. These procedures were developed in consultation with Caltrans and approved on April 3, 2018.

5.3 Traffic Noise Levels Prediction Methods

5.3.1 Traffic Noise Levels

Traffic Noise Model:

The Federal Highway Administration's Traffic Noise Model (TNM) version 2.5 was used for the noise computations (FHWA, 2004) and the Roadway Construction Noise Model (RCNM) version 1.1 was used for construction noise (FHWA, 2008).

TNM 2.5 inputs are based on a three-dimensional grid created for the noise study area to be modeled. All roadway, barrier, and receptor points are defined by their x, y, and z coordinates. The x and y coordinates are obtained by digitizing line strings into a provided computer-assisted drafting (CAD) layout drawing and later exported into a spreadsheet. The z coordinates are determined by the existing ground digital terrain map (DTM), which is a 3-D rendering of the topographic data as well as topographic contours included in the CAD layout map. The coordinates are then exported from the spreadsheet into TNM 2.5.

Roadways and barriers are coded into TNM 2.5 as line segments defined by their end points. Receptors, defined as single points, are typically located at frequent outdoor use areas such as the outdoor sports complex. Receptors are modeled at a height of 5 feet above ground elevation. Appendix E lists the addresses of modeled noise receptors. TNM files are contained on a CD that is located under Appendix G.

To determine the noise levels generated by traffic, the TNM computer program requires inputs of traffic volumes, speeds, and vehicle types. Three vehicle types were inputted into the model: cars, medium trucks, and heavy trucks. The propagation path between the source and receptor is modeled in TNM by specifying building structures and existing barriers such as safety barriers. Propagation of noise can be further specified by selecting ground types such as hard soil, loose soil, pavement, lawn, and field grass. The lawn option was chosen as the overall ground type for this study, because the noise model calibrated best with the lawn option.

Traffic Volumes, Truck Percentages, and Speeds

Traffic noise is a function of traffic type, volume, and speed. Generally, noise increases with increased speed and with higher volumes of traffic. However, at much higher volumes, travel speed decreases (stop and go conditions), so the worst-case noise levels are experienced when there is an optimum balance between the volume and speed. For purposes of determining noise impacts, the worst-case traffic noise occurs when traffic is operating under Level of Service (LOS) C conditions. Under these conditions, traffic is heavy, but remains free flowing.

Existing, design-year no-build, and design-year build conditions have been modeled to determine worst-noise hour noise levels using TNM. Existing conditions were modeled in accordance with the Technical Noise Supplement.

The following assumptions were used for modeling peak-noise hour traffic noise levels for the existing, no-build, and build alternative:

- I-80 Mainline Volumes: 1,800 vehicles-per-hour (vph) / lane
- I-80 Ramp Volumes: 1,000 vph / lane (or predicted volume, if less)
- Gilman Street, West Frontage Road, and Eastshore Highway Volumes: Predicted volumes (or capped at LOS C volumes)
- I-80 Mainline Speed: 65 mph
- I-80 On-Ramp Speed: 10 to 65 mph – existing and no-build
20 to 65 mph – build
- I-80 Off-Ramp Speed: 65 to 10 mph – existing and no-build
65 to 20 mph – build
- Gilman Street, West Frontage Road, and Eastshore Highway Speeds: Posted speed limits

Peak-hour traffic volumes for Gilman Street, West Frontage Road, and Eastshore Highway under existing (year 2016) and design-year (year 2040) conditions were provided in the Traffic Operation Analysis Report (TJKM, 2017). Traffic volumes were examined under existing, design-year no-build, and design-year build conditions to determine the traffic level of service. The Traffic Report defines the level of service for the intersections under existing and design-year conditions as follows:

- Existing (2016) traffic volumes under the existing condition exceed LOS C for both AM and PM peak hours.
- Design-year (2040) traffic volumes under the no-build condition exceed LOS C for both AM and PM peak hours.
- Design-year (2040) traffic volumes under the build alternative condition exceed LOS C for both AM and PM peak hours.at the western roundabout as well as the Second Street intersection and the design year traffic volumes are below LOS C for both AM and PM peak hours at the eastern roundabout.

Based on the provided level of service, LOS C volumes for AM and PM peak hours were developed for the noise study and LOS C AM peak volumes were used to model existing and design-year no-build conditions. The AM peak hour was chosen because the volumes were greater in the AM.

Furthermore, to use the highest volumes while remaining LOS C or better conditions for the design year conditions, a combination of predicted 2040 AM peak volumes and LOS C AM peak volumes were used to model the build condition.

Truck percentages for I-80 are based on year 2014 truck traffic data provided on the Caltrans' website. Truck percentages along Gilman Street were derived from traffic counts performed for the Traffic Operations Analysis Report (TJKM, 2017). Truck percentages on West Frontage Road and Eastshore Highway were assumed to be the average of the truck percentages on Gilman Street. Appendix A presents the future traffic

volumes and traffic distribution per direction of travel for the existing, design-year no-build, and design-year build conditions.

The methodology for determining speeds as the traffic approaches and departs an intersection used in the traffic noise models are based on those described in the NCHRP Report 791, Supplemental Guidance on the Application of FHWA's Traffic Noise Model (Transportation Research Board, 2014). NCHRP Report 791 provides guidance on modeling speeds to be used for acceleration as well as deceleration at common roadway intersections including four-way stops, signalized intersections, and roundabouts.

Noise Model Calibration

TNM 2.5 was used to compare measured traffic noise levels to modeled noise levels at field measurement locations to validate the accuracy of the model. Traffic volumes counted during each measurement period were adjusted to 1-hour volumes by multiplying the 20 minute counts by a factor of three. Appendix A contains traffic volumes counted for the model calibration. The 1-hour volumes were assigned to the corresponding noise study area roadways to simulate the noise source strength at the roadways during the actual measurement periods. Modeled and corresponding measured sound levels were then compared to determine the accuracy of the model and if additional calibration of the model was necessary. Refinement of the noise model is performed until there is agreement between the two compared values. If, after thorough re-evaluation, calibration still cannot be achieved, then a calibration constant is added such that the modeled and measured values agree.

5.3.2 Train Noise Levels

Train traffic noise was estimated using the latest version of the noise model based on Federal Transit Administration (FTA) General Transit Noise Assessment methodology (FTA, 2006). Calculation of peak-hour train noise required various input parameters such as number of train operations, operational speeds, distances from the representative receptors to the railroad tracks, and the reference noise level determined from measured data. Current daily train operations for the project with maximum speeds were provided and compared to field observations which were conducted April 18 through 20, 2018. It is assumed that there will be no change to train operations in the future.

The Union Pacific Railroad (UPRR) line runs between 2nd Street and 4th Street in a northbound/southbound direction and crosses Gilman Street at grade through the noise study area. Because the crossing at Gilman Street is at grade, train horn noise has been considered in the noise assessment.

Both passenger, operated by Capitol Corridor Joint Powers Authority (CCJPA) and Amtrak, and freight trains, operated by UPRR, operate on this line and field observations established that both passenger and freight trains operate throughout the daytime hours. Therefore, when calculating the peak-hour train noise, both types of trains were considered.

Based on both field observations and provided maximum speed data, the number of peak-hour operations and cruising speeds were assumed to be five passenger trains traveling at 65 mph and one freight train traveling at 50 mph for all receptors within the noise study

area. Despite the expected train volume growth of both CCJPA and UPRR operations by design year 2040, it is assumed that the peak-hour operations would remain to be five passenger trains and one freight train per hour for future year 2040 conditions.

Noise impact analysis was conducted with the latest version of the FTA Noise Analysis Spreadsheet with a correction to the train noise source based on the train pass-by measurements. The measured data was first sorted to separate passenger and freight trains as well as to remove all inconsistent measurements such as the pass-by events with different observed horn characteristics and lower speeds as well those measurements which did not follow the trend. The sorted measured single event level (SEL) data for the train pass-bys were then converted to the single event level reference (SEL_{ref}) and then averaged and used as the FTA Noise and Vibration Assessment Manual SEL_{ref} to calculate noise impacts. The measured SEL_{ref} level at 50 feet for passenger and freight train noise used for calculating noise impacts is 106 dBA. Appendix I presents the sorted train noise data used in calculating the reference SEL (SELref).

Because receptors located along Gilman Street east of I-80 are exposed to train noise in addition to traffic noise, the composite noise levels of trains and project traffic were modeled for these receptors. Train noise is determined to be negligible for all receptors west of I-80 and not considered for these receptors. This is because the train noise contribution to the overall noise is insignificant relative to the high noise levels from the constant flow of traffic on I-80 for these receptors. Additionally, receptors west of I-80 are over 1,000 feet away from the tracks and shielded from train noise by both the fill of the I-80 overcrossing and by several buildings between the tracks and receptors significantly reducing the train noise contributions to these receptors.

5.4 Methods for Identifying Traffic Noise Impacts and Consideration of Abatement

Traffic noise impacts are considered to occur at receptor locations where predicted design-year traffic noise levels are 12 dB or more greater than existing noise levels, or where predicted design-year traffic noise levels approach or exceed the NAC for the applicable activity category. Where traffic noise impacts are identified, noise abatement must be considered for reasonability and feasibility as required by Title 23 CFR 772 and the Protocol.

According to the Protocol, abatement measures are considered acoustically feasible if a minimum noise reduction of 5 dB at impacted receptor locations is predicted with implementation of the abatement measures. In addition, barriers should be designed to intercept the line-of-sight from the exhaust stack of a truck to the first tier of receptors, as suggested by the Caltrans Highway Design Manual, Chapter 1100. Other factors that affect feasibility include topography, access requirements for driveways and ramps, presence of local cross streets, utility conflicts, other noise sources in the area, and safety considerations.

The overall reasonableness of noise abatement is determined by the following three factors:

- The noise reduction design goal.
- The cost of noise abatement.
- The viewpoints of benefited receptors (including property owners and residents of the benefited receptors).

The Caltrans' acoustical design goal is that a barrier must be predicted to provide at least 7 dB of noise reduction at one benefited receptor. This design goal applies to any receptor and is not limited to impacted receptors.

The Protocol defines the procedure for assessing reasonableness of noise barriers from a cost perspective. Based on 2017 construction costs an allowance of $95,000 is provided for each benefited receptor (i.e., receptors that receive at least 5 dB of noise reduction from a noise barrier). The total allowance for each barrier is calculated by multiplying the number of benefited receptors by $95,000. If the estimated construction cost of a barrier is less than the total calculated allowance for the barrier, the barrier is considered reasonable from a cost perspective. The viewpoints of benefits receptors are determined by a survey that is typically conducted after completion of the noise study report. The process for conducting the survey is described in detail in the Protocol.

This noise study report identifies traffic noise impacts and evaluates noise abatement for acoustical feasibility. It also reports information that will be used in the reasonableness analysis including if the 7 dB design goal reduction in noise can be achieved and the abatement allowances. The noise study report does not make any conclusions regarding reasonableness. The feasibility and reasonableness of noise abatement is reported in the Noise Abatement Decision Report.

Chapter 6. Existing Noise Environment

6.1 Existing Land Uses

An aerial photography survey was conducted to identify land uses that could be subject to traffic and construction noise impacts from the proposed project. The following land uses were identified in the noise study area:

- Tom Bates Regional Sports Complex and San Francisco Bay Trail: Activity Category C
- Horse stable area of Golden Gate Fields and general commercial land uses: Activity Category E
- Industrial facilities, Activity Category F

Although all developed land uses are evaluated in this analysis, noise abatement is only considered for areas of frequent human use that would benefit from a lowered noise level. Accordingly, this impact analysis focuses on locations with defined outdoor activity areas, specifically the Tom Bates Regional Sports Complex.

Land uses in the noise study area have been grouped into a series of lettered analysis areas that are identified in Figure 5-1. Each of these analysis areas is considered to be acoustically equivalent.

Area A: Area A is located west of West Frontage Road and I-80 and south of Gilman Street. The Tom Bates Regional Sports Complex as well as the San Francisco Bay Trail (Activity Category C) are located in this area. This area is flat and no noise barriers are located or topographic shielding occurs between the roadways and this area.

Area B: Area B is located west of I-80 and north of Gilman Street. The stable area of Golden Gates Fields (Activity Category E) is located in this area. While there are no formal frequent human use areas located within this location, horse trainers train their horses at a carousal in front of the stables. However, because this activity does not fall with those described in Activity Category C and the City of Berkeley has zoned this area as commercial, this area is classified as Activity Category E. Area B is flat and no noise barriers located or topographic shielding occurs between the roadways and the land use.

Area C: Area C is located east of Eastshore Highway as well as I-80 and south of Gilman Street. This area is mainly industrial (Activity Category F) with a commercial establishment (Activity Category E) on Gilman Street. There are no formal frequent human use areas located within this location. This area is flat. There are no noise barriers or topographic shielding that occurs between the roadway and the land uses.

Area D: Area D is located south of Gilman Street between 2nd Street and 4th Street. This area contains commercial land uses and a restaurant (Activity Category E) as well as industrial land uses (Activity Category F). There are no formal frequent human use areas located within this

location. This area is flat and no noise barriers are located or topographic shielding occurs between the roadway and the land uses.

Area E: Area E is located north of Gilman Street between 2nd Street and 4th Street. This area contains industrial land uses and a retail establishment (Activity Category F). There are no formal frequent human use areas located within this location. This area is flat. There are no noise barriers or topographic shielding that occurs between the roadway and the land uses.

Area F: Area F is located east of Eastshore Highway as well as I-80 and north of Gilman Street. This area is a mix of commercial (Activity Category E) and industrial (Activity Category F) land uses. There are no formal frequent human use areas located within this location. This area is flat. There are not any noise barriers or topographic shielding that occurs between the roadways and the land uses.

6.2 Noise Measurement Results

The existing noise environment in the noise study area is characterized in the following sections based on short-term and long-term noise monitoring that was conducted. The objective of the measurements was to calibrate the TNM noise model and to determine peak-noise hour ambient noise levels.

6.2.1. Short-Term Monitoring

Short-term noise measurements were conducted at two sites in August 2016 for two consecutive 10-minute intervals for a total duration of 20 minutes each. Table 6-1 summarizes the short-term noise measurement results. Also included in Table 6-1 are the addresses and land use types for each of the measurement sites. Appendix C includes noise measurement data sheets recorded in the field with meteorological data, Appendix D includes the noise measurement site photographs, and Figure 1 in Appendix F present the noise measurement locations.

Table 6-1. Short-Term Noise Measurement Results

Site No.[1]	Street Address, City, State	Area	Land Use[2]	Activity Category and (NAC)	Measurement Dates	Start Time[3]	Measured Leq(h), dBA
ST1	San Francisco Bay Trail, Berkeley, CA	A	TRL	C (67)	08/31/16	12:20 pm	64
ST2	Golden Gate Fields, 1100 Eastshore Highway, Berkeley, CA	B	STA	E (72)	08/31/16	12:20 pm	65

Notes:
1 - ST – Short-Term Measurements.
2 - Land Use: TRL – trail; STA – horse stable area.
3 - Short-term measured noise levels were measured for a total period of 20 minutes.

6.2.2. Long-Term Monitoring

Long-term noise measurements were conducted to observe hourly noise distribution and identify the worst-noise hours. Long-term noise measurements were conducted at one location in April 2018 for 72 hours using a Larson-Davis Model 812 Type 1 sound level meter. Table 6-2 and Figure 6-1 summarizes the long-term monitoring results and shows addresses and land use types of the monitoring location. Appendix C includes field survey sheets and Appendix D includes the noise measurement site photographs. Figure 1 in Appendix F shows the noise measurement location.

Table 6-2. Long-Term Noise Measurement Results

Site No.[1]	Street Address, City, State	Area	Land Use[2]	Activity Category and (NAC)	Measurement Dates	Start Time	Measured Worst-Hour Leq(h), dBA	Peak-Hour Time
LT1	Golden Gate Fields, 1100 Eastshore Highway, Berkeley, CA	B	STA	E (72)	04/17/18 to 04/20/18	11:00 am	68	5:00 am

Notes:
1 - LT – Long-Term Measurements.
2 - Land Use: STA – horse stable area.

6.2.3. Train Pass-By Monitoring

Train pass-by measurements were conducted as requested by Caltrans on April 18, 19, and 20, 2018 specifically for the purpose of determining existing train characteristics including pass-by noise levels, number of locomotives and cars, and speeds. Table 6-3 presents the train pass-by noise measurement results. Appendix C includes noise measurement data sheets recorded in the field, Appendix D includes the noise measurement site photographs, and Figure 2 in Appendix F present the noise measurement location.

6.3 Traffic Noise Model Calibration

Noise measurements for the calibration were conducted with simultaneous traffic counts at the two short-term measurement locations. These measurements were conducted to calibrate the TNM 2.5 model. Concurrent with the measurements, traffic volumes were recorded through the use of a video camera attached to a drone. Traffic speeds were measured by timing the vehicles between two fixed points in the video. The traffic counts were tabulated according to three vehicle types, including automobiles, medium trucks (two-axle with six-wheels but not including pick-up trucks), and heavy trucks (three or more axles).

As a general rule, the noise model is considered to be calibrated if the field measured noise levels versus the modeled noise levels (using field-collected traffic data) agree within 3 dB of each other. If differences are more than 3 dB, refinement of the noise model is performed until there is agreement between the two values. If, after thorough re-evaluation, calibration still cannot be achieved due to complex topography or other unusual circumstances, then a calibration constant is added such that the measured versus modeled values agree before any predictions can be made with the model.

Figure 6-1. Long-Term Noise Measurement Results

Site LT1 Hourly Noise Levels, $L_{eq}(h)$

Location: Golden Gate Fields, 1100 Eastshore Highway, Berkeley, CA
Position: Horse Stable Area
Sources: I-80 Traffic
Date: 04/17/18 - 04/20/18

TIME	04/17-04/18 $L_{eq(h)}$ dBA	04/18-04/19 $L_{eq(h)}$ dBA	04/19-04/20 $L_{eq(h)}$ dBA
11:00 - 12:00 PM	63	64	62
12:00 - 01:00 PM	63	65	62
01:00 - 02:00 PM	63	66	63
02:00 - 03:00 PM	63	62	63
03:00 - 04:00 PM	62	62	61
04:00 - 05:00 PM	61	62	62
05:00 - 06:00 PM	62	62	62
06:00 - 07:00 PM	62	62	63
07:00 - 08:00 PM	62	62	64
08:00 - 09:00 PM	63	62	63
09:00 - 10:00 PM	64	61	64
10:00 - 11:00 PM	62	61	64
11:00 - 12:00 AM	61	60	63
12:00 - 01:00 AM	60	59	61
01:00 - 02:00 AM	60	60	61
02:00 - 03:00 AM	60	60	61
03:00 - 04:00 AM	62	63	62
04:00 - 05:00 AM	66	66	67
05:00 - 06:00 AM	67	68	68
06:00 - 07:00 AM	65	66	66
07:00 - 08:00 AM	64	64	66
08:00 - 09:00 AM	60	61	61
09:00 - 10:00 AM	62	61	61
10:00 - 11:00 AM	65	62	62

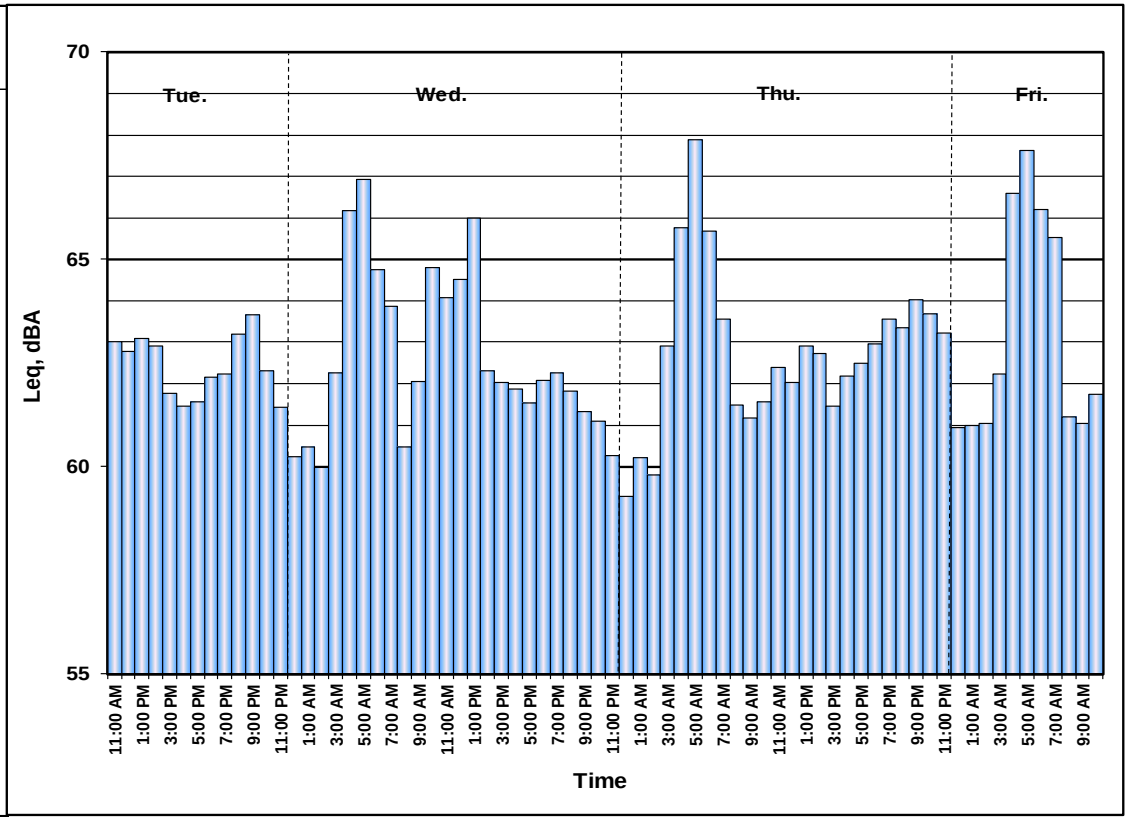

Table 6-3. Train Pass-By Noise Measurement Results

Meas. ID	Date	Start Time	Train Type	Train Direction	Track ID	Distance to Track (ft)	Number of Locomotives	Number of Cars	Speed (mph)	Lmax, dBA	SEL, dBA	Notes
P1	04/18/18	8:34	Amtrak	SB	2	50	2	11	67	103	106	Horn on Approach and Departure
P2	04/18/18	8:42	Amtrak	SB	2	50	1	5	40	99	103	Horn on Approach and Departure
P3	04/18/18	9:15	Amtrak	SB	2	50	2	11	53	104	107	Horn on Approach and Departure
P4	04/18/18	9:16	Amtrak	SB	1	37	1	4	35	98	104	Horn on Approach and Departure
P5	04/18/18	10:02	Amtrak	SB	1	37	1	4	50	102	106	Horn on Approach and Departure
P6	04/18/18	10:11	Amtrak	NB	1	37	1	4	62	100	105	Horn on Approach and Departure
P7	04/18/18	10:19	Amtrak	SB	1	37	1	5	46	95	100	Reduced Horn Noise
P8	04/18/18	10:42	Amtrak	NB	1	37	1	4	40	104	108	Horn on Approach and Departure
P9	04/18/18	11:45	Amtrak	SB	1	37	1	4	64	103	106	Horn on Approach and Departure
P10	04/18/18	13:50	Amtrak	NB	1	37	1	5	47	100	105	Horn on Approach and Departure
P11	04/18/18	13:51	Amtrak	SB	2	50	1	4	64	104	106	Horn on Approach and Departure
P12	04/18/18	14:02	Amtrak	SB	1	37	1	4	60	105	108	Horn on Approach and Departure
P13	04/18/18	14:51	Amtrak	NB	1	37	1	4	53	108	109	Horn on Approach and Departure
P14	04/18/18	15:05	Amtrak	NB	1	37	1	4	41	95	100	Reduced Horn Noise
P15	04/19/18	7:58	Amtrak	NB	2	50	1	5	58	96	101	Reduced Horn Noise
P16	04/19/18	8:03	Amtrak	SB	1	37	1	5	32	105	109	Horn on Approach and Departure
P17	04/19/18	8:09	Amtrak	NB	2	50	1	4	44	97	102	Reduced Horn Noise
P18	04/19/18	9:03	Amtrak	SB	2	50	2	11	31	95	100	Horn on Approach and Departure
P19	04/19/18	9:15	Amtrak	NB	1	37	2	11	65	106	110	Horn on Approach and Departure
P20	04/19/18	9:17	Amtrak	SB	1	37	1	5	23	100	104	Horn on Approach and Departure
P21	04/19/18	10:10	Amtrak	NB	2	50	1	4	61	106	108	Horn on Approach and Departure
P22	04/19/18	10:17	Amtrak	SB	1	37	1	4	35	109	112	Horn on Approach and Departure
P23	04/19/18	10:27	Amtrak	SB	1	37	1	5	27	97	99	Horn on Approach and Departure
P24	04/19/18	10:49	Amtrak	NB	1	37	1	5	32	101	104	Horn on Approach and Departure
P25	04/19/18	11:45	Amtrak	SB	1	37	1	5	30	100	102	Horn on Approach and Departure

Table 6-3. Train Pass-By Noise Measurement Results (Cont'd)

Meas. ID	Date	Start Time	Train Type	Train Direction	Track ID	Distance to Track (ft)	Number of Locomotives	Number of Cars	Speed (mph)	Lmax, dBA	SEL, dBA	Notes
P26	04/20/18	7:55	Amtrak	NB	2	50	1	5	54	93	99	Reduced Horn Noise
P27	04/20/18	7:58	Amtrak	SB	2	50	1	5	37	92	97	Reduced Horn Noise
P28	04/20/18	8:09	Amtrak	SB	2	50	2	11	47	104	107	Increased Horn Noise
P29	04/20/18	8:19	Amtrak	NB	1	37	1	5	37	100	105	Increased Horn Noise
P30	04/20/18	8:46	Amtrak	SB	1	37	1	5	36	88	96	Horn on Approach and Departure
P31	04/20/18	9:16	Amtrak	NB	2	50	2	8	62	101	105	Horn on Approach and Departure
P32	04/20/18	10:12	Amtrak	SB	2	50	1	4	32	100	103	Horn on Approach and Departure
P33	04/20/18	10:16	Amtrak	NB	1	37	1	4	51	87	94	Horn on Approach and Departure
P34	04/20/18	10:27	Amtrak	SB	1	37	1	4	35	103	108	Increased Horn Noise
P35	04/20/18	10:45	Amtrak	NB	1	37	1	5	26	98	103	Horn on Approach and Departure
F1	04/18/18	9:25	Freight	SB	2	50	1	4	30	105	108	Horn on Approach and Departure
F2	04/18/18	9:33	Freight	SB	2	50	4	134	22	102	106	Horn on Approach and Departure
F3	04/18/18	11:10	Freight	SB	2	50	2	22	34	102	104	Horn on Approach and Departure
F4	04/19/18	8:31	Freight	NB	2	50	1	1	44	104	107	Horn on Approach and Departure
F5	04/19/18	9:51	Freight	NB	2	50	3	100	44	106	110	Horn on Approach and Departure
F6	04/20/18	7:45	Freight	SB	1	37	2	10	25	111	116	Increased Horn Noise
F7	04/20/18	8:38	Freight	NB	2	50	2	0	28	105	109	Horn on Approach and Departure
F8	04/20/18	10:23	Freight	NB	2	50	1	24	24	106	112	Horn on Approach and Departure

Table 6-4 summarizes the calibration results of the two measurement locations. The traffic volumes that were used in the calibration process are located in Appendix A. Table 6-4 shows that the measured and modeled levels differed by about 4 dB; therefore, adjustment to the model was deemed necessary and a calibration or "K" factor have been applied to the noise model results for the areas acoustically equivalent to the two measurement sites. Possible causes of the noise level differences at both measurement sites is the observed reductions in speed along westbound I-80 that occurred during the measurement.

Table 6-4. Noise Model Calibration Results

Measurement Site	Modeled Receptor No.	Date	Start Time	Noise Levels, $L_{eq(h)}$, dBA		Deviation, dB	Applied Adjustment, dB
				Measured	Modeled		
ST1	R6	08/31/16	12:20	64.3	68.1	-3.8	-4.0
ST2	R12	08/31/16	12:20	64.9	68.8	-3.9	-4.0

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Chapter 7. Future Noise Environment, Impacts, and Considered Abatement

This NSR was produced to determine future traffic noise impacts of the proposed project at frequent human use areas within the highway corridor. The future worst case traffic noise impact at frequent outdoor human use areas along the project corridor was modeled for the No-Build Alternative and Build Alternative to determine appropriate abatement measures. This section discusses the predicted traffic noise level under existing and design year conditions (Build and No Build), identifies traffic noise impacts, and considers noise abatement measures.

7.1 Future Noise Environment and Impacts

Tables in Appendix B summarize the traffic noise levels for the existing and design-year No-Build condition, as well as for design-year Build Alternative. Predicted design-year traffic noise levels with the project are compared to existing conditions and to the design-year no-build conditions. The comparison to existing conditions is included in the analysis to identify traffic noise impacts under Title 23 CFR 772. The comparison to no-build conditions indicates the direct impact of noise resulting from the project.

As stated in the TeNS, modeling results are rounded to the nearest decibel before comparisons are made. In some cases, this can result in relative changes that may not appear intuitive. An example would be a comparison between sound levels of 64.4 and 64.5 dBA. The difference between these two values is 0.1 dB. However, after rounding, the difference is reported as 1 dB.

Table B-1 in Appendix B presents the results of the analysis. Figures 1 and 2 in Appendix F show the proposed alignment of the Build Alternative, noise receptor locations, and land uses.

Area A

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at the Tom Bates Regional Sports Complex represented by Receptors R1 through R5 as well as two locations of the San Francisco Bay Trail represented by Receptors R6 and R7 (Activity Category C) are predicted to range from 59 to 69 dBA L_{eq}(h) in the design-year. There is no anticipated change in noise levels between the Build and No Build conditions. The results also indicate that there is no noise increase between existing conditions and the design-year; therefore, the predicted noise levels in the design-year are not predicted result in a substantial increase in noise. However, because the predicted noise levels in the design-year are predicted to approach or exceed the noise abatement criterion (67 dBA L_{eq}[h]) at two areas of the sports complex represented by Receptors R3 and R4 and one location along the trail represented by Receptor R6, traffic noise impacts are predicted to occur and noise abatement must be considered for this area.

Area B

The traffic noise modeling results in Table B-1 indicate traffic noise levels at the horse stable area of Golden Gate Fields represented by Receptors R8 through R12A (Activity Category E) in Area B will be in the range of 56 to 71 dBA L_{eq}(h) in the design-year. There is no anticipated change in noise levels between the Build and No Build conditions. The results also indicate that there will be no increase in noise between existing conditions and the design-year conditions. Because the predicted noise levels in the design-year are not predicted to approach or exceed the noise abatement criterion (72 dBA L_{eq}[h]) at the horse stable area (Receptors R8 through R11) and a substantial increase in noise will not occur, no traffic noise impacts are predicted in Area B. Receptors R12 and R12A, which were noise measurement locations, are located in parking stalls and are not representative of the horse stables; therefore, even though Receptor R12A is predicted to approach the noise abatement criterion, the impact does not require noise abatement.

Area C

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at the commercial establishment represented by Receptor R15 (Activity Category E) is predicted to be 67 dBA L_{eq}(h) in the design-year. Industrial land uses represented by Receptors R13 and R14 (Activity Category F) are predicted to be in the range of 67 to 72 dBA L_{eq}(h) in the design-year. There is a 1 dB increase in noise levels anticipated between the Build and No Build conditions at Receptor R15. The results also indicate that the increase in noise between existing conditions and the design-year is predicted to range between 0 and 1 dB. Because the predicted noise levels in the design-year are not predicted to approach or exceed the noise abatement criterion (72 dBA L_{eq}[h]) at the commercial establishment, there is no noise abatement criterion for Activity Category F uses, and a substantial increase in noise will not occur, no traffic noise impacts are predicted in Area C.

The increase in traffic noise levels in the design-year at Receptor R15 is likely due to the traffic volumes on the nearby roundabout which brings traffic closer to the receptor.

The train noise modeling results in Table B-1 indicate that train noise levels in Area C are predicted to range from 52 to 63 dBA L_{eq}(h) with combined traffic and train noise levels of 67 to 72 dBA L_{eq}(h) in the design-year. The addition of train noise increases the overall noise levels by 2 dB at Receptor R15 In Area C.

Area D

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at the commercial establishments represented by Receptors R17 and R18 (Activity Category E) is predicted to be 65 dBA L_{eq}(h) in the design-year. Industrial land uses represented by Receptor R16 (Activity Category F) are predicted to be 68 dBA L_{eq}(h) in the design-year. There is a 1 dB decrease in noise levels anticipated between the Build and No Build conditions at Receptors R17 and R18. The results also indicate that there is no increase in noise between existing conditions and the design-year conditions. Because the predicted noise levels in the design-year are not predicted to approach or exceed the noise abatement criterion (72 dBA L_{eq}[h]) at the commercial establishment, there is no noise

abatement criterion for Activity Category F uses, and a substantial increase in noise will not occur, no traffic noise impacts are predicted in Area D.

The decrease in traffic noise levels in the design-year at Receptors R17 and R18 is due to the horizontal shift to the north of the traveled way on Gilman Street which pushes the traffic further from this receptor. The shift in the traveled way is to make room for the bicycle lane.

The train noise modeling results in Table B-1 indicate that train noise levels in Area D are predicted to range from 67 to 72 dBA L_{eq}(h) with combined traffic and train noise levels of 69 to 73 dBA L_{eq}(h) in the design-year. The addition of train noise increases the overall noise levels by 2 to 8 dB in this area where Receptor R17 experiences the additional 8 dB in Area D. This is due to the very close proximity of the train tracks to the receptor. While the overall noise levels including train noise at Receptor R17 is predicted to exceed the noise abatement criterion (72 dBA L_{eq}[h]) at the commercial establishment, this area is not considered impacted. Train noise is not considered when determining impacts because train noise is not related to the project.

Area E

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at the retail establishment represented by Receptor R19 and industrial land uses represented by Receptors R20 and R21 (Activity Category F) are predicted to range from 64 to 67 dBA L_{eq}(h) in the design-year. There is a 1 dB increase in noise levels anticipated between the Build and No Build conditions at Receptor R19. The results also indicate that the increase in noise between existing conditions and the design-year is predicted to range from 0 to 1 dB. Because there is no noise abatement criterion for Activity Category F uses, and a substantial increase in noise will not occur, no traffic noise impacts are predicted in Area E.

The increase in traffic noise levels in the design-year at Receptor R19 is due to the horizontal shift to the north of the traveled way on Gilman Street which brings the traffic closer to this receptor. The shift in the traveled way is to make room for the bicycle lane.

The train noise modeling results in Table B-1 indicate that train noise levels in Area E are predicted to range from 66 to 74 dBA L_{eq}(h) with combined traffic and train noise levels of 69 to 75 dBA L_{eq}(h) in the design-year. The addition of train noise increases the overall noise levels by 2 to 11 dB in this area where Receptor R20 experiences the additional 11 dB in Area E. This is due to the very close proximity of the train tracks to the receptor.

Area F

The traffic noise modeling results in Table B-1 indicate that traffic noise levels at the commercial establishment represented by Receptor R23 (Activity Category E) is predicted to be 70 dBA L_{eq}(h) in the design-year. Industrial land uses represented by Receptor R22 (Activity Category F) is predicted to be 64 dBA L_{eq}(h) in the design-year. There is no anticipated change in noise levels between the Build and No Build conditions. The results also indicate that there will be no increase in noise between

existing conditions and the design-year conditions. Because the predicted noise levels in the design-year are not predicted to approach or exceed the noise abatement criterion (72 dBA L_{eq}[h]) at the commercial establishment, there is no noise abatement criterion for Activity Category F uses, and a substantial increase in noise will not occur, no traffic noise impacts are predicted in Area F.

The train noise modeling results in Table B-1 indicate that train noise levels in Area F are predicted to range from 55 to 56 dBA L_{eq}(h) with combined traffic and train noise levels of 65 to 70 dBA L_{eq}(h) in the design-year. The addition of train noise increases the overall noise levels by 1 dB at Receptor R22 In Area F.

7.2 Preliminary Noise Abatement Analysis

Noise abatement is considered where noise impacts are predicted in areas of frequent human use that would benefit from a lowered noise level. According to 23 CFR 772(13)(c) and 772(15)(c), federal funding may be used for the following abatement measures:

- Construction of noise barriers, including acquisition of property rights, either within or outside the highway right-of-way.
- Traffic management measures including, but not limited to, traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive lane designations.
- Alteration of horizontal and vertical alignments.
- Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise.
- Noise insulation of Activity Category D land use facilities listed in Table 1. Post-installation maintenance and operational costs for noise insulation are not eligible for Federal-aid funding.

A Noise barrier is the only form of noise abatement considered for this project. The noise barrier evaluated has been evaluated for feasibility based on achievable noise reduction (5 dB or more). For a noise barrier determined to be acoustically feasible, it was determined if the Caltrans acoustical design goal (a 7 dB reduction in noise or greater) could be achieved, then reasonable cost allowances were calculated by multiplying the number of benefited receptors by $95,000.

For any noise barrier to be considered reasonable from a cost perspective the estimated cost of the noise barrier should be equal to or less than the total cost allowance calculated for the barrier. The cost calculations of the noise barrier must include all items appropriate and necessary for construction of the barrier, such as traffic control, drainage modification, retaining walls, landscaping for graffiti abatement, and right-of-way costs.

Construction cost estimates are compared to reasonableness allowances to identify which wall configurations are reasonable from a cost perspective.

The design of the noise barrier presented in this report is preliminary and has been conducted at a level appropriate for environmental review and not for final design of the project. Preliminary information on the physical location, length, and height of the noise barrier(s) is provided in this report. If pertinent parameters change substantially during the final project design, preliminary noise barrier designs may be modified or eliminated from the final project. A final decision on the construction of location specific noise abatement will be made upon completion of the project design.

The minimum heights and locations of the soundwall that would provide feasible abatement and achieve the 7 dB design goal is shown graphically in the figures in Appendix F

The minimum barrier height required to cut the line-of-sight from each receptor to the exhaust stacks of heavy trucks has been calculated for all feasible barriers. These heights were evaluated through calculations performed by TNM 2.5.

This report analyzes two noise barriers which act as a system with heights from 8 to 16 feet to determine feasible noise abatement for the Build Alternative. The following discussion considers six areas within the study limits. Noise abatement was considered for one area. Tables 7-1 summarizes the data used to assess the abatement cost allowances at each of the considered barrier heights. The following analysis presents predicted traffic noise levels at various receptors and abatement measures for the Build Alternative. Table B-1 in Appendix B presents the results of the barrier analysis. Figures 1 and 2 in Appendix F shows the proposed alignment of the Build Alternative, noise receptor locations, land uses, and proposed noise barrier locations.

The following is a discussion of noise abatement considered for each evaluation area where traffic noise impacts are considered.

7.2.1 Area A

Because the predicted noise levels in the design-year are predicted to approach or exceed the noise abatement criterion (67 dBA L_{eq}[h]) at two areas of the Tom Bates Regional Sports Complex represented by Receptors R3 and R4, and one location of the San Francisco Bay Trail represented by Receptor R6, a traffic noise impact is predicted to occur and noise abatement must be considered for this area.

Soundwalls S169 and S175: Soundwalls S169 and S175 would work as a system. Soundwall S169 would be located on the edge of shoulder of the westbound I-80 on-ramp and would replace the existing safety barrier separating the westbound I-80 on-ramp from West Frontage Road. Soundwall S175 would be located on the edge of shoulder of westbound I-80 mainline. These soundwalls would provide feasible noise abatement for three outdoor use areas of represented by Receptors R2, R3, and R4. Soundwalls S169 and S175 would also meet the design goal by providing 7 dB in traffic noise reduction at Receptor R4.

Although Receptor R6 is impacted, Soundwalls S169 and S175 would not provide feasible abatement (5 dB noise reduction) for this receptor. This is due to the close proximity of West Frontage Road to Receptor R6 which the soundwalls do not block.

An alternative location for Soundwall S169 were considered at the right-of-way line; however, this location would interfere with a future proposed pedestrian overcrossing and was removed from consideration.

Table 7-1 summarizes the range of reasonable allowances for the feasible noise abatement measure considered. Figure 1 in Appendix F shows the location, minimum length, and height required for this soundwall to provide feasible traffic noise abatement.

Table 7-1. Summary of Reasonableness Determination Data – Soundwalls S169 and S175[a]

Barrier I.D. S169 and S175	8-Foot Barrier	10-Foot Barrier	12-Foot Barrier	14-Foot Barrier	16-Foot Barrier
Number of Benefited Receptors	1	1	3	3	5[b]
Reasonable Allowance Per Benefited Receiver	$95,000	$95,000	$95,000	$95,000	$95,000
Total Reasonable Allowance	$95,000	$95,000	$285,000	$285,000	$475,000[b]

Note: N/A-Not applicable. Barrier does not provide 5 dB of noise reduction.

[a] An NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.

[b] Per the Highway Design Manual, the maximum height of a noise barrier should not exceed 14 feet when located 15 feet or less from edge of traveled way and the data for total reasonable allowence is provided for informational purposes only.

The reasonable allowance for Soundwalls S169 and S175 would be $285,000 and would be approximately 1,200 and 860 feet in length.

7.2.2 Area B

No traffic noise impacts are predicted for the horse stable area of Golden Gate Fields represented by Receptors R8 through R11 nor would the project result in a substantial increase in noise in Area B. Accordingly, noise abatement does not need to be considered for this area. Receptor R12A is predicted to approach the noise abatement criterion; however, because this receptor as well as Receptor R12 are located in parking stalls and is not representative of the horse stables, the impact does not require noise abatement.

7.2.3 Area C

Traffic noise impact is not predicted to occur at the commercial establishment represented by Receptor R15. In addition, because there is no noise abatement criterion for the industrial land uses represented by Receptors R13 and R14, and because the project would not result in a substantial increase in noise in Area C, noise abatement is not required for this area.

7.2.4 Area D

No traffic noise impacts are predicted for the commercial establishment or restaurant represented by Receptors R17 and R18, respectively, there not a noise abatement criterion for the industrial land use represented by Receptors R16, nor would the project result in a substantial increase in noise in Area D Even though the combined traffic and train noise level is predicted to exceed the noise abatement criterion (72 dBA L_{eq}[h]) at the commercial establishment, this area is not considered impacted as train noise is not considered when determining impacts because train noise is not related to the project. Accordingly, noise abatement does not need to be considered for this area.

7.2.5 Area E

Because there is no noise abatement criterion for this area and because the project would not result in a substantial increase in noise, noise abatement is not required for the retail and industrial establishments represented by Receptors R19 through R21.

7.2.6 Area F

Traffic noise impact is not predicted to occur at the commercial establishment represented by Receptor R23. In addition, because there is no noise abatement criterion for the industrial land uses represented by Receptor R22, and because the project would not result in a substantial increase in noise in Area F, noise abatement is not required for this area.

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Chapter 8. Construction Noise and Vibration

During the construction phases of the project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. Table 8-1 summarizes noise levels produced by construction equipment commonly used on roadway construction projects. As indicated, equipment involved in construction is expected to generate noise levels ranging from 80 to 88 dBA at a distance of 50 feet. Noise produced by construction equipment would be reduced over distance at a rate of approximately 6 dB per doubling of distance.

Table 8-1. Construction Equipment Noise

Equipment	Maximum Noise Level (dBA at 50 feet)
Jackhammer	88
Loader	85
Heavy Trucks	88
Backhoe	80
Grader	85
Concrete Pump	82

Source: Federal Transit Administration, 2006

Construction noise varies greatly depending on the construction process, type and condition of equipment used, as well as layout of the construction site. Many of these factors are traditionally left to the contractor's discretion, which makes it difficult to accurately estimate levels of construction noise. Construction noise estimates are approximate because of the lack of specific information available at the time of the assessment. Temporary construction noise impacts would be unavoidable at areas located immediately adjacent to the proposed project alignment.

8.1 Regulatory Criteria

8.1.1 State Regulations and Policies

Noise associated with construction is controlled by Caltrans Standard Specifications Section 14-8.02 "Noise Control" Which states the following:

- Control and monitor noise resulting from work activities
- Do not exceed 86 dBA at 50 feet from the job site from 9:00 p.m. to 6:00 a.m.

8.1.2 Local Regulations

Typically, work taking place within Caltrans right-of-way is not subject to local noise ordinances; however, Caltrans will work with contractor to meet local requirements where feasible.

The City of Berkeley Municipal Code imposes construction noise restrictions where technically and economically feasible to be conducted in such a manner that the maximum noise levels at affected properties will not exceed those listed in Tables 8-2 and 8-3. The maximum sound levels listed in Table 8-2 are for nonscheduled, intermittent, short-term operation (less than 10 days) of mobile equipment. The maximum sound levels listed in Table 8-3 are for repetitively scheduled and relatively long-term operation (period of 10 days or more) of stationary equipment.

Table 8-2. Maximum Allowed Noise Levels of Short-Term Constuction Equipment

	Single-Family Residential Land Uses (L_{max}, dBA)	Multi-Family Residential Land Uses (L_{max}, dBA)	Commercial / Industrial Land Uses (L_{max}, dBA)
Weekdays 7:00 a.m. to 7:00 p.m.	75	80	85
Weekends 9:00 a.m. to 8:00 p.m.	60	65	70

Source: City of Berkeley, 2017

Table 8-3. Maximum Allowed Noise Levels of Long-Term Constuction Equipment

	Single-Family Residential Land Uses (L_{max}, dBA)	Multi-Family Residential Land Uses (L_{max}, dBA)	Commercial / Industrial Land Uses (L_{max}, dBA)
Weekdays 7:00 a.m. to 7:00 p.m.	60	65	70
Weekends 9:00 a.m. to 8:00 p.m.	50	55	60

Source: City of Berkeley, 2017

The City of Berkeley Municipal Code further identifies construction noise restrictions such that operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work before 7:00 a.m. on a weekday (or before 9:00 a.m. on a weekend or holiday) or after 7:00 p.m. on a weekday (or after 8:00 p.m. on a weekend or holiday) such that the sound therefrom across a residential or commercial real property line at the exterior noise limits listed in Table 8-4 is prohibited.

Table 8-4.Maximum Exterior Noise Limits

Land Use	Time Period	Noise Level (L_{eq}, dBA)[1]
Single-Family Residential	7:00 p.m. – 10:00 p.m. 10:00 p.m. – 7:00 a.m.	55 45
Multi-Family Residential	7:00 p.m. – 10:00 p.m. 10:00 p.m. – 7:00 a.m.	60 55
Commercial	7:00 p.m. – 10:00 p.m. 10:00 p.m. – 7:00 a.m.	65 60
Industrial	Anytime	70

Note:
1 - Levels not to be exceeded more than 30 minutes any hour
Source: City of Berkeley, 2017

In addition, if the ambient noise level is greater than the level within any of the noise limit categories listed in Table 8-4, the sound level shall not exceed:

a. The ambient noise level for a cumulative period of more than 30 minutes in any hour; or

b. The ambient noise level plus 5 dBA for a cumulative period of more than 15 minutes in any hour; or

c. The ambient noise level plus 10 dBA for a cumulative period of more than 5 minutes in any hour; or

d. The ambient noise level plus 15 dBA for a cumulative period of more than 1 minute in any hour; or

e. The ambient noise level plus 20 dBA for any period of time.

8.2 Construction Phasing and Noise Levels

There will be some work during night-time hours to avoid temporary roadway closures for tasks that could interfere with traffic or create safety hazards

The flowing describes the different phases of the construction. Equipment used during the phases of construction is itemized in Appendix H.

- Phase 1 – Day work – Demo curb and gutter, asphalt pavement removal, grading, construct curb and gutter, construct new pavement, most utility and Caltrans signal relocations
- Phase 2 – night work (Caltrans ramps) – Demo curb and gutter, asphalt pavement removal, grading, construct curb and gutter, construct new pavement
- Phase 3 – Day work – Demo curb and gutter, asphalt pavement removal, grading, construct curb and gutter, construct new pavement
- Phase4 – Night work (West Gilman intersection) – Demo curb and gutter, asphalt pavement removal, grading, construct curb and gutter, construct new pavement
- Phase 5 – Night work (East Gilman intersection) – Demo curb and gutter, pavement grinding, grading, construct curb and gutter, construct new pavement
- Phase 6 – Day work – Roadway finishes and landscaping, guard rail
- Pedestrian Overcrossing (POC) – (Conducted during all phases) – Approaches, Foundations, substructure, superstructure, steel installation, POC deck, ret wall & stairs

Construction noise would primarily result from the operation of heavy construction equipment and arrival and departure of heavy-duty trucks. The highest maximum instantaneous noise levels would result from special impact tools. FHWA's Roadway Construction Noise Model (RCNM) was used to calculate the maximum and average noise levels anticipated during the phases of construction at the receptor location as well as at a distance of 50, 100, 200, and 500 feet. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power. Vehicles and equipment anticipated during each phase of construction were input into RCNM to calculate noise levels at a distance of 50 feet. Appendix H includes the noise model inputs and outputs.

Tables 8-5 and 8-6 present the construction noise levels estimated for each major phase of the project. It is anticipated the same construction equipment will be used for Phases 1 through 5. Noise generated by construction equipment drops off at a rate of 6 dB per doubling of distance.

Table 8-5. Predicted Noise Levels by Construction Phase at Receptor Locations

Rec	Land Use	Construction Phase 1 - 5		Construction Phase 6		Pedestrian Overcrossing	
		Maximum Noise Level (L_{max}, dBA)	Hourly Average Noise Level (L_{eq}, dBA)	Maximum Noise Level (L_{max}, dBA)	Hourly Average Noise Level (L_{eq}, dBA)	Maximum Noise Level (L_{max}, dBA)	Hourly Average Noise Level (L_{eq}, dBA)
R5	Sports Complex	84	82	80	75	80	79
R6	Trail	95	93	90	85	90	90
R10	Stables	83	81	79	74	65	65
R13	Industrial	93	91	89	84	83	82
R15	Commercial	86	84	81	76	70	69
R18	Restaurant	89	88	85	80	59	59
R21	Industrial	92	90	88	82	65	65
R23	Commercial	89	88	85	80	62	61

RCNM modeling input/output is provided in Appendix H

Table 8-6. Predicted Noise Levels by Construction Phase at Fixed Distances

Construction Phase	Maximum Noise Level (L_{max}, dBA)	Hourly Average Noise Level (L_{eq}, dBA)	Maximum Noise Level (L_{max}, dBA)	Hourly Average Noise Level (L_{eq}, dBA)	Maximum Noise Level (L_{max}, dBA)	Hourly Average Noise Level (L_{eq}, dBA)	Maximum Noise Level (L_{max}, dBA)	Hourly Average Noise Level (L_{eq}, dBA)
	50 feet		100 feet		200 feet		500 feet	
Phase 1 - 5	89	87	83	81	77	75	69	67
Phase 6	84	79	78	73	72	67	64	59
Pedestrian Overcrossing	84	84	78	78	72	72	64	64

RCNM modeling input/output is provided in Appendix H

8.3 Construction Noise Impacts

Roadway construction activities typically occur for relatively short periods of time as construction proceeds along the project's alignment. Construction noise would mostly be of concern when construction activities would occur during nighttime hours.

As indicated in Tables 8-2, 8-5, and 8-6, Phases 1 through 5 are anticipated to exceed the maximum allowable noise limits for commercial and industrial land uses by 1 to 8 dBA between the daytime hours of 7:00 a.m. and 7:00 p.m. at the receptor locations, assuming the construction activities are short-term. However, based on the drop off at a rate of 6 dB per doubling of distance, no construction noise impacts are anticipated at distances of approximately 80 feet and greater. In addition, construction noise impacts by up to 4 dBA are anticipated during Phase 6 at some of the commercial and inductrial receptor locations and no impacts are anticipated during the pedestrian overcrossing construction during daytime hours. No construction noise impacts are anticipated at the stable areas between the daytime hours of 7:00 a.m. and 7:00 p.m. for construction Phase 1 through 6 or the pedestrian overcrossing construction.

Construction activities are anticipated to exceed the allowable noise limits at commercial land uses by as much as 24 and 29 dBA during the hours of 7:00 p.m. through 10:00 p.m. and 10:00 p.m. through 7:00 a.m., respectively, and by as much as 23 dBA at industrial land uses during the hours of 7:00 p.m. through 7:00 a.m.at the receptor locations. Construction noise impacts are anticipated at the stable areas by as much as 18 and 23 dBA during the hours of 7:00 p.m. through 10:00 p.m. and 10:00 p.m. through 7:00 a.m., respectively. However, human activity at commercial, including the stable areas, and industrial land uses would be at a minimum during these hours and impacts are not likely.

There is no specified criteria for land uses such as the Tom Bates Regional Sports Complex or trail; therefore, the sports complex and trail would only be subject to the limits defined by Caltrans Standard Specifications, in which construction activities are anticipated to exceed the allowable limits by 9 dBA at the trail. Construction noise impacts are not anticipated at the sports complex based on the receptor location, but would exceed the allowable limits by 3 dBA at 50 feet from construction activities. However, because the operating hours of the sports complex are from 8:00 a.m. to 11:00 p.m., the majority of the complex is much more than 50 feet from the construction activities, and the Standard Specifications only limit noise levels between the hours of 9:00 p.m. and 6:00 a.m., construction noise impacts are not likely at the sports complex.

8.4 Construction Noise Minimization Measures

There are many measures that can be taken to minimize noise intrusion without placing unreasonable constraints on the construction process or substantially increasing costs.

The following are possible control measures that can be implemented to minimize noise disturbances at sensitive areas during construction:

- All equipment should have sound-control devices no less effective than those provided on the original equipment Equip an internal combustion engine with a muffler recommended by the manufacturer. No internal combustion engine should be operated on the job site without an appropriate muffler.

- Construction methods or equipment that will provide the lowest level of noise impact should be used.

- Idling equipment should be turned off or minimized.

- Truck loading, unloading, and hauling operations should be restricted so that noise and vibration are kept to a minimum through neighborhoods to the greatest possible extent.

- Where feasible, temporary noise barriers should be used and relocated, as needed, to protect sensitive receptors against excessive noise from construction activities involving large equipment and by small items such as compressors, generators, pneumatic tools, and jackhammers. Noise barriers can be made of heavy plywood, moveable insulated sound blankets, or other best available control techniques.

- Noise impacts are typically minimized when construction activities are performed during daytime hours; however, nighttime construction is anticipated to avoid major traffic disruption..

- Construction lay-down or staging areas should be selected in industrially zoned districts. If industrially zoned areas are not available, commercially zoned areas may be used, or locations that are at least 100 feet from any noise-sensitive land use (e.g., residences) The selected staging areas for this project are underneath the freeway and within the Tom Bates Regional Sports Complex. The staging areas within the sports complex are primarily in the parking areas and would not physically interfere with any recreational activities.

8.5 Construction Vibration

It is possible that certain construction activities could cause intermittent localized concern from vibration in the project area. Processes such as earth moving with bulldozers and the use of vibratory compaction rollers may cause construction related vibration impacts such as human annoyance or, in some cases, building damage. The following are some procedures that can be used to minimize the potential impacts from construction vibration:

- The owner of a building close enough to a construction vibration source that damage to that structure due to vibration is possible would be entitled to a preconstruction building inspection to document the preconstruction condition of that structure.

- Conduct vibration monitoring during vibration-intensive activities such as the use of vibratory compaction rollers.

A combination of the mitigation techniques for equipment vibration control as well as administrative measures, when properly implemented, can be selected to provide the most effective means to minimize the effects of construction activity. Application of the mitigation measures will reduce the construction impacts; however, temporary increases in vibration would likely occur at some locations.

Chapter 9. References

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Appendix A Traffic Data

Table A-1 – Traffic Data for Existing (Year 2016) Conditions

	Segment	Number of Lanes	Total Peak Hour Volume[1]	Auto		Medium Trucks[2]		Heavy Trucks[2]		Speed[3] (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
I-80 Eastbound Lane 1	South of Gilman Street	1	1800	--	1,767	--	33	--	0	65/65/55
I-80 Eastbound Lanes 2 & 3		2	3600	--	3,534	--	66	--	0	
I-80 Eastbound Lanes 4 & 5		2	3600	--	3,269	--	66	--	265	
I-80 Eastbound Total		5	9000	95.23%	8570	1.83%	165	2.94%	265	
I-80 Eastbound Off-Ramp		1	372	95.23%	354	1.83%	7	2.94%	11	65/65/55 to 10
I-80 Eastbound Lane 1	North of Gilman Street	1	1800	--	1,767	--	33	--	0	65/65/55
I-80 Eastbound Lanes 2 & 3		2	3600	--	3,534	--	66	--	0	
I-80 Eastbound Lanes 4 & 5		2	3600	--	3,269	--	66	--	265	
I-80 Eastbound Total		5	9000	95.23%	8570	1.83%	165	2.94%	265	
I-80 Eastbound On-Ramp		1	402	95.23%	383	1.83%	7	2.94%	12	10 to 65/65/55
I-80 Westbound Lane 1	South of Gilman Street	1	1800	--	1,767	--	33	--	0	65/65/55
I-80 Westbound Lanes 2 & 3		2	3600	--	3,534	--	66	--	0	
I-80 Westbound Lanes 4 & 5		2	3600	--	3,269	--	66	--	265	
I-80 Westbound Total		5	9000	95.23%	8570	1.83%	165	2.94%	265	
I-80 Westbound On-Ramp		1	366	95.23%	348	1.83%	7	2.94%	11	10 to 65/65/55
I-80 Westbound Lane 1	North of Gilman Street	1	1800	--	1,767	--	33	--	0	65/65/55
I-80 Westbound Lanes 2 & 3		2	3600	--	3,534	--	66	--	0	
I-80 Westbound Lanes 4 & 5		2	3600	--	3,269	--	66	--	265	
I-80 Westbound Lane 6		1	1800	--	1,714	--	33	--	53	
I-80 Westbound Total		6	10800	95.23%	10284	1.83%	198	2.94%	318	
I-80 Westbound Off-Ramp		1	1000	95.23%	953	1.83%	18	2.94%	29	65/65/55 to 10

Notes:

1 - Roadway volumes based on year 2016 AM peak traffic volumes from the Traffic Operations Analysis Report capped at Level of Service C volumes.

2 - Truck percentages for I-80 based on year 2014 truck traffic data provided on the Caltrans' web site. Truck percentages for Gilman Street, West Frontage Road, and Eastshore Highway were derived from traffic counts performed for the Traffic Operations Analysis Report.

3 - Posted speeds were used for modeling.

Table A-1 – Traffic Data for Existing (Year 2016) Conditions (Cont'd)

	Segment	Number of Lanes	Total Peak Hour Volume[1]	Auto		Medium Trucks[2]		Heavy Trucks[2]		Speed[3] (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
Gilman Street Eastbound	West of West Frontage Road	1	7	94.26%	7	3.06%	0	2.68%	0	25/25/25
Gilman Street Westbound		1	48	95.69%	46	0.93%	0	3.38%	2	25/25/25
Gilman Street Eastbound	Between West Frontage Road and Westbound I-80 Ramps	1	83	94.26%	78	3.06%	3	2.68%	2	25/25/25
Gilman Street Westbound		1	434	95.69%	415	0.93%	4	3.38%	15	25/25/25
Gilman Street Eastbound	Between Eastbound I-80 Ramps and Eastshore Highway	1	974	91.86%	895	2.79%	27	5.35%	52	25/25/25
Gilman Street Westbound		1	986	95.65%	943	3.86%	38	0.49%	5	25/25/25
Gilman Street Eastbound	Between Eastshore Highway and Second Street	1	649	91.86%	596	2.79%	18	5.35%	35	25/25/25
Gilman Street Westbound		1	634	95.65%	607	3.86%	24	0.49%	3	25/25/25
Gilman Street Eastbound	East of Second Street	1	610	91.86%	560	2.79%	17	5.35%	33	25/25/25
Gilman Street Westbound		1	653	95.65%	625	3.86%	25	0.49%	3	25/25/25
Northbound West Frontage Road	South of Gilman Street	1	74	94.98%	71	1.99%	1	3.03%	2	35/35/35
Southbound West Frontage Road		1	323	94.98%	307	1.99%	6	3.03%	10	35/35/35
Northbound Eastshore Highway		1	24	93.76%	22	3.32%	1	2.92%	1	25/25/25
Southbound Eastshore Highway		1	188	93.76%	177	3.32%	6	2.92%	5	25/25/25
Northbound Eastshore Highway	North of Gilman Street	1	26	93.76%	24	3.32%	1	2.92%	1	25/25/25
Southbound Eastshore Highway		1	203	93.76%	190	3.32%	7	2.92%	6	25/25/25

Notes:

1 - Roadway volumes based on year 2016 AM peak traffic volumes from the Traffic Operations Analysis Report capped at Level of Service C volumes.

2 - Truck percentages for I-80 based on year 2014 truck traffic data provided on the Caltrans' web site. Truck percentages for Gilman Street, West Frontage Road, and Eastshore Highway were derived from traffic counts performed for the Traffic Operations Analysis Report.

3 - Posted speeds were used for modeling.

Table A-2 – Traffic Data for Design-Year No Build (Year 2040) Conditions

	Segment	Number of Lanes	Total Peak Hour Volume[1]	Auto		Medium Trucks[2]		Heavy Trucks[2]		Speed[3] (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
I-80 Eastbound Lane 1	South of Gilman Street	1	1800	--	1,767	--	33	--	0	65/65/55
I-80 Eastbound Lanes 2 & 3		2	3600	--	3,534	--	66	--	0	
I-80 Eastbound Lanes 4 & 5		2	3600	--	3,269	--	66	--	265	
I-80 Eastbound Total		5	9000	95.23%	8570	1.83%	165	2.94%	265	
I-80 Eastbound Off-Ramp		1	372	95.23%	354	1.83%	7	2.94%	11	65/65/55 to 10
I-80 Eastbound Lane 1	North of Gilman Street	1	1800	--	1,767	--	33	--	0	65/65/55
I-80 Eastbound Lanes 2 & 3		2	3600	--	3,534	--	66	--	0	
I-80 Eastbound Lanes 4 & 5		2	3600	--	3,269	--	66	--	265	
I-80 Eastbound Total		5	9000	95.23%	8570	1.83%	165	2.94%	265	
I-80 Eastbound On-Ramp		1	433	95.23%	412	1.83%	8	2.94%	13	10 to 65/65/55
I-80 Westbound Lane 1	South of Gilman Street	1	1800	--	1,767	--	33	--	0	65/65/55
I-80 Westbound Lanes 2 & 3		2	3600	--	3,534	--	66	--	0	
I-80 Westbound Lanes 4 & 5		2	3600	--	3,269	--	66	--	265	
I-80 Westbound Total		5	9000	95.23%	8570	1.83%	165	2.94%	265	
I-80 Westbound On-Ramp		1	551	95.23%	525	1.83%	10	2.94%	16	10 to 65/65/55
I-80 Westbound Lane 1	North of Gilman Street	1	1800	--	1,767	--	33	--	0	65/65/55
I-80 Westbound Lanes 2 & 3		2	3600	--	3,534	--	66	--	0	
I-80 Westbound Lanes 4 & 5		2	3600	--	3,269	--	66	--	265	
I-80 Westbound Lane 6		1	1800	--	1,714	--	33	--	53	
I-80 Westbound Total		6	10800	95.23%	10284	1.83%	198	2.94%	318	
I-80 Westbound Off-Ramp		1	1000	95.23%	953	1.83%	18	2.94%	29	65/65/55 to 10

Notes:

1 - Roadway volumes based on year 2040 AM peak traffic volumes from the Traffic Operations Analysis Report capped at Level of Service C volumes.

2 - Truck percentages for I-80 based on year 2014 truck traffic data provided on the Caltrans' web site. Truck percentages for Gilman Street, West Frontage Road, and Eastshore Highway were derived from traffic counts performed for the Traffic Operations Analysis Report.

3 - Posted speeds were used for modeling.

Table A-2 – Traffic Data for Design-Year No Build (Year 2040) Conditions (Cont'd)

	Segment	Number of Lanes	Total Peak Hour Volume[1]	Auto		Medium Trucks[2]		Heavy Trucks[2]		Speed[3] (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
Gilman Street Eastbound	West of West Frontage Road	1	7	94.26%	7	3.06%	0	2.68%	0	25/25/25
Gilman Street Westbound		1	48	95.69%	46	0.93%	0	3.38%	2	25/25/25
Gilman Street Eastbound	Between West Frontage Road and Westbound I-80 Ramps	1	83	94.26%	78	3.06%	3	2.68%	2	25/25/25
Gilman Street Westbound		1	434	95.69%	415	0.93%	4	3.38%	15	25/25/25
Gilman Street Eastbound	Between Eastbound I-80 Ramps and Eastshore Highway	1	974	91.86%	895	2.79%	27	5.35%	52	25/25/25
Gilman Street Westbound		1	986	95.65%	943	3.86%	38	0.49%	5	25/25/25
Gilman Street Eastbound	Between Eastshore Highway and Second Street	1	649	91.86%	596	2.79%	18	5.35%	35	25/25/25
Gilman Street Westbound		1	634	95.65%	607	3.86%	24	0.49%	3	25/25/25
Gilman Street Eastbound	East of Second Street	1	610	91.86%	560	2.79%	17	5.35%	33	25/25/25
Gilman Street Westbound		1	653	95.65%	625	3.86%	25	0.49%	3	25/25/25
Northbound West Frontage Road	South of Gilman Street	1	74	94.98%	71	1.99%	1	3.03%	2	35/35/35
Southbound West Frontage Road		1	323	94.98%	307	1.99%	6	3.03%	10	35/35/35
Northbound Eastshore Highway		1	24	93.76%	22	3.32%	1	2.92%	1	25/25/25
Southbound Eastshore Highway		1	188	93.76%	177	3.32%	6	2.92%	5	25/25/25
Northbound Eastshore Highway	North of Gilman Street	1	26	93.76%	24	3.32%	1	2.92%	1	25/25/25
Southbound Eastshore Highway		1	203	93.76%	190	3.32%	7	2.92%	6	25/25/25

Notes:

1 - Roadway volumes based on year 2040 AM peak traffic volumes from the Traffic Operations Analysis Report capped at Level of Service C volumes.

2 - Truck percentages for I-80 based on year 2014 truck traffic data provided on the Caltrans' web site. Truck percentages for Gilman Street, West Frontage Road, and Eastshore Highway were derived from traffic counts performed for the Traffic Operations Analysis Report.

3 - Posted speeds were used for modeling.

Table A-3 – Traffic Data for Design-Year Build (Year 2040) Conditions

	Segment	Number of Lanes	Total Peak Hour Volume[1]	Auto		Medium Trucks[2]		Heavy Trucks[2]		Speed[3] (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
I-80 Eastbound Lane 1	South of Gilman Street	1	1800	--	1,767	--	33	--	0	65/65/55
I-80 Eastbound Lanes 2 & 3		2	3600	--	3,534	--	66	--	0	
I-80 Eastbound Lanes 4 & 5		2	3600	--	3,269	--	66	--	265	
I-80 Eastbound Total		5	9000	95.23%	8570	1.83%	165	2.94%	265	
I-80 Eastbound Off-Ramp		1	372	95.23%	354	1.83%	7	2.94%	11	65/65/55 to 10
I-80 Eastbound Lane 1	North of Gilman Street	1	1800	--	1,767	--	33	--	0	65/65/55
I-80 Eastbound Lanes 2 & 3		2	3600	--	3,534	--	66	--	0	
I-80 Eastbound Lanes 4 & 5		2	3600	--	3,269	--	66	--	265	
I-80 Eastbound Total		5	9000	95.23%	8570	1.83%	165	2.94%	265	
I-80 Eastbound On-Ramp		1	433	95.23%	412	1.83%	8	2.94%	13	10 to 65/65/55
I-80 Westbound Lane 1	South of Gilman Street	1	1800	--	1,767	--	33	--	0	65/65/55
I-80 Westbound Lanes 2 & 3		2	3600	--	3,534	--	66	--	0	
I-80 Westbound Lanes 4 & 5		2	3600	--	3,269	--	66	--	265	
I-80 Westbound Total		5	9000	95.23%	8570	1.83%	165	2.94%	265	
I-80 Westbound On-Ramp		1	361	95.23%	344	1.83%	7	2.94%	11	10 to 65/65/55
I-80 Westbound Lane 1	North of Gilman Street	1	1800	--	1,767	--	33	--	0	65/65/55
I-80 Westbound Lanes 2 & 3		2	3600	--	3,534	--	66	--	0	
I-80 Westbound Lanes 4 & 5		2	3600	--	3,269	--	66	--	265	
I-80 Westbound Lane 6		1	1800	--	1,714	--	33	--	53	
I-80 Westbound Total		6	10800	95.23%	10284	1.83%	198	2.94%	318	
I-80 Westbound Off-Ramp		1	1000	95.23%	953	1.83%	18	2.94%	29	65/65/55 to 10

Notes:

1 - Roadway volumes based on year 2040 AM peak traffic volumes from the Traffic Operations Analysis Report capped at Level of Service C volumes.

2 - Truck percentages for I-80 based on year 2014 truck traffic data provided on the Caltrans' web site. Truck percentages for Gilman Street, West Frontage Road, and Eastshore Highway were derived from traffic counts performed for the Traffic Operations Analysis Report.

3 - Posted speeds were used for modeling.

Table A-3 – Traffic Data for Design-Year Build (Year 2040) Conditions (Cont'd)

	Segment	Number of Lanes	Total Peak Hour Volume[1]	Auto		Medium Trucks[2]		Heavy Trucks[2]		Speed[3] (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
Gilman Street Eastbound	West of Western Roundabout	1	7	94.26%	7	3.06%	0	2.68%	0	25/25/25
Gilman Street Westbound		1	48	95.69%	46	0.93%	0	3.38%	2	25/25/25
Gilman Street Eastbound	Between Eastern Roundabout and Second Street	1	649	91.86%	596	2.79%	18	5.35%	35	25/25/25
Gilman Street Westbound		1	634	95.65%	607	3.86%	24	0.49%	3	25/25/25
Gilman Street Eastbound	East of Second Street	1	610	91.86%	560	2.79%	17	5.35%	33	25/25/25
Gilman Street Westbound		1	653	95.65%	625	3.86%	25	0.49%	3	25/25/25
Northbound West Frontage Road	South of Gilman Street	1	74	94.98%	71	1.99%	1	3.03%	2	35/35/35
Southbound West Frontage Road		1	323	94.98%	307	1.99%	6	3.03%	10	35/35/35
Northbound Eastshore Highway		1	64	93.76%	60	3.32%	2	2.92%	2	25/25/25
Southbound Eastshore Highway		1	471	93.76%	441	3.32%	16	2.92%	14	25/25/25
Northbound Eastshore Highway	North of Gilman Street	1	70	93.76%	66	3.32%	2	2.92%	2	25/25/25
Southbound Eastshore Highway		1	509	93.76%	477	3.32%	17	2.92%	15	25/25/25

Notes:

1 - Roadway volumes based on year 2040 AM peak traffic volumes from the Traffic Operations Analysis Report capped at Level of Service C volumes.

2 - Truck percentages for I-80 based on year 2014 truck traffic data provided on the Caltrans' web site. Truck percentages for Gilman Street, West Frontage Road, and Eastshore Highway were derived from traffic counts performed for the Traffic Operations Analysis Report.

3 - Posted speeds were used for modeling.

Table A-4 – Traffic Data for Noise Model Calibration

	Segment	Number of Lanes	Total Peak Hour Volume	Auto		Medium Trucks[1]		Heavy Trucks[1]		Speed[2] (A/MT/HT)
				%	Volume	%	Volume	%	Volume	
I-80 Eastbound Lane 1	South and North of Gilman Street	1	1384	--	1,347	--	37	--	0	60/60/--
I-80 Eastbound Lanes 2 & 3		2	2767	--	2,691	--	76	--	0	55/55/--
I-80 Eastbound Lanes 4 & 5		2	2767	--	2,352	--	76	--	339	50/50/45
I-80 Eastbound Total		5	6918	92.37%	6390	2.73%	189	4.90%	339	
I-80 Westbound Lane 1	South of Gilman Street	1	1323	--	1,267	--	56	--	0	45/45/--
I-80 Westbound Lanes 2 & 3		2	2645	--	2,534	--	111	--	0	35/35/--
I-80 Westbound Lanes 4 & 5		2	2645	--	2,195	--	111	--	339	25/25/20
I-80 Westbound Total		5	6613	90.67%	5996	4.20%	278	5.13%	339	
I-80 Westbound On-Ramp		1	354	87.85%	311	8.76%	31	3.39%	12	10 to 45/45/40
I-80 Westbound Lane 1	North of Gilman Street	1	1102	--	1,056	--	46	--	0	45/45/--
I-80 Westbound Lanes 2 & 3		2	2204	--	2,111	--	93	--	0	35/35/--
I-80 Westbound Lanes 4 & 5		2	2204	--	1,885	--	93	--	226	25/25/20
I-80 Westbound Lane 6		1	1103	--	944	--	46	--	113	25/25/20
I-80 Westbound Total		6	6613	90.67%	5996	4.20%	278	5.13%	339	
I-80 Westbound Off-Ramp		1	713	95.37%	680	3.79%	27	0.84%	6	45/45/40 to 10
W Frontage Road Northbound	South of Gilman Street	1	111	97.30%	108	2.70%	3	0.00%	0	35/35/--
W Frontage Road Southbound		1	282	98.94%	279	1.06%	3	0.00%	0	35/35/--

Notes:

1 - Truck percentages determined from traffic counts performed during calibration noise measurements.

2 - Observed speeds were used for modeling.

Appendix B Predicted Noise Levels and Noise Barrier Analysis

Table B-1 – Predicted Noise Levels and Barrier Analysis

Receptor I.D.	Area	Barrier I.D. and Location	Land Use[2]	Number of Dwelling Units	Existing Noise Level Leq(h), dBA[1]	I-80/Gilman Street Interchange Improvement Project Future Worst Hour Noise Levels - Leq(h), dBA[1]																				
						Design Year No Build Noise Level Leq(h), dBA[1]	Design Year Build Noise Level Leq(h), dBA[1]	Design Year No Build Noise Level Minus Existing Conditions Leq(h), dBA	Design Year Build Noise Level Minus No Build Conditions Leq(h), dBA	Activity Category (NAC)	Impact Type[3]	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefitted Receivers (NBR)														
												8 feet			10 feet			12 feet			14 feet			16 feet		
												Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR
R1 [K]	A	S169 and S175 Shoulder	SPO	1	62	62	62	0	0	C (67)	NONE	60	2	*0*	60	2	*0*	59 [T]	3	*0*	58	4	*0*	58	4	*0*
R1A [K]	A		SPO	1	62	62	62	0	0	C (67)	NONE	60	2	*0*	60	2	*0*	59 [T]	3	*0*	58	4	*0*	57	5	*1*
R2 [K]	A		SPO	1	63	63	63	0	0	C (67)	NONE	60	3	*0*	59	4	*0*	**58** [R,T]	**5**	***1***	58	5	*1*	57	6	*1*
R3 [K]	A		SPO	1	68	68	68	0	0	C (67)	A/E	65	3	*0*	64	4	*0*	**63** [R,T]	**5**	***1***	62	6	*1*	62	6	*1*
R4 [K]	A		SPO	1	69	69	69	0	0	C (67)	A/E	64	5	*1*	64	5	*1*	**62** [R,T]	**7**	***1***	62	7	*1*	61	8	*1*
R5 [K]	A		SPO	1	65	65	65	0	0	C (67)	NONE	64	1	*0*	63	2	*0*	63	2	*0*	63 [T]	2	*0*	63	2	*0*
R6 [M,C,K]	A		TRL	1	67	67	67	0	0	C (67)	A/E	66	1	*0*	66	1	*0*	65	2	*0*	65 [T]	2	*0*	65	2	*0*
R7 [K]	A		TRL	1	59	59	59	0	0	C (67)	NONE	57	2	*0*	56	3	*0*	55	4	*0*	55	4	*0*	54	5	*1*
R8 [K]	B	--	STA	1	56	56	56	0	0	E (72)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R9 [K]	B		STA	1	56	56	56	0	0	E (72)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R10 [K]	B		STA	1	68	68	68	0	0	E (72)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R11 [K]	B		STA	1	69	69	69	0	0	E (72)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R12 [M,C,K,*]	B		STA	1	70	70	70	0	0	E (72)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R12A [M,K,*]	B		STA	1	71	71	71	0	0	E (72)	A/E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SPO - sports complex; TRL - trail; STA - horse stable area; IND - industrial; COM - commercial; RST - restaurant; RTL - retail.

3 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.

4 - Barrier height needed to meet requirements at adjacent receiver(s).

5 - Because the shoulder width is less than 15 feet, per the Highway Design Manual, the maximum height of a noise barrier should not exceed 14 feet when located 15 feet or less from edge of traveled way. Therefore the hieght of 16 feet is not considered.

M - Noise measurement site.

C - Model calibration site.

R - The minimum height to meet feasibility requirements and design goal.

T - Minimum height required to block the line-of-sight from the receiver to truck exhaust stacks.

K - A calibration factor of -4.0 dB is applied for this receptor and adjacent receptors with similar geographic features.

* - Receptor/measurement site is located in parking stall and is not representative of land use. Therefore, noise abatement has not been considered.

Table B-1 – Predicted Noise Levels and Barrier Analysis (Cont'd)

Receptor I.D.	Area	Barrier I.D. and Location	Land Use[2]	Number of Dwelling Units	Existing Traffic Noise Level Leq(h), dBA[1]	Train Noise Level Leq(h), dBA1	Existing Traffic Plus Train Noise Level Leq(h), dBA[1]	I-80/Gilman Street Interchange Improvement Project Future Worst Hour Noise Levels - Leq(h), dBA[1]								Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefitted Receivers (NBR)												
								Design Year No Build Traffic Noise Level Leq(h), dBA[1]	Design Year No Build Traffic Plus Train Noise Level Leq(h), dBA[1]	Design Year Build Traffic Noise Level Leq(h), dBA[1]	Design Year Build Traffic Plus Train Noise Level Leq(h), dBA[1]	Design Year No Build Traffic Noise Level Minus Existing Conditions Leq(h), dBA	Design Year Build Traffic Noise Level Minus No Build Conditions Leq(h), dBA	Activity Category (NAC)	Impact Type[3,6]	8 feet			10 feet			12 feet			14 feet			16 feet		
																Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR
R13 [K]	C		IND	1	72	52	72	72	72	72	72	0	0	F (--)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R14 [K]	C	--	IND	1	67	52	67	67	67	67	67	0	0	F (--)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R15 [K]	C		COM	1	64	63	66	64	66	65	67	0	1	E (72)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R16	D		IND	1	68	67	70	68	70	68	70	0	0	F (--)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R17	D	--	COM	1	66	72	73	66	73	65	73	0	-1	E (72)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R18	D		RES	1	66	67	70	66	69	65	69	0	-1	E (72)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R19	E		RTL	1	66	67	70	66	70	67	70	0	1	F (--)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R20	E	--	IND	1	64	74	75	64	75	64	75	0	0	F (--)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R21	E		IND	1	67	66	69	67	69	67	69	0	0	F (--)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R22 [K]	F	--	IND	1	64	56	65	64	65	64	65	0	0	F (--)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R23 [K]	F		COM	1	70	55	70	70	70	70	70	0	0	E (72)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SPO - sports complex; TRL - trail; STA - horse stable area; IND - industrial; COM - commercial; RST - restaurant; RTL - retail.

3 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.

4 - Barrier height needed to meet requirements at adjacent receiver(s).

5 - Because the shoulder width is less than 15 feet, per the Highway Design Manual, the maximum height of a noise barrier should not exceed 14 feet when located 15 feet or less from edge of traveled way. Therefore the hieght of 16 feet is not considered.

Noise levels only include predicted traffic noise.

Noise levels include train noise.

6 - Noise impacts are based on Design Year Build traffic noise levels. Train noise is not considered in determining project impacts.

M - Noise measurement site.

C - Model calibration site.

R - The minimum height to meet feasibility requirements and design goal.

T - Minimum height required to block the line-of-sight from the receiver to truck exhaust stacks.

K - A calibration factor of -4.0 dB is applied for this receptor and adjacent receptors with similar geographic features.

* - Receptor/measurement site is located in parking stall and is not representative of land use. Therefore, noise abatement has not been considered.

Appendix C Noise Measurement Data Forms

FIELD SURVEY FORM

PROJECT: I-80 / Gilman Street Interchange Project	ENGINEER: G. Berg	DATE: 8/31/16
MEASUREMENT ADDRESS: S. F. Bay Trail	CITY: Berkeley, CA	☐ Single-Family ☐ Multi-Family ☒ Recreational ☐ Commercial — SITE NO.: ST1

SOUND LEVEL METER: ☐ LD-870 ☐ LD-820 ☐ LD-LxT ☐ LD-824 ☒ LD-812 ☐ B&K-2250 ☐ LD-2900 ☐ _____
SERIAL #: 0659

MICROPHONE: ☒ NON-POLAR ☐ POLARIZED ☒ 1/2-INCH ☐ FREEFIELD ☐ 1-INCH ☐ RANDOM ☒ WIND SCREEN
SERIAL #: 3159

PRE AMP: ☐ LD-900 ☐ LD-LxT ☒ LD-828 ☐ ZC-0032 ☐ LD-902 ☐ _____
SERIAL #: 1938

CALIBRATOR: ☒ LD CA250 ☐ LD CA200 ☐ B&K 4231 ☐ _____ S/N 2479
Freq, Hz.: ☒ 250 ☐ 1000 ☐ 84 ☐ _____

CALIBRATION RECORD:
Input, dB / Reading, dB / Offset, dB / Time
Before 114.0, 114.0, 7.2, 11:17
After 114.0, 113.8, —, 1301

METER SETTINGS: ☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS 10 - MINUTE ☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☒ L_N PERCENTILE VALUES

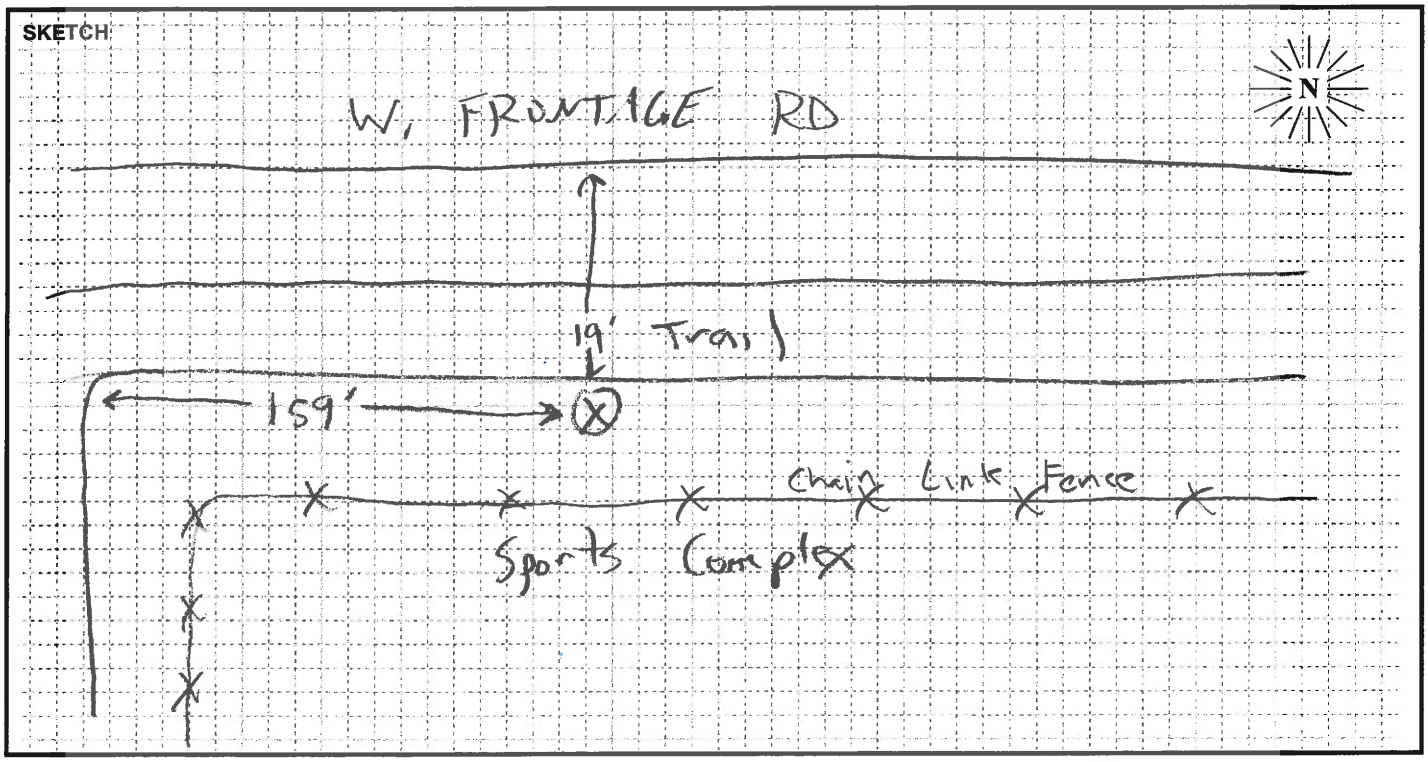
NOTES:
SYSTEM PWR: ☒ BAT ☐ AC
(observations at start of measurement)
TEMP: 72 °F R.H.: 67 %
WIND SPEED: 3 MPH
TOWARD (DIR): _____
SKIES: _____
CAMERA _____
PHOTO NOs. _____

NOTES: Dist. to Center _____ ☐ Video ☐ Radar — Counts AT MT HT

MEAS. TYPE: ☐ Long Term ☒ Short Term

DATE	START TIME	STOP TIME	L_{MIN}	L_{99}	L_{90}	L_{50}	L_{25}	L_{10}	L_{01}	L_{MAX}	L_{EQ}	NOTES:
08/31/16	1220	12:30	56.7	—	59.2	62.1	64.8	67.6	—	74.2	64.3	
8/31	12:30	12:40	56.1	—	58.1	61.6	65.4	67.9	—	75.6	64.3	

SKETCH



PARSONS

FIELD SURVEY FORM

PROJECT: I-80 / Gilman Street Interchange Project	ENGINEER: G. Berg	DATE: 8/31/16
MEASUREMENT ADDRESS: Golden Gate Fields	CITY: Berkeley, CA	☐ Single-Family ☐ Multi-Family ☐ Recreational ☒ Commercial
		SITE NO.: ST2

SOUND LEVEL METER:
☐ LD-870 ☐ LD-820 ☐ LD-LxT
☐ LD-824 ☒ LD-812 ☐ B&K-2250
☐ LD-2900 ☐ _____
SERIAL #: 0638

MICROPHONE:
☒ NON-POLAR ☐ POLARIZED
☒ 1/2-INCH ☒ FREEFIELD
☐ 1-INCH ☐ RANDOM
☒ WIND SCREEN
SERIAL #: 3155

PRE AMP:
☐ LD-900 ☐ LD-LxT
☒ LD-828 ☐ ZC-0032
☐ LD-902 ☐ _____
SERIAL #: 1629

CALIBRATOR:
☒ LD CA250 ☐ LD CA200
☐ B&K 4231 ☐ _____
S/N 2479
Freq, Hz.
☒ 250
☐ 1000
☐ 84
☐ _____

CALIBRATION RECORD:
Input, dB / Reading, dB / Offset, dB / Time
Before 114.0, 114.0, 8.0, 11:21
After 114.0, 114.1, —, 13:04

METER SETTINGS:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS 10 - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☒ L_N PERCENTILE VALUES

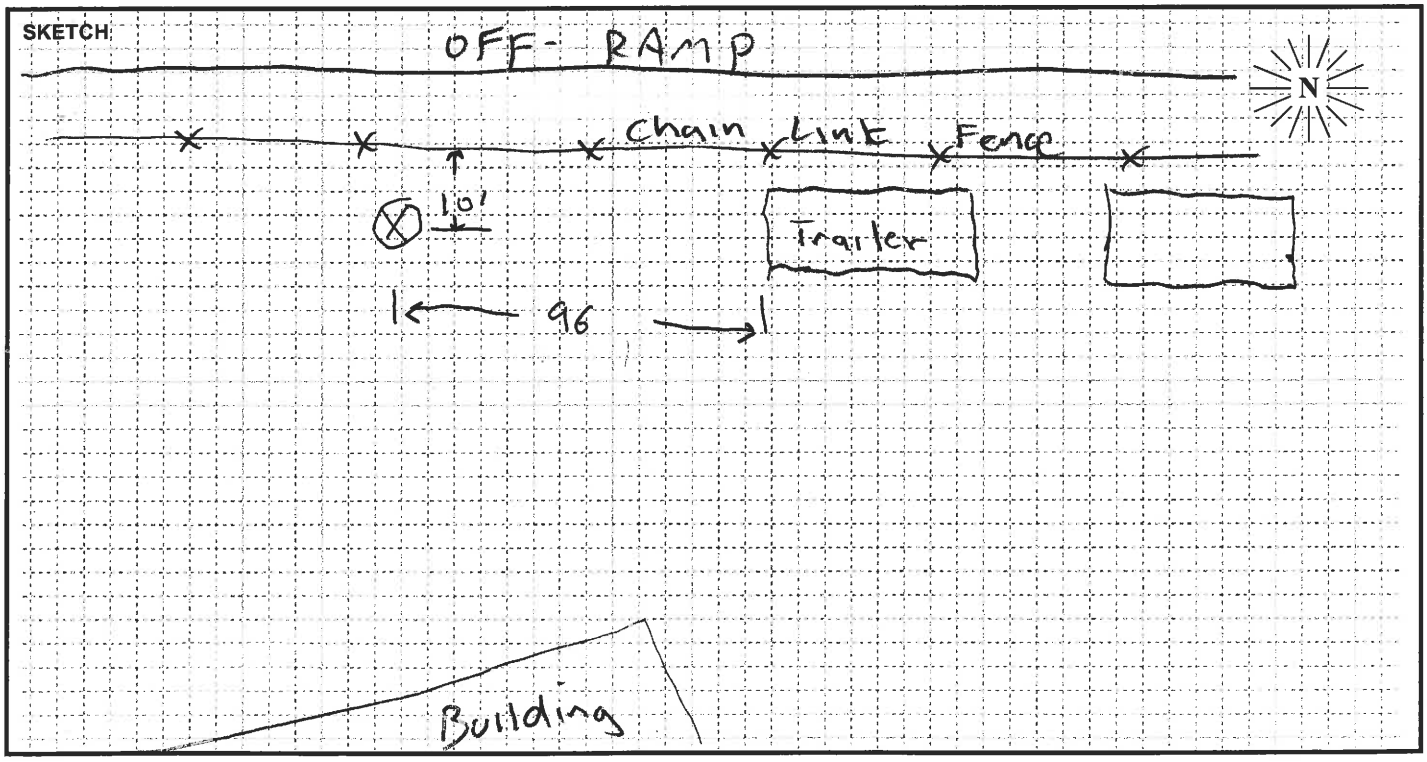
NOTES:
SYSTEM PWR: ☒ BAT ☐ AC
(observations at start of measurement)
TEMP: 72 °F R.H.: 67 %
WIND SPEED: 3 MPH
TOWARD (DIR): _____
SKIES: _____
CAMERA _____
PHOTO NOs. _____

NOTES: Dist. to Center _____ ☐ Video ☐ Radar Counts AT MT HT

MEAS. TYPE: ☐ Long Term ☒ Short Term

DATE	START TIME	STOP TIME	L_{MIN}	L_{99}	L_{90}	L_{50}	L_{25}	L_{10}	L_{01}	L_{MAX}	L_{EQ}	NOTES:
8/31	12:20	12:30	56.3	—	60.1	62.7	64.6	67.6	—	77.7	64.9	
8/31	12:30	12:40	55.8	—	57.9	61.4	64.4	67.4	—	80.6	64.9	

SKETCH



PARSONS

FIELD SURVEY FORM

PROJECT:	ENGINEER:	DATE:
I-80 / Gilman Street Interchange	VINCENZA	4/17/18

MEASUREMENT ADDRESS/LOCATION:	CITY:			SITE NO.:
1100 EASTSHORE HWY GOLDEN GATES	BERKELEY	☐ Single-Family ☐ Multi-Family ☐ School	☐ Recreational ☐ Commercial ☐ Church	LT 1

SOUND LEVEL METER:
☐ LD-870 ☐ LD-820 ☐ LD-LxT
☐ LD-824 ☒ LD-812 ☐ B&K-2250
☐ LD-2900 ☐ _____
SERIAL #: 0659

MICROPHONE:
☒ NON-POLAR ☐ POLARIZED
☒ 1/2-INCH ☐ FREEFIELD
☐ 1-INCH ☐ RANDOM
☒ WIND SCREEN
SERIAL #: 3155

PRE AMP:
☐ LD-900 ☐ LD-LxT
☒ LD-828 ☐ ZC-0032
☐ LD-902 ☐ _____
SERIAL #: 1891

CALIBRATOR:
☒ LD CA250 ☐ LD CA200
☐ B&K 4231 ☐ _____
S/N 2479

Freq, Hz.
☒ 250
☐ 1000
☐ 84
☐ _____

CALIBRATION RECORD:
Input, dB / Reading, dB / Offset, dB / Time
Before 114.0 / 114.0 / 6.9 / 10:47am
After 114.0 / 113.8 / — / 11:12am

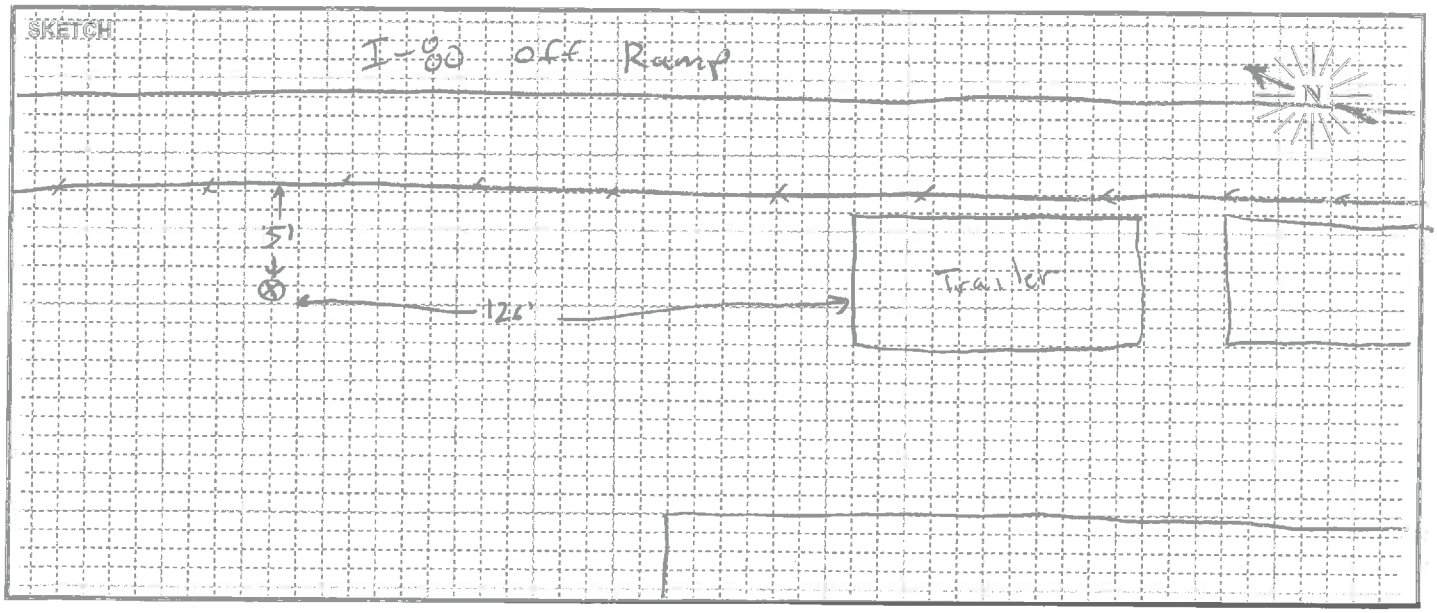
METER SETTINGS:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS 10 - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☐ L_N PERCENTILE VALUES

NOTES:
SYSTEM PWR: ☒ BAT ☐ AC
(observations during measurement)
TEMP: _____ °F R.H.: _____ %
WIND SPEED: _____ MPH
TOWARD (DIR): _____
SKIES: _____
CAMERA _____
☐ VIDEO ☐ RADAR

NOTES: 184% BATT

DATE	START TIME	STOP TIME	L_{MIN}	L_{MAX}	L_{EQ}	SEL	NUMBER OF LOCOMOTIVES	NUMBER OF CARS	SPEED (mph)	NOTES:
4/17	10:53									
4/20		11:10								

SKETCH



PARSONS

FIELD SURVEY FORM

PROJECT:	ENGINEER:	DATE:
I-80 / Gilman Street Interchange	VIRGINIA	4/18/19

MEASUREMENT ADDRESS/LOCATION:	CITY:			SITE NO.:
1450 Fourth St #10 and Adjacent DANIEL WINKLER	BERKELEY	☐ Single-Family ☐ Multi-Family ☐ School	☐ Recreational ☒ Commercial ☐ Church	PR1

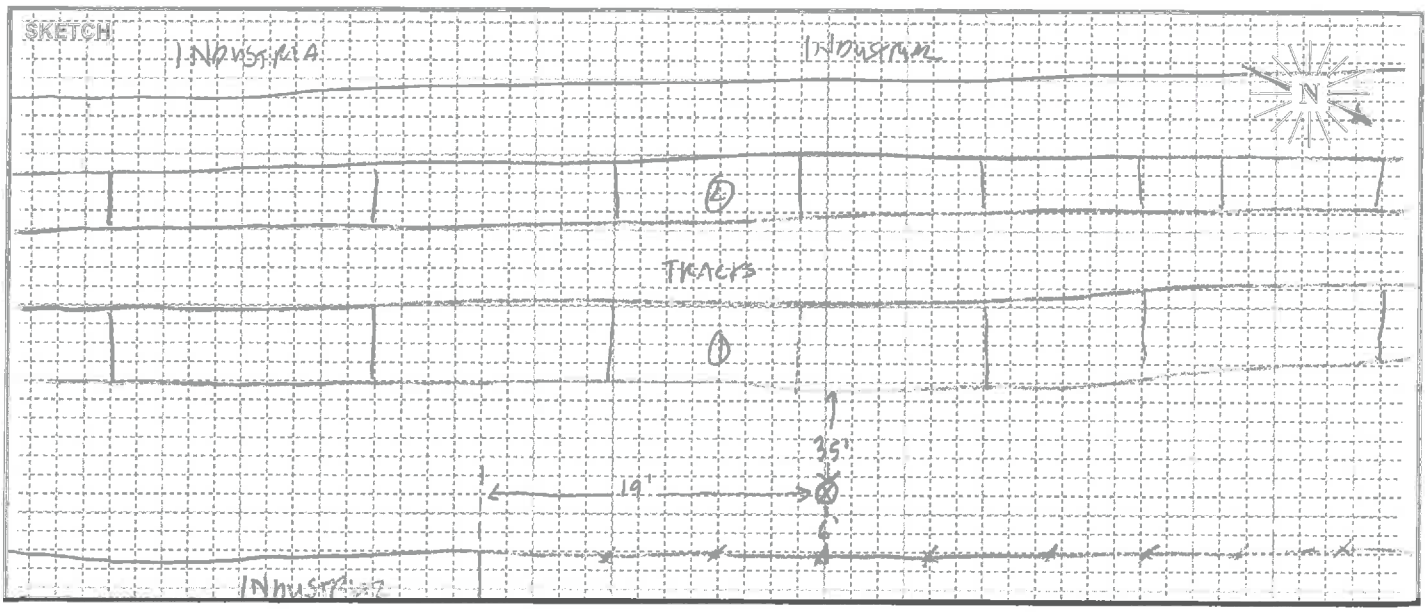
SOUND LEVEL METER:	MICROPHONE:	PRE AMP:	NOTES:
☐ LD-870 ☒ LD-820 ☐ LD-LxT ☐ LD-824 ☐ LD-812 ☐ B&K-2250 ☐ LD-2900 ☐ _____	☒ NON-POLAR ☐ POLARIZED ☒ 1/2-INCH ☐ FREEFIELD ☐ 1-INCH ☐ RANDOM ☒ WIND SCREEN	☐ LD-900 ☐ LD-LxT ☒ LD-828 ☐ ZC-0032 ☐ LD-902 ☐ _____	SYSTEM PWR: ☒ BAT ☐ AC (observations during measurement)
SERIAL #: 1616	SERIAL #: 3378	SERIAL #: 1629	

CALIBRATOR:		CALIBRATION RECORD:	NOTES:
☒ LD CA250 ☐ LD CA200 ☐ B&K 4231 ☐ _____ S/N 2479	Freq, Hz. ☒ 250 ☐ 1000 ☐ 84 ☐ _____	Input, dB / Reading, dB / Offset, dB / Time Before 114.0 / 114.0 / 76 / 8:28 After 114.0 / 113.8 / — / 11:55	TEMP: 62 °F R.H.: 46.2 % WIND SPEED: 0 MPH TOWARD (DIR): _____ SKIES: Cloudy CAMERA Rugel Phone ☐ VIDEO ☐ RADAR

METER SETTINGS:					
☒ A-WTD	☐ LINEAR	☒ SLOW	☐ 1/1 OCT	☒ INTERVALS _____ - MINUTE	
☐ C-WTD	☐ IMPULSE	☐ FAST	☐ 1/3 OCT	☐ L_N PERCENTILE VALUES	

NOTES:

DATE	START TIME	STOP TIME	L_{MIN}	L_{MAX}	L_{EQ}	SEL	NUMBER OF LOCOMOTIVES	NUMBER OF CARS	SPEED (mph)	NOTES:
4/18	8:34	8:35	63.6	102.6	93.2	105.7	2	11	67	② ← AMTRAK
	8:42	9:43	77.3	99.3	91.9	102.9	1	5	40	② ← AMTRAK
	8:44	8:49	61.1	63.9	62.4	87.3	—	—	—	AMBIENT
	9:04	9:09	61.0	63.3	62.1	86.9	—	—	—	AMBIENT
	9:15	9:16	63.5	103.7	93.5	106.6	2	11	53	② → AMTRAK



PARSONS

FIELD SURVEY FORM

PROJECT:	ENGINEER:	DATE:
	URENDA	4/18/18

MEASUREMENT ADDRESS/LOCATION:	CITY:		SITE NO.:
1450 Fourth St #10	BERKELEY	☐ Single-Family ☐ Multi-Family ☐ Recreational ☒ Commercial	PB1

SOUND LEVEL METER:
☐ LD-870 ☒ LD-820 ☐ LD-LxT
☐ LD-824 ☐ LD-812 ☐ B&K-2250
☐ LD-2900 ☐ _____
SERIAL #: 1616

MICROPHONE:
☒ NON-POLAR ☐ POLARIZED
☒ 1/2-INCH ☐ FREEFIELD
☐ 1-INCH ☐ RANDOM
☒ WIND SCREEN
SERIAL #: 3378

PRE AMP:
☐ LD-900 ☐ LD-LxT
☒ LD-828 ☐ ZC-0032
☐ LD-902 ☐ _____
SERIAL #: 1629

CALIBRATOR:
☒ LD CA250 ☐ LD CA200
☐ B&K 4231 ☐ _____
S/N 2479
Freq, Hz.
☒ 250
☐ 1000
☐ 84
☐ _____

CALIBRATION RECORD:
Input, dB / Reading, dB / Offset, dB / Time
Before 114.0 / 113.8 / 7.6 / 13:04
After 114.0 / 113.6 / – / 15:10

METER SETTINGS:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS _____ - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☐ L_N PERCENTILE VALUES

NOTES:
SYSTEM PWR: ☒ BAT ☐ AC
(observations at start of measurement)
TEMP: _____ °F R.H.: _____ %
WIND SPEED: _____ MPH
TOWARD (DIR): _____
SKIES: _____
CAMERA _____
PHOTO NOs. _____

NOTES:

DATE	START TIME	STOP TIME	L_{MIN}	L_{MAX}	L_{EQ}	SEL	NUMBER OF LOCOMOTIVES	NUMBER OF CARS	SPEED (mph)	NOTES:
4/18	9:16	9:17	63.7	98.2	91.6	104.4	1	4	35	① ← AMTRAK
	9:25	9:26	71.3	104.8	96.2	108.3	1	4	30	② ← FREIGHT
	9:33	9:34	61.8	102.4	82.4	105.9	4	134	22	③ ← FREIGHT
	9:49	9:54	60.8	69.1	62.5	87.3	—	—	—	AMBIENT
	10:02	10:03	63.8	102.0	93.9	105.5	1	4	50	① ← AMTRAK
	10:11	10:12	72.6	100.1	93.3	104.5	1	4	62	① → AMTRAK
	10:19	10:20	62.7	95.2	89.1	100.4	1	5	46	① ← AMTRAK (LESS HORN)
	10:42	10:43	62.5	103.7	94.3	107.9	1	4	40	① → AMTRAK
	11:10	11:11	63.0	102.1	86.7	104.2	2	22	34	② ← FREIGHT
	11:31	11:36	52.0	56.9	54.0	78.3	—	—	—	AMBIENT
	11:45	11:46	61.9	103.0	95.2	106.2	1	4	64	① ← AMTRAK
	11:49	11:50	54.9	64.6	57.1	81.9	—	—	—	AMBIENT
	13:20	13:25	50.4	59.8	53.4	78.3	—	—	—	AMBIENT
	13:50	13:51	59.9	99.7	91.9	104.7	1	5	47	① → AMTRAK
	13:51	13:52	80.3	102.7	96.4	105.5	1	4	64	② ← AMTRAK
	14:02	14:03	79.4	104.8	96.5	107.6	1	4	60	① ← AMTRAK
	14:19	14:20					2	33	20	① ← FREIGHT
	14:40	14:45	52.8	61.2	55.1	79.9	—	—	—	AMBIENT
	14:51	14:52	57.7	107.6	97.3	109.2	1	4	53	① → AMTRAK
	15:05	15:06	59.2	94.5	88.7	100.1	1	4	41	① → AMTRAK (LESS HORN)

BACK TO BACK

PARSONS

FIELD SURVEY FORM

PROJECT:	ENGINEER:	DATE:
I-80 / Gilman Street Interchange	URENDA	4/19/18

MEASUREMENT ADDRESS/LOCATION:	CITY:		SITE NO.:
1450 FOURTH ST #10	BERKELEY	☐ Single-Family ☐ Multi-Family ☐ School ☐ Recreational ☒ Commercial ☐ Church	PB1

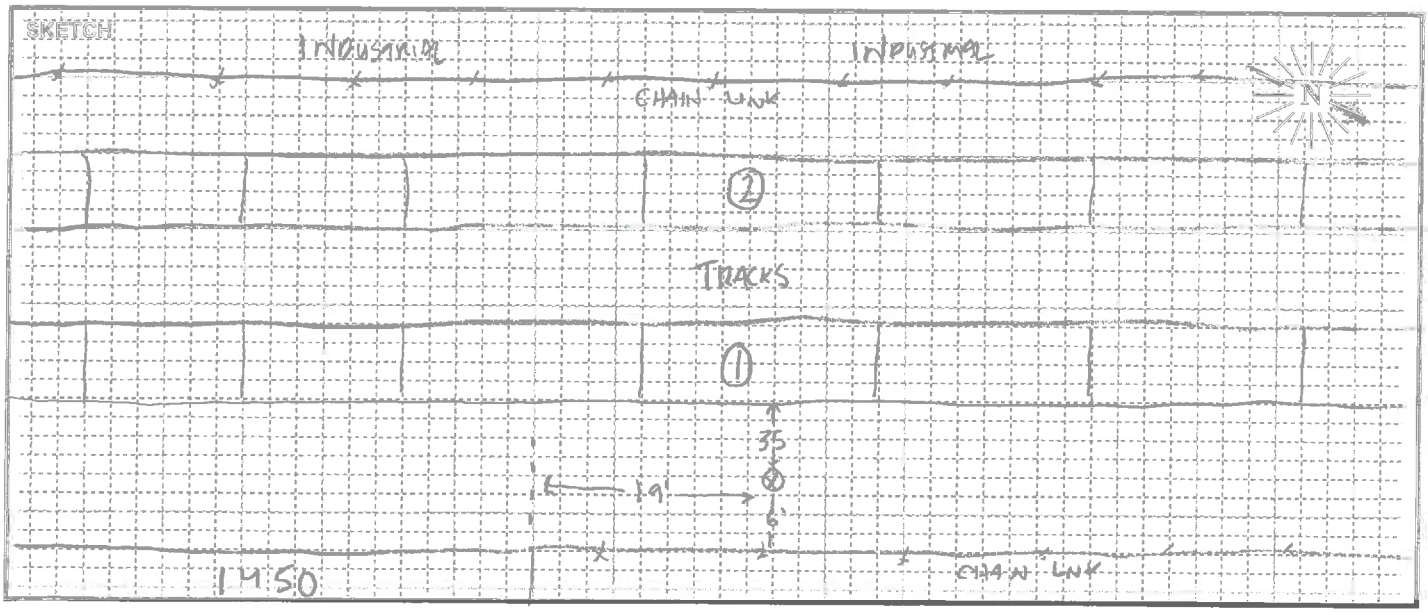
SOUND LEVEL METER:	MICROPHONE:	PRE AMP:	NOTES:
☐ LD-870 ☒ LD-820 ☐ LD-LxT ☐ LD-824 ☐ LD-812 ☐ B&K-2250 ☐ LD-2900 ☐ _____	☒ NON-POLAR ☐ POLARIZED ☑ 1/2-INCH ☐ FREEFIELD ☐ 1-INCH ☐ RANDOM ☒ WIND SCREEN	☐ LD-900 ☐ LD-LxT ☒ LD-828 ☐ ZC-0032 ☐ LD-902 ☐ _____	SYSTEM PWR: ☒ BAT ☐ AC
SERIAL #: 1616	SERIAL #: 3378	SERIAL #: 1629	(observations during measurement)

CALIBRATOR:		CALIBRATION RECORD:	NOTES:
☒ LD CA250 ☐ LD CA200 ☐ B&K 4231 ☐ _____ S/N 24779	Freq, Hz. ☒ 250 ☐ 1000 ☐ 84 ☐ _____	Input, dB / Reading, dB / Offset, dB / Time Before 114.0 / 114.0 / 7.3 / 7:41am After _____ / _____ / _____ / _____	TEMP: 45 °F R.H.: 74 % WIND SPEED: 0 MPH TOWARD (DIR): _____ SKIES: CLEAR CAMERA RUBEN PHONE ☐ VIDEO ☐ RADAR

METER SETTINGS:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS _____ - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☐ L_N PERCENTILE VALUES

NOTES:

DATE	START TIME	STOP TIME	L_{MIN}	L_{MAX}	L_{EQ}	SEL	NUMBER OF LOCOMOTIVES	NUMBER OF CARS	SPEED (mph)	NOTES:
4/19	7:58	7:59	63.3	96.2	89.5	100.8	1	5	58	② → (SACTO) (LESS HORN) AMTRAK
	8:03	8:04	66.6	104.8	95.9	109.3	1	5	32	① ← AMTRAK
	8:09	8:10	56.1	97.2	88.8	101.6	1	4	44	② → (BACK) (LESS HORN) AMTRAK
	8:31	8:32	63.9	104.1	94.9	106.9	1	1	44	② → FREIGHT
	8:47	8:48					1	4	37	① ← AMTRAK



PARSONS

FIELD SURVEY FORM

PROJECT:	ENGINEER:	DATE:
	URENDA	4/19/18

MEASUREMENT ADDRESS/LOCATION:	CITY:		SITE NO.:
1450 FOURTH ST #10	BERKELEY	☐ Single-Family ☐ Multi-Family ☐ Recreational ☒ Commercial	PB1

SOUND LEVEL METER:
☐ LD-870 ☒ LD-820 ☐ LD-LxT
☐ LD-824 ☐ LD-812 ☐ B&K-2250
☐ LD-2900 ☐ _____
SERIAL #: 1616

MICROPHONE:
☒ NON-POLAR ☐ POLARIZED
☒ 1/2-INCH ☐ FREEFIELD
☐ 1-INCH ☐ RANDOM
☒ WIND SCREEN
SERIAL #: 3378

PRE AMP:
☐ LD-900 ☐ LD-LxT
☐ LD-828 ☐ ZC-0032
☐ LD-902 ☐ _____
SERIAL #: 1629

CALIBRATOR:
☒ LD CA250 ☐ LD CA200
☐ B&K 4231 ☐ _____
S/N 2479
Freq, Hz.
☒ 250
☐ 1000
☐ 84
☐ _____

CALIBRATION RECORD:
Input, dB / Reading, dB / Offset, dB / Time
Before _____ / _____ / _____ / _____
After 114.0 / 113.8 / — / 11:53

METER SETTINGS:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS _____ - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☐ L_N PERCENTILE VALUES

NOTES:
SYSTEM PWR: ☒ BAT ☐ AC
(observations at start of measurement)
TEMP: _____ °F R.H.: _____ %
WIND SPEED: _____ MPH
TOWARD (DIR): _____
SKIES: CLEAR
CAMERA RUREN Walk
PHOTO NOs. _____

NOTES:

DATE	START TIME	STOP TIME	L_{MIN}	L_{MAX}	L_{EQ}	SEL	NUMBER OF LOCOMOTIVES	NUMBER OF CARS	SPEED (mph)	NOTES:
4/19	9:03	9:04	57.9	75.1	84	99.5	2	11	31	② ← AMTRAK
	9:15	9:16	68.4	105.9	96.2	109.6	2	11	65	① → AMTRAK
	9:17	9:18	58.8	100.3	88.7	104.0	1	5	23	① ← AMTRAK
	9:27	9:37	52.5	61.0	54.9	83.5	—	—	-	AMBIENT
	9:51	9:52	58.5	105.5	89.0	109.5	3	100	44	② → FREIGHT
	10:10	10:11	64.9	106.1	95.1	107.7	1	4	61	② → AMTRAK
	10:17	10:18	59.5	109.4	99.7	111.8	1	4	35	① ← AMTRAK
	10:27	10:28	62.0	97.0	84.6	99.2	1	5	27	① ← AMTRAK
	10:32	10:37	53.1	60.0	55.0	79.3	—	—	-	AMBIENT
	10:49	10:50	56.6	101.4	89.7	104.3	1	5	32	① → AMTRAK
	11:40	11:45	53.8	59.7	55.9	80.2	—	—	—	AMBIENT
	11:45	11:46	65.9	99.7	88.6	102.7	1	5	30	① ← AMTRAK

PARSONS

FIELD SURVEY FORM

PROJECT:	ENGINEER:	DATE:
I-80 / Gilman Street Interchange	URBANA	4/20/19

MEASUREMENT ADDRESS/LOCATION:	CITY:		SITE NO.:
1450 FOURTH ST #10	BERKELEY	☐ Single-Family ☐ Multi-Family ☐ School ☐ Recreational ☒ Commercial ☐ Church	PR1

SOUND LEVEL METER:
☐ LD-870 ☒ LD-820 ☐ LD-LxT
☐ LD-824 ☐ LD-812 ☐ B&K-2250
☐ LD-2900 ☐ _____
SERIAL #: 1616

MICROPHONE:
☒ NON-POLAR ☐ POLARIZED
☒ 1/2-INCH ☐ FREEFIELD
☐ 1-INCH ☐ RANDOM
☒ WIND SCREEN
SERIAL #: 3378

PRE AMP:
☐ LD-900 ☐ LD-LxT
☒ LD-828 ☐ ZC-0032
☐ LD-902 ☐ _____
SERIAL #: 1629

CALIBRATOR:
☒ LD CA250 ☐ LD CA200
☐ B&K 4231 ☐ _____
S/N 2479
Freq, Hz.
☒ 250
☐ 1000
☐ 84
☐ _____

CALIBRATION RECORD:
Input, dB / Reading, dB / Offset, dB / Time
Before 114.0 / 114.0 / 7.3 / 7:35am
After _____ / _____ / _____ / _____

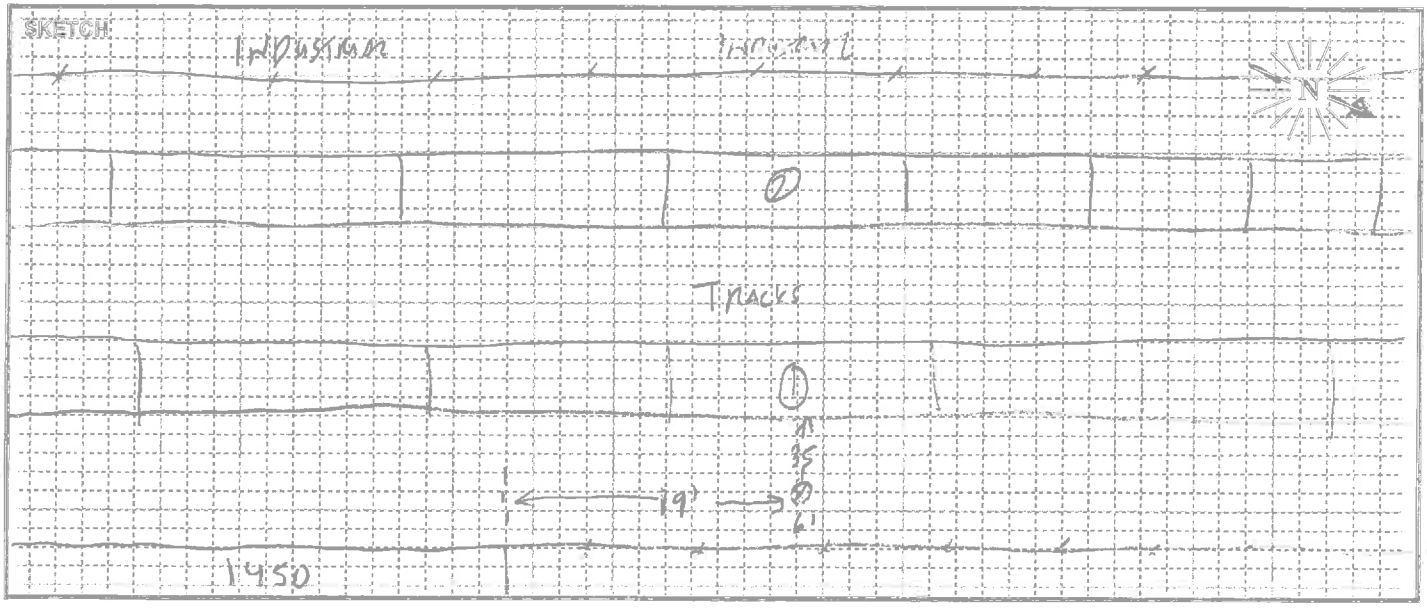
METER SETTINGS:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS _____ - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☐ L_N PERCENTILE VALUES

NOTES:
SYSTEM PWR: ☒ BAT ☐ AC
(observations during measurement)
TEMP: 54 °F R.H.: 73.4 %
WIND SPEED: 1.2 MPH
TOWARD (DIR): _____
SKIES: CLEAR
CAMERA RUBEN PINEDA
☐ VIDEO ☐ RADAR

NOTES:

DATE	START TIME	STOP TIME	L_{MIN}	L_{MAX}	L_{EQ}	SEL	NUMBER OF LOCOMOTIVES	NUMBER OF CARS	SPEED (mph)	NOTES:
4/20	7:45	7:46	63.1	111.3	100.4	115.9	2	10	25	① ← Horn FREIGHT
	7:55	7:56	71.6	92.8	87	99.2	1	5	54	② → A
	7:58	7:59	65.1	91.8	84.1	97.4	1	5	37	② ← Horn AMTRAK
	8:09	8:10	65.9	103.8	92.4	106.6	2	11	41	② ← Horn AMTRAK
	8:19	8:20	58.7	100.0	92.1	105.4	1	5	37	① → Horn AMTRAK

SKETCH



PARSONS

FIELD SURVEY FORM

PROJECT:	ENGINEER:	DATE:
	UNEMA	4/20/18

MEASUREMENT ADDRESS/LOCATION:	CITY:	☐ Single-Family ☐ Multi-Family ☐ Recreational ☒ Commercial	SITE NO.:
1450 FOURTH ST #10	BERKELEY		PB1

SOUND LEVEL METER:
☐ LD-870 ☒ LD-820 ☐ LD-LxT
☐ LD-824 ☐ LD-812 ☐ B&K-2250
☐ LD-2900 ☐ _____

MICROPHONE:
☒ NON-POLAR ☐ POLARIZED
☒ 1/2-INCH ☐ FREEFIELD
☐ 1-INCH ☐ RANDOM
☒ WIND SCREEN

PRE AMP:
☐ LD-900 ☐ LD-LxT
☒ LD-828 ☐ ZC-0032
☐ LD-902 ☐ _____

SERIAL #:	SERIAL #:	SERIAL #:
1616	3378	1629

CALIBRATOR:
☒ LD CA250 ☐ LD CA200
☐ B&K 4231 ☐ _____
S/N 2479

Freq, Hz.
☒ 250
☐ 1000
☐ 84
☐ _____

CALIBRATION RECORD:
Input, dB / Reading, dB / Offset, dB / Time
Before _____ / _____ / _____ / _____
After 114.0 / 113.8 / — / 10:52a

METER SETTINGS:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS _____ - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☐ L_N PERCENTILE VALUES

NOTES:
SYSTEM PWR: ☒ BAT ☐ AC
(observations at start of measurement)
TEMP: _____ °F R.H.: _____ %
WIND SPEED: _____ MPH
TOWARD (DIR): _____
SKIES: CLEAR
CAMERA RUSH Wide
PHOTO NOs. _____

NOTES:

DATE	START TIME	STOP TIME	L_{MIN}	L_{MAX}	L_{EQ}	SEL	NUMBER OF LOCOMOTIVES	NUMBER OF CARS	SPEED (mph)	NOTES:
4/20	8:39	8:39	62.8	105.3	95.4	108.5	2	0	28	② → FREIGHT
	8:40	8:45	61.3	64.1	62.1	87.5	—	—	—	AMBIENT
	8:46	8:47	66.5	87.9	81.6	95.7	1	5	36	① ← AMTRAK
	9:16	9:17	63.5	101.1	90.5	105.1	2	8	62	② → AMTRAK
	9:18	9:19					1	5	31	① ← AMTRAK
	10:12	10:13	57.4	101.3	90.9	103.4	1	4	37	② ← AMTRAK
	10:16	10:17	58.9	87.6	82.1	94.3	1	4	51	① → AMTRAK
	10:23	10:24	57.2	105.9	93.7	111.9	1	24	24	② → FREIGHT
	10:27	10:28	64.9	103.2	93.9	107.5	1	4	35	① ← (HORN) AMTRAK
	10:30	10:35	53.3	61.3	55.6	81.7	—	—	—	AMBIENT
	10:45	10:46	55.7	97.8	88.5	102.5	1	5	26	① → AMTRAK

PARSONS

Appendix D Noise Measurement Site Photographs

Facing East

Facing West

SHORT-TERM MEASUREMENT SITE ST1

Facing East

Facing southwest

SHORT-TERM MEASUREMENT SITE ST2

Facing East

Facing Southwest

SHORT-TERM MEASUREMENT SITE LT1

Facing West

Facing Southeast

TRAIN PASS-BY MEASUREMENT SITE PB1

Appendix E Street Addresses for Modeled Noise Receptors

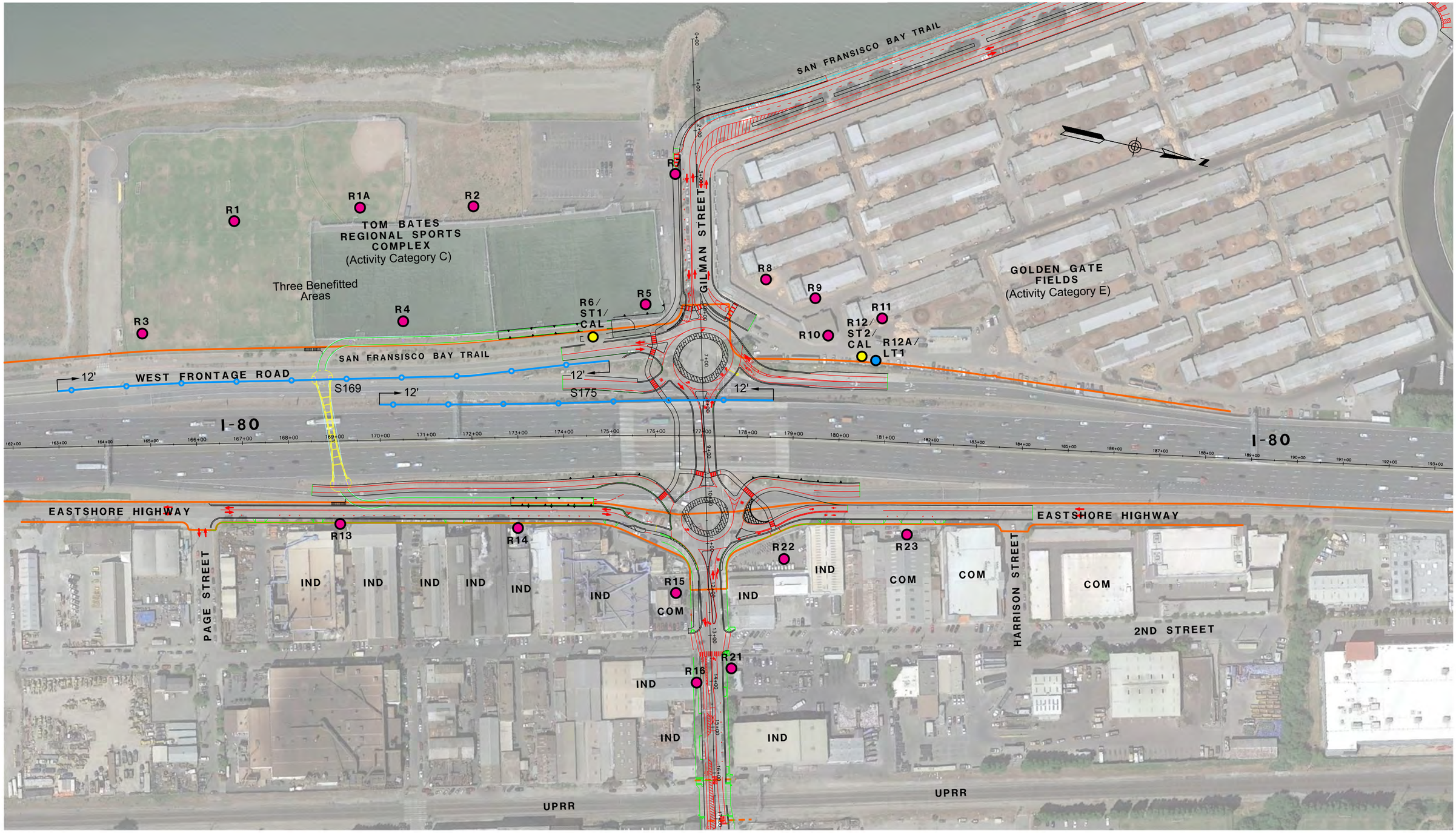
Table E-1 – Street Addresses for Modeled Receptors

RECEPTOR I.D.	ADDRESS or LOCATION	LAND USE [1]	NUMBER of DWELLING UNITS
R1	Tom Bates Regional Sports Complex 400 Gilman Street, Berkeley	SPO	1
R1A	Tom Bates Regional Sports Complex 400 Gilman Street, Berkeley	SPO	1
R2	Tom Bates Regional Sports Complex 400 Gilman Street, Berkeley	SPO	1
R3	Tom Bates Regional Sports Complex 400 Gilman Street, Berkeley	SPO	1
R4	Tom Bates Regional Sports Complex 400 Gilman Street, Berkeley	SPO	1
R5	Tom Bates Regional Sports Complex 400 Gilman Street, Berkeley	SPO	1
R6	San Francisco Bay Trail	TRL	1
R7	San Francisco Bay Trail	TRL	1
R8	Golden Gate Fields 1100 Eastshore Highway, Berkeley	STA	1
R9	Golden Gate Fields 1100 Eastshore Highway, Berkeley	STA	1
R10	Golden Gate Fields 1100 Eastshore Highway, Berkeley	STA	1
R11	Golden Gate Fields 1100 Eastshore Highway, Berkeley	STA	1
R12	Golden Gate Fields 1100 Eastshore Highway, Berkeley	STA	1
R12A	Golden Gate Fields 1100 Eastshore Highway, Berkeley	STA	1
R13	1401 Eastshore Hwy Berkeley, CA 94710	IND	1
R14	1305 Eastshore Hwy Berkeley, CA 94710	IND	1
R15	600 Gilman St Berkeley, CA 94710	COM	1
R16	640 Gilman St Berkeley, CA 94710	IND	1
R17	708 Gilman St Berkeley, CA 94710	COM	1
R18	1300 Gilman St Berkeley, CA 94710	RES	1
R19	725 Gilman St Berkeley, CA 94710	RTL	1
R20	707 Gilman St Berkeley, CA 94710	IND	1
R21	669 Gilman St Berkeley, CA 94710	IND	1
R22	635 Gilman St Berkeley, CA 94710	IND	1
R23	1255 Eastshore Hwy Berkeley, CA 94710	COM	1

Note:

1 - Land Use: SPO - sports complex; TRL - trail; STA - horse stable area; IND - industrial; COM - comn
RST - restaurant; RTL - retail.

Appendix F Noise Measurement, Modeled Receptor, and Barrier Locations



LEGEND

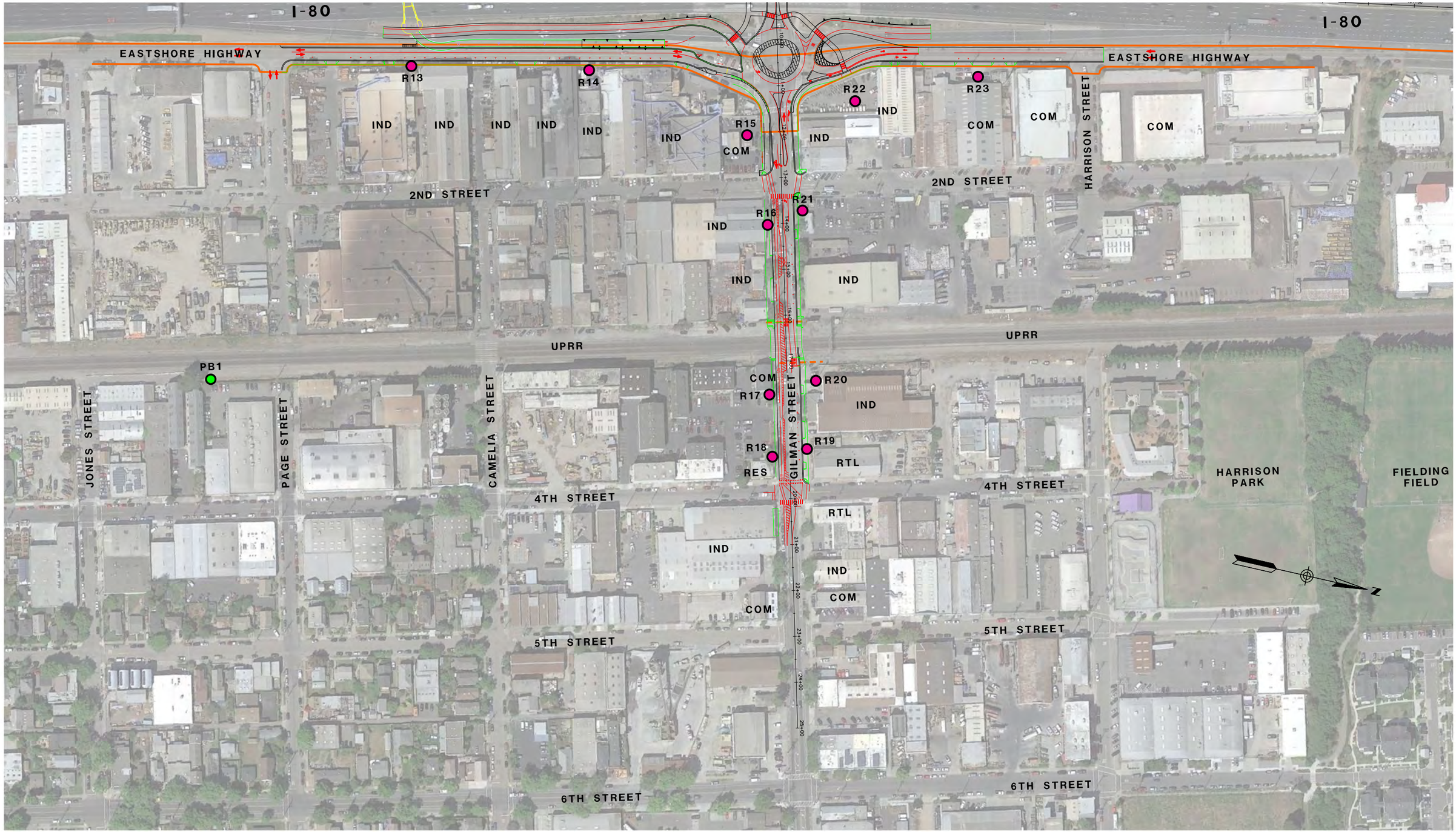
RXX	– NOISE RECEPTOR	COM	– COMMERCIAL	RES	– RESTAURANT
ST	– SHORT–TERM MEASUREMENT	RTL	– RETAIL		– SOUNDWALL
LT	– LONG–TERM MEASUREMENT	IND	– INDUSTRAIL		
PB	– TRAIN PASS–BY MEASUREMENT SITE	CAL	– CALIBRATION SITE		

1in : 200ft

0 ft 100ft 200ft 300ft

I-80/ GILMAN STREET INTERCHANGE IMPROVEMENT PROJECT NOISE RECEPTOR AND BARRIER LOCATIONS

JUNE 2018 | FIGURE 1



LEGEND

- RXX – NOISE RECEPTOR
- ST – SHORT-TERM MEASUREMENT
- LT – LONG-TERM MEASUREMENT
- PB – TRAIN PASS-BY MEASUREMENT SITE

- COM – COMMERCIAL
- RTL – RETAIL
- IND – INDUSTRAIL
- CAL – CALIBRATION SITE

- RES – RESTAURANT
- – SOUNDWALL

1in : 200ft

0 ft 100ft 200ft 300ft

I-80/ GILMAN STREET INTERCHANGE IMPROVEMENT PROJECT NOISE RECEPTOR AND BARRIER LOCATIONS

JUNE 2018

FIGURE 2

Appendix G Computer Noise Modeling Files (CD-ROM)

CD Containing
TNM 2.5 Files
Included

Appendix H Road Construction Noise Modeling Data

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Phases 1 through 5

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	85.0	0.0
Grader	No	40	85.0		85.0	0.0
Excavator	No	40		80.7	85.0	0.0
Compactor (ground)	No	20		83.2	85.0	0.0
Front End Loader	No	40		79.1	85.0	0.0
Concrete Mixer Truck	No	40		78.8	85.0	0.0
Backhoe	No	40		77.6	85.0	0.0
Roller	No	20		80.0	85.0	0.0
Dump Truck	No	40		76.5	85.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Jackhammer	84.3	77.3	66.0	N/A	61.0	N/A	56.0	N/A	18.3	N/A	23.3	N/A	28.3	N/A
Grader	80.4	76.4	65.0	N/A	60.0	N/A	55.0	N/A	15.4	N/A	20.4	N/A	25.4	N/A
Excavator	76.1	72.1	65.0	N/A	60.0	N/A	55.0	N/A	11.1	N/A	16.1	N/A	21.1	N/A
Compactor (ground)	78.6	71.6	65.0	N/A	60.0	N/A	55.0	N/A	13.6	N/A	18.6	N/A	23.6	N/A
Front End Loader	74.5	70.5	65.0	N/A	60.0	N/A	55.0	N/A	9.5	N/A	14.5	N/A	19.5	N/A
Concrete Mixer Truck	74.2	70.2	65.0	N/A	60.0	N/A	55.0	N/A	9.2	N/A	14.2	N/A	19.2	N/A
Backhoe	73.0	69.0	65.0	N/A	60.0	N/A	55.0	N/A	8.0	N/A	13.0	N/A	18.0	N/A
Roller	75.4	68.4	65.0	N/A	60.0	N/A	55.0	N/A	10.4	N/A	15.4	N/A	20.4	N/A
Dump Truck	71.8	67.9	65.0	N/A	60.0	N/A	55.0	N/A	6.8	N/A	11.8	N/A	16.8	N/A
Total	84.3	82.3	65.0	N/A	60.0	N/A	55.0	N/A	19.3	N/A	24.3	N/A	29.3	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	25.0	0.0
Grader	No	40	85.0		25.0	0.0
Excavator	No	40		80.7	25.0	0.0
Compactor (ground)	No	20		83.2	25.0	0.0
Front End Loader	No	40		79.1	25.0	0.0
Concrete Mixer Truck	No	40		78.8	25.0	0.0

Backhoe	No	40	77.6	25.0	0.0
Roller	No	20	80.0	25.0	0.0
Dump Truck	No	40	76.5	25.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	94.9	87.9	66.0	N/A	61.0	N/A	56.0	N/A	28.9	N/A	33.9	N/A	38.9	N/A
Grader	91.0	87.0	65.0	N/A	60.0	N/A	55.0	N/A	26.0	N/A	31.0	N/A	36.0	N/A
Excavator	86.7	82.8	65.0	N/A	60.0	N/A	55.0	N/A	21.7	N/A	26.7	N/A	31.7	N/A
Compactor (ground)	89.3	82.3	65.0	N/A	60.0	N/A	55.0	N/A	24.3	N/A	29.3	N/A	34.3	N/A
Front End Loader	85.1	81.2	65.0	N/A	60.0	N/A	55.0	N/A	20.1	N/A	25.1	N/A	30.1	N/A
Concrete Mixer Truck	84.8	80.8	65.0	N/A	60.0	N/A	55.0	N/A	19.8	N/A	24.8	N/A	29.8	N/A
Backhoe	83.6	79.6	65.0	N/A	60.0	N/A	55.0	N/A	18.6	N/A	23.6	N/A	28.6	N/A
Roller	86.0	79.0	65.0	N/A	60.0	N/A	55.0	N/A	21.0	N/A	26.0	N/A	31.0	N/A
Dump Truck	82.5	78.5	65.0	N/A	60.0	N/A	55.0	N/A	17.5	N/A	22.5	N/A	27.5	N/A
Total	94.9	93.0	65.0	N/A	60.0	N/A	55.0	N/A	29.9	N/A	34.9	N/A	39.9	N/A

**** Receptor #3 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	95.0	0.0
Grader	No	40	85.0		95.0	0.0
Excavator	No	40		80.7	95.0	0.0
Compactor (ground)	No	20		83.2	95.0	0.0
Front End Loader	No	40		79.1	95.0	0.0
Concrete Mixer Truck	No	40		78.8	95.0	0.0
Backhoe	No	40		77.6	95.0	0.0
Roller	No	20		80.0	95.0	0.0
Dump Truck	No	40		76.5	95.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	83.3	76.3	71.0	N/A	66.0	N/A	61.0	N/A	12.3	N/A	17.3	N/A	22.3	N/A
Grader	79.4	75.4	70.0	N/A	65.0	N/A	60.0	N/A	9.4	N/A	14.4	N/A	19.4	N/A
Excavator	75.1	71.2	70.0	N/A	65.0	N/A	60.0	N/A	5.1	N/A	10.1	N/A	15.1	N/A
Compactor (ground)	77.7	70.7	70.0	N/A	65.0	N/A	60.0	N/A	7.7	N/A	12.7	N/A	17.7	N/A
Front End Loader	73.5	69.6	70.0	N/A	65.0	N/A	60.0	N/A	3.5	N/A	8.5	N/A	13.5	N/A
Concrete Mixer Truck	73.2	69.2	70.0	N/A	65.0	N/A	60.0	N/A	3.2	N/A	8.2	N/A	13.2	N/A
Backhoe	72.0	68.0	70.0	N/A	65.0	N/A	60.0	N/A	2.0	N/A	7.0	N/A	12.0	N/A
Roller	74.4	67.4	70.0	N/A	65.0	N/A	60.0	N/A	4.4	N/A	9.4	N/A	14.4	N/A
Dump Truck	70.9	66.9	70.0	N/A	65.0	N/A	60.0	N/A	0.9	N/A	5.9	N/A	10.9	N/A
Total	83.3	81.4	70.0	N/A	65.0	N/A	60.0	N/A	13.3	N/A	18.3	N/A	23.3	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	30.0	0.0
Grader	No	40	85.0		30.0	0.0
Excavator	No	40		80.7	30.0	0.0
Compactor (ground)	No	20		83.2	30.0	0.0
Front End Loader	No	40		79.1	30.0	0.0
Concrete Mixer Truck	No	40		78.8	30.0	0.0
Backhoe	No	40		77.6	30.0	0.0
Roller	No	20		80.0	30.0	0.0
Dump Truck	No	40		76.5	30.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	93.3	86.3	71.0	N/A	71.0	N/A	71.0	N/A	22.3	N/A	22.3	N/A	22.3	N/A
Grader	89.4	85.5	70.0	N/A	70.0	N/A	70.0	N/A	19.4	N/A	19.4	N/A	19.4	N/A
Excavator	85.1	81.2	70.0	N/A	70.0	N/A	70.0	N/A	15.1	N/A	15.1	N/A	15.1	N/A
Compactor (ground)	87.7	80.7	70.0	N/A	70.0	N/A	70.0	N/A	17.7	N/A	17.7	N/A	17.7	N/A
Front End Loader	83.5	79.6	70.0	N/A	70.0	N/A	70.0	N/A	13.5	N/A	13.5	N/A	13.5	N/A
Concrete Mixer Truck	83.2	79.3	70.0	N/A	70.0	N/A	70.0	N/A	13.2	N/A	13.2	N/A	13.2	N/A
Backhoe	82.0	78.0	70.0	N/A	70.0	N/A	70.0	N/A	12.0	N/A	12.0	N/A	12.0	N/A
Roller	84.4	77.4	70.0	N/A	70.0	N/A	70.0	N/A	14.4	N/A	14.4	N/A	14.4	N/A
Dump Truck	80.9	76.9	70.0	N/A	70.0	N/A	70.0	N/A	10.9	N/A	10.9	N/A	10.9	N/A
Total	93.3	91.4	70.0	N/A	70.0	N/A	70.0	N/A	23.3	N/A	23.3	N/A	23.3	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	70.0	0.0
Grader	No	40	85.0		70.0	0.0
Excavator	No	40		80.7	70.0	0.0
Compactor (ground)	No	20		83.2	70.0	0.0
Front End Loader	No	40		79.1	70.0	0.0
Concrete Mixer Truck	No	40		78.8	70.0	0.0
Backhoe	No	40		77.6	70.0	0.0
Roller	No	20		80.0	70.0	0.0
Dump Truck	No	40		76.5	70.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Jackhammer	86.0	79.0	71.0	N/A	66.0	N/A	61.0	N/A	15.0	N/A	20.0	N/A	25.0	N/A
Grader	82.1	78.1	70.0	N/A	65.0	N/A	60.0	N/A	12.1	N/A	17.1	N/A	22.1	N/A
Excavator	77.8	73.8	70.0	N/A	65.0	N/A	60.0	N/A	7.8	N/A	12.8	N/A	17.8	N/A
Compactor (ground)	80.3	73.3	70.0	N/A	65.0	N/A	60.0	N/A	10.3	N/A	15.3	N/A	20.3	N/A
Front End Loader	76.2	72.2	70.0	N/A	65.0	N/A	60.0	N/A	6.2	N/A	11.2	N/A	16.2	N/A
Concrete Mixer Truck	75.9	71.9	70.0	N/A	65.0	N/A	60.0	N/A	5.9	N/A	10.9	N/A	15.9	N/A
Backhoe	74.6	70.7	70.0	N/A	65.0	N/A	60.0	N/A	4.6	N/A	9.6	N/A	14.6	N/A
Roller	77.1	70.1	70.0	N/A	65.0	N/A	60.0	N/A	7.1	N/A	12.1	N/A	17.1	N/A
Dump Truck	73.5	69.5	70.0	N/A	65.0	N/A	60.0	N/A	3.5	N/A	8.5	N/A	13.5	N/A
Total	86.0	84.0	70.0	N/A	65.0	N/A	60.0	N/A	16.0	N/A	21.0	N/A	26.0	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	45.0	0.0
Grader	No	40	85.0		45.0	0.0
Excavator	No	40		80.7	45.0	0.0
Compactor (ground)	No	20		83.2	45.0	0.0
Front End Loader	No	40		79.1	45.0	0.0
Concrete Mixer Truck	No	40		78.8	45.0	0.0
Backhoe	No	40		77.6	45.0	0.0
Roller	No	20		80.0	45.0	0.0
Dump Truck	No	40		76.5	45.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Jackhammer	89.8	82.8	71.0	N/A	66.0	N/A	61.0	N/A	18.8	N/A	23.8	N/A	28.8	N/A
Grader	85.9	81.9	70.0	N/A	65.0	N/A	60.0	N/A	15.9	N/A	20.9	N/A	25.9	N/A
Excavator	81.6	77.6	70.0	N/A	65.0	N/A	60.0	N/A	11.6	N/A	16.6	N/A	21.6	N/A
Compactor (ground)	84.1	77.2	70.0	N/A	65.0	N/A	60.0	N/A	14.1	N/A	19.1	N/A	24.1	N/A
Front End Loader	80.0	76.0	70.0	N/A	65.0	N/A	60.0	N/A	10.0	N/A	15.0	N/A	20.0	N/A
Concrete Mixer Truck	79.7	75.7	70.0	N/A	65.0	N/A	60.0	N/A	9.7	N/A	14.7	N/A	19.7	N/A
Backhoe	78.5	74.5	70.0	N/A	65.0	N/A	60.0	N/A	8.5	N/A	13.5	N/A	18.5	N/A
Roller	80.9	73.9	70.0	N/A	65.0	N/A	60.0	N/A	10.9	N/A	15.9	N/A	20.9	N/A
Dump Truck	77.4	73.4	70.0	N/A	65.0	N/A	60.0	N/A	7.4	N/A	12.4	N/A	17.4	N/A
Total	89.8	87.9	70.0	N/A	65.0	N/A	60.0	N/A	19.8	N/A	24.8	N/A	29.8	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Description	Impact Device	Usage (%)	Equipment: Spec Lmax (dBA)	Equipment: Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	35.0	0.0
Grader	No	40	85.0		35.0	0.0
Excavator	No	40		80.7	35.0	0.0
Compactor (ground)	No	20		83.2	35.0	0.0
Front End Loader	No	40		79.1	35.0	0.0
Concrete Mixer Truck	No	40		78.8	35.0	0.0
Backhoe	No	40		77.6	35.0	0.0
Roller	No	20		80.0	35.0	0.0
Dump Truck	No	40		76.5	35.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Jackhammer	92.0	85.0	71.0	N/A	71.0	N/A	71.0	N/A	21.0	N/A	21.0	N/A	21.0	N/A
Grader	88.1	84.1	70.0	N/A	70.0	N/A	70.0	N/A	18.1	N/A	18.1	N/A	18.1	N/A
Excavator	83.8	79.8	70.0	N/A	70.0	N/A	70.0	N/A	13.8	N/A	13.8	N/A	13.8	N/A
Compactor (ground)	86.3	79.3	70.0	N/A	70.0	N/A	70.0	N/A	16.3	N/A	16.3	N/A	16.3	N/A
Front End Loader	82.2	78.2	70.0	N/A	70.0	N/A	70.0	N/A	12.2	N/A	12.2	N/A	12.2	N/A
Concrete Mixer Truck	81.9	77.9	70.0	N/A	70.0	N/A	70.0	N/A	11.9	N/A	11.9	N/A	11.9	N/A
Backhoe	80.7	76.7	70.0	N/A	70.0	N/A	70.0	N/A	10.7	N/A	10.7	N/A	10.7	N/A
Roller	83.1	76.1	70.0	N/A	70.0	N/A	70.0	N/A	13.1	N/A	13.1	N/A	13.1	N/A
Dump Truck	79.5	75.6	70.0	N/A	70.0	N/A	70.0	N/A	9.5	N/A	9.5	N/A	9.5	N/A
Total	92.0	90.0	70.0	N/A	70.0	N/A	70.0	N/A	22.0	N/A	22.0	N/A	22.0	N/A

**** Receptor #8 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Description	Impact Device	Usage (%)	Equipment: Spec Lmax (dBA)	Equipment: Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	45.0	0.0
Grader	No	40	85.0		45.0	0.0
Excavator	No	40		80.7	45.0	0.0
Compactor (ground)	No	20		83.2	45.0	0.0
Front End Loader	No	40		79.1	45.0	0.0
Concrete Mixer Truck	No	40		78.8	45.0	0.0
Backhoe	No	40		77.6	45.0	0.0
Roller	No	20		80.0	45.0	0.0
Dump Truck	No	40		76.5	45.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq

Jackhammer	89.8	82.8	71.0	N/A	66.0	N/A	61.0	N/A	18.8	N/A	23.8	N/A	28.8	N/A
Grader	85.9	81.9	70.0	N/A	65.0	N/A	60.0	N/A	15.9	N/A	20.9	N/A	25.9	N/A
Excavator	81.6	77.6	70.0	N/A	65.0	N/A	60.0	N/A	11.6	N/A	16.6	N/A	21.6	N/A
Compactor (ground)	84.1	77.2	70.0	N/A	65.0	N/A	60.0	N/A	14.1	N/A	19.1	N/A	24.1	N/A
Front End Loader	80.0	76.0	70.0	N/A	65.0	N/A	60.0	N/A	10.0	N/A	15.0	N/A	20.0	N/A
Concrete Mixer Truck	79.7	75.7	70.0	N/A	65.0	N/A	60.0	N/A	9.7	N/A	14.7	N/A	19.7	N/A
Backhoe	78.5	74.5	70.0	N/A	65.0	N/A	60.0	N/A	8.5	N/A	13.5	N/A	18.5	N/A
Roller	80.9	73.9	70.0	N/A	65.0	N/A	60.0	N/A	10.9	N/A	15.9	N/A	20.9	N/A
Dump Truck	77.4	73.4	70.0	N/A	65.0	N/A	60.0	N/A	7.4	N/A	12.4	N/A	17.4	N/A
Total	89.8	87.9	70.0	N/A	65.0	N/A	60.0	N/A	19.8	N/A	24.8	N/A	29.8	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Phase 6

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	85.0	0.0
Concrete Mixer Truck	No	40		78.8	85.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	79.8	72.8	65.0	N/A	60.0	N/A	55.0	N/A	14.8	N/A	19.8	N/A	24.8	N/A
Concrete Mixer Truck	74.2	70.2	65.0	N/A	60.0	N/A	55.0	N/A	9.2	N/A	14.2	N/A	19.2	N/A
Total	79.8	74.7	65.0	N/A	60.0	N/A	55.0	N/A	14.8	N/A	19.8	N/A	24.8	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	25.0	0.0
Concrete Mixer Truck	No	40		78.8	25.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	90.4	83.4	65.0	N/A	60.0	N/A	55.0	N/A	25.4	N/A	30.4	N/A	35.4	N/A
Concrete Mixer Truck	84.8	80.8	65.0	N/A	60.0	N/A	55.0	N/A	19.8	N/A	24.8	N/A	29.8	N/A
Total	90.4	85.3	65.0	N/A	60.0	N/A	55.0	N/A	25.4	N/A	30.4	N/A	35.4	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Description	Impact Device	Usage (%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	95.0	0.0
Concrete Mixer Truck	No	40		78.8	95.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	78.8	71.8	70.0	N/A	65.0	N/A	60.0	N/A	8.8	N/A	13.8	N/A	18.8	N/A
Concrete Mixer Truck	73.2	69.2	70.0	N/A	65.0	N/A	60.0	N/A	3.2	N/A	8.2	N/A	13.2	N/A
Total	78.8	73.7	70.0	N/A	65.0	N/A	60.0	N/A	8.8	N/A	13.8	N/A	18.8	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Description	Impact Device	Usage (%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	30.0	0.0
Concrete Mixer Truck	No	40		78.8	30.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	88.8	81.8	70.0	N/A	70.0	N/A	70.0	N/A	18.8	N/A	18.8	N/A	18.8	N/A
Concrete Mixer Truck	83.2	79.3	70.0	N/A	70.0	N/A	70.0	N/A	13.2	N/A	13.2	N/A	13.2	N/A
Total	88.8	83.7	70.0	N/A	70.0	N/A	70.0	N/A	18.8	N/A	18.8	N/A	18.8	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	70.0	0.0
Concrete Mixer Truck	No	40		78.8	70.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	81.4	74.4	70.0	N/A	65.0	N/A	60.0	N/A	11.4	N/A	16.4	N/A	21.4	N/A
Concrete Mixer Truck	75.9	71.9	70.0	N/A	65.0	N/A	60.0	N/A	5.9	N/A	10.9	N/A	15.9	N/A
Total	81.4	76.4	70.0	N/A	65.0	N/A	60.0	N/A	11.4	N/A	16.4	N/A	21.4	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	45.0	0.0
Concrete Mixer Truck	No	40		78.8	45.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	85.3	78.3	70.0	N/A	65.0	N/A	60.0	N/A	15.3	N/A	20.3	N/A	25.3	N/A
Concrete Mixer Truck	79.7	75.7	70.0	N/A	65.0	N/A	60.0	N/A	9.7	N/A	14.7	N/A	19.7	N/A
Total	85.3	80.2	70.0	N/A	65.0	N/A	60.0	N/A	15.3	N/A	20.3	N/A	25.3	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	35.0	0.0
Concrete Mixer Truck	No	40		78.8	35.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	87.5	80.5	70.0	N/A	70.0	N/A	70.0	N/A	17.5	N/A	17.5	N/A	17.5	N/A
Concrete Mixer Truck	81.9	77.9	70.0	N/A	70.0	N/A	70.0	N/A	11.9	N/A	11.9	N/A	11.9	N/A
Total	87.5	82.4	70.0	N/A	70.0	N/A	70.0	N/A	17.5	N/A	17.5	N/A	17.5	N/A

**** Receptor #8 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	45.0	0.0
Concrete Mixer Truck	No	40		78.8	45.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	85.3	78.3	70.0	N/A	65.0	N/A	60.0	N/A	15.3	N/A	20.3	N/A	25.3	N/A
Concrete Mixer Truck	79.7	75.7	70.0	N/A	65.0	N/A	60.0	N/A	9.7	N/A	14.7	N/A	19.7	N/A
Total	85.3	80.2	70.0	N/A	65.0	N/A	60.0	N/A	15.3	N/A	20.3	N/A	25.3	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/22/2018
Case Description: I-80/Gilman Pedestrian Overcrossing

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	85.0	0.0
Excavator	No	40		80.7	85.0	0.0
Front End Loader	No	40		79.1	85.0	0.0
Concrete Pump Truck	No	20		81.4	85.0	0.0
Concrete Mixer Truck	No	40		78.8	85.0	0.0
Backhoe	No	40		77.6	85.0	0.0
Crane	No	16		80.6	85.0	0.0
Dump Truck	No	40		76.5	85.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	79.8	72.8	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	19.8	N/A	24.8	N/A
Excavator	76.1	72.1	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	16.1	N/A	21.1	N/A
Front End Loader	74.5	70.5	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	14.5	N/A	19.5	N/A
Concrete Pump Truck	76.8	69.8	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	16.8	N/A	21.8	N/A
Concrete Mixer Truck	74.2	70.2	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	14.2	N/A	19.2	N/A
Backhoe	73.0	69.0	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	13.0	N/A	18.0	N/A
Crane	75.9	68.0	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	15.9	N/A	20.9	N/A
Dump Truck	71.8	67.9	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	11.8	N/A	16.8	N/A
Total	79.8	79.4	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	19.8	N/A	24.8	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	25.0	0.0
Excavator	No	40		80.7	25.0	0.0
Front End Loader	No	40		79.1	25.0	0.0
Concrete Pump Truck	No	20		81.4	25.0	0.0
Concrete Mixer Truck	No	40		78.8	25.0	0.0
Backhoe	No	40		77.6	25.0	0.0
Crane	No	16		80.6	25.0	0.0
Dump Truck	No	40		76.5	25.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	90.4	83.4	80.0	N/A	60.0	N/A	55.0	N/A	10.4	N/A	30.4	N/A	35.4	N/A
Excavator	86.7	82.8	80.0	N/A	60.0	N/A	55.0	N/A	6.7	N/A	26.7	N/A	31.7	N/A
Front End Loader	85.1	81.2	80.0	N/A	60.0	N/A	55.0	N/A	5.1	N/A	25.1	N/A	30.1	N/A
Concrete Pump Truck	87.4	80.4	80.0	N/A	60.0	N/A	55.0	N/A	7.4	N/A	27.4	N/A	32.4	N/A
Concrete Mixer Truck	84.8	80.8	80.0	N/A	60.0	N/A	55.0	N/A	4.8	N/A	24.8	N/A	29.8	N/A
Backhoe	83.6	79.6	80.0	N/A	60.0	N/A	55.0	N/A	3.6	N/A	23.6	N/A	28.6	N/A
Crane	86.6	78.6	80.0	N/A	60.0	N/A	55.0	N/A	6.6	N/A	26.6	N/A	31.6	N/A
Dump Truck	82.5	78.5	80.0	N/A	60.0	N/A	55.0	N/A	2.5	N/A	22.5	N/A	27.5	N/A
Total	90.4	90.0	80.0	N/A	60.0	N/A	55.0	N/A	10.4	N/A	30.4	N/A	35.4	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	470.0	0.0
Excavator	No	40		80.7	470.0	0.0
Front End Loader	No	40		79.1	470.0	0.0
Concrete Pump Truck	No	20		81.4	470.0	0.0

Concrete Mixer Truck	No	40	78.8	470.0	0.0
Backhoe	No	40	77.6	470.0	0.0
Crane	No	16	80.6	470.0	0.0
Dump Truck	No	40	76.5	470.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	64.9	57.9	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.9	N/A
Excavator	61.2	57.3	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	1.2	N/A
Front End Loader	59.6	55.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Pump Truck	61.9	54.9	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	1.9	N/A
Concrete Mixer Truck	59.3	55.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	58.1	54.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Crane	61.1	53.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	1.1	N/A
Dump Truck	57.0	53.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.9	64.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.9	N/A

**** Receptor #4 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	60.0	0.0
Excavator	No	40		80.7	60.0	0.0
Front End Loader	No	40		79.1	60.0	0.0
Concrete Pump Truck	No	20		81.4	60.0	0.0
Concrete Mixer Truck	No	40		78.8	60.0	0.0
Backhoe	No	40		77.6	60.0	0.0
Crane	No	16		80.6	60.0	0.0
Dump Truck	No	40		76.5	60.0	0.0

Results

	Calculated (dBA)	Noise Limits (dBA)			Noise Limit Exceedance (dBA)		
		Day	Evening	Night	Day	Evening	Night

Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	82.8	75.8	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	12.8	N/A	12.8	N/A
Excavator	79.1	75.1	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	9.1	N/A	9.1	N/A
Front End Loader	77.5	73.5	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	7.5	N/A	7.5	N/A
Concrete Pump Truck	79.8	72.8	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	9.8	N/A	9.8	N/A
Concrete Mixer Truck	77.2	73.2	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	7.2	N/A	7.2	N/A
Backhoe	76.0	72.0	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	6.0	N/A	6.0	N/A
Crane	79.0	71.0	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	9.0	N/A	9.0	N/A
Dump Truck	74.9	70.9	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	4.9	N/A	4.9	N/A
Total	82.8	82.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	12.8	N/A	12.8	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	270.0	0.0
Excavator	No	40		80.7	270.0	0.0
Front End Loader	No	40		79.1	270.0	0.0
Concrete Pump Truck	No	20		81.4	270.0	0.0
Concrete Mixer Truck	No	40		78.8	270.0	0.0
Backhoe	No	40		77.6	270.0	0.0
Crane	No	16		80.6	270.0	0.0
Dump Truck	No	40		76.5	270.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	69.7	62.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	4.7	N/A	9.7	N/A
Excavator	66.1	62.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.1	N/A	6.1	N/A
Front End Loader	64.5	60.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.5	N/A
Concrete Pump Truck	66.8	59.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Concrete Mixer Truck	64.2	60.2	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.2	N/A
Backhoe	62.9	58.9	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	2.9	N/A
Crane	65.9	57.9	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	0.9	N/A	5.9	N/A
Dump Truck	61.8	57.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	1.8	N/A
Total	69.7	69.3	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	4.7	N/A	9.7	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	930.0	0.0
Excavator	No	40		80.7	930.0	0.0
Front End Loader	No	40		79.1	930.0	0.0
Concrete Pump Truck	No	20		81.4	930.0	0.0
Concrete Mixer Truck	No	40		78.8	930.0	0.0
Backhoe	No	40		77.6	930.0	0.0
Crane	No	16		80.6	930.0	0.0
Dump Truck	No	40		76.5	930.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	59.0	52.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Excavator	55.3	51.3	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Front End Loader	53.7	49.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Pump Truck	56.0	49.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	53.4	49.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	52.2	48.2	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Crane	55.2	47.2	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	51.1	47.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	59.0	58.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

	Spec	Actual	Receptor	Estimated

Description	Impact Device	Usage (%)	Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Auger Drill Rig	No	20		84.4	470.0	0.0
Excavator	No	40		80.7	470.0	0.0
Front End Loader	No	40		79.1	470.0	0.0
Concrete Pump Truck	No	20		81.4	470.0	0.0
Concrete Mixer Truck	No	40		78.8	470.0	0.0
Backhoe	No	40		77.6	470.0	0.0
Crane	No	16		80.6	470.0	0.0
Dump Truck	No	40		76.5	470.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	64.9	57.9	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Excavator	61.2	57.3	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Front End Loader	59.6	55.7	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Pump Truck	61.9	54.9	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	59.3	55.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	58.1	54.1	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Crane	61.1	53.1	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	57.0	53.0	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.9	64.5	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A

**** Receptor #8 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	690.0	0.0
Excavator	No	40		80.7	690.0	0.0
Front End Loader	No	40		79.1	690.0	0.0
Concrete Pump Truck	No	20		81.4	690.0	0.0
Concrete Mixer Truck	No	40		78.8	690.0	0.0
Backhoe	No	40		77.6	690.0	0.0
Crane	No	16		80.6	690.0	0.0
Dump Truck	No	40		76.5	690.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	61.6	54.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	1.6	N/A
Excavator	57.9	53.9	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Front End Loader	56.3	52.3	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Pump Truck	58.6	51.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	56.0	52.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	54.8	50.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Crane	57.8	49.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	53.7	49.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	61.6	61.2	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	1.6	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Phases 1 through 5

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	50.0	0.0
Grader	No	40	85.0		50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Compactor (ground)	No	20		83.2	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Roller	No	20		80.0	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Jackhammer	88.9	81.9	66.0	N/A	61.0	N/A	56.0	N/A	22.9	N/A	27.9	N/A	32.9	N/A
Grader	85.0	81.0	65.0	N/A	60.0	N/A	55.0	N/A	20.0	N/A	25.0	N/A	30.0	N/A
Excavator	80.7	76.7	65.0	N/A	60.0	N/A	55.0	N/A	15.7	N/A	20.7	N/A	25.7	N/A
Compactor (ground)	83.2	76.2	65.0	N/A	60.0	N/A	55.0	N/A	18.2	N/A	23.2	N/A	28.2	N/A
Front End Loader	79.1	75.1	65.0	N/A	60.0	N/A	55.0	N/A	14.1	N/A	19.1	N/A	24.1	N/A
Concrete Mixer Truck	78.8	74.8	65.0	N/A	60.0	N/A	55.0	N/A	13.8	N/A	18.8	N/A	23.8	N/A
Backhoe	77.6	73.6	65.0	N/A	60.0	N/A	55.0	N/A	12.6	N/A	17.6	N/A	22.6	N/A
Roller	80.0	73.0	65.0	N/A	60.0	N/A	55.0	N/A	15.0	N/A	20.0	N/A	25.0	N/A
Dump Truck	76.5	72.5	65.0	N/A	60.0	N/A	55.0	N/A	11.5	N/A	16.5	N/A	21.5	N/A
Total	88.9	86.9	65.0	N/A	60.0	N/A	55.0	N/A	23.9	N/A	28.9	N/A	33.9	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	50.0	0.0
Grader	No	40	85.0		50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Compactor (ground)	No	20		83.2	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0

Backhoe	No	40	77.6	50.0	0.0
Roller	No	20	80.0	50.0	0.0
Dump Truck	No	40	76.5	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	88.9	81.9	66.0	N/A	61.0	N/A	56.0	N/A	22.9	N/A	27.9	N/A	32.9	N/A
Grader	85.0	81.0	65.0	N/A	60.0	N/A	55.0	N/A	20.0	N/A	25.0	N/A	30.0	N/A
Excavator	80.7	76.7	65.0	N/A	60.0	N/A	55.0	N/A	15.7	N/A	20.7	N/A	25.7	N/A
Compactor (ground)	83.2	76.2	65.0	N/A	60.0	N/A	55.0	N/A	18.2	N/A	23.2	N/A	28.2	N/A
Front End Loader	79.1	75.1	65.0	N/A	60.0	N/A	55.0	N/A	14.1	N/A	19.1	N/A	24.1	N/A
Concrete Mixer Truck	78.8	74.8	65.0	N/A	60.0	N/A	55.0	N/A	13.8	N/A	18.8	N/A	23.8	N/A
Backhoe	77.6	73.6	65.0	N/A	60.0	N/A	55.0	N/A	12.6	N/A	17.6	N/A	22.6	N/A
Roller	80.0	73.0	65.0	N/A	60.0	N/A	55.0	N/A	15.0	N/A	20.0	N/A	25.0	N/A
Dump Truck	76.5	72.5	65.0	N/A	60.0	N/A	55.0	N/A	11.5	N/A	16.5	N/A	21.5	N/A
Total	88.9	86.9	65.0	N/A	60.0	N/A	55.0	N/A	23.9	N/A	28.9	N/A	33.9	N/A

**** Receptor #3 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	50.0	0.0
Grader	No	40	85.0		50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Compactor (ground)	No	20		83.2	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Roller	No	20		80.0	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	88.9	81.9	71.0	N/A	66.0	N/A	61.0	N/A	17.9	N/A	22.9	N/A	27.9	N/A
Grader	85.0	81.0	70.0	N/A	65.0	N/A	60.0	N/A	15.0	N/A	20.0	N/A	25.0	N/A
Excavator	80.7	76.7	70.0	N/A	65.0	N/A	60.0	N/A	10.7	N/A	15.7	N/A	20.7	N/A
Compactor (ground)	83.2	76.2	70.0	N/A	65.0	N/A	60.0	N/A	13.2	N/A	18.2	N/A	23.2	N/A
Front End Loader	79.1	75.1	70.0	N/A	65.0	N/A	60.0	N/A	9.1	N/A	14.1	N/A	19.1	N/A
Concrete Mixer Truck	78.8	74.8	70.0	N/A	65.0	N/A	60.0	N/A	8.8	N/A	13.8	N/A	18.8	N/A
Backhoe	77.6	73.6	70.0	N/A	65.0	N/A	60.0	N/A	7.6	N/A	12.6	N/A	17.6	N/A
Roller	80.0	73.0	70.0	N/A	65.0	N/A	60.0	N/A	10.0	N/A	15.0	N/A	20.0	N/A
Dump Truck	76.5	72.5	70.0	N/A	65.0	N/A	60.0	N/A	6.4	N/A	11.5	N/A	16.5	N/A
Total	88.9	86.9	70.0	N/A	65.0	N/A	60.0	N/A	18.9	N/A	23.9	N/A	28.9	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	50.0	0.0
Grader	No	40	85.0		50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Compactor (ground)	No	20		83.2	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Roller	No	20		80.0	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	88.9	81.9	71.0	N/A	71.0	N/A	71.0	N/A	17.9	N/A	17.9	N/A	17.9	N/A
Grader	85.0	81.0	70.0	N/A	70.0	N/A	70.0	N/A	15.0	N/A	15.0	N/A	15.0	N/A
Excavator	80.7	76.7	70.0	N/A	70.0	N/A	70.0	N/A	10.7	N/A	10.7	N/A	10.7	N/A
Compactor (ground)	83.2	76.2	70.0	N/A	70.0	N/A	70.0	N/A	13.2	N/A	13.2	N/A	13.2	N/A
Front End Loader	79.1	75.1	70.0	N/A	70.0	N/A	70.0	N/A	9.1	N/A	9.1	N/A	9.1	N/A
Concrete Mixer Truck	78.8	74.8	70.0	N/A	70.0	N/A	70.0	N/A	8.8	N/A	8.8	N/A	8.8	N/A
Backhoe	77.6	73.6	70.0	N/A	70.0	N/A	70.0	N/A	7.6	N/A	7.6	N/A	7.6	N/A
Roller	80.0	73.0	70.0	N/A	70.0	N/A	70.0	N/A	10.0	N/A	10.0	N/A	10.0	N/A
Dump Truck	76.5	72.5	70.0	N/A	70.0	N/A	70.0	N/A	6.4	N/A	6.4	N/A	6.4	N/A
Total	88.9	86.9	70.0	N/A	70.0	N/A	70.0	N/A	18.9	N/A	18.9	N/A	18.9	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	50.0	0.0
Grader	No	40	85.0		50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Compactor (ground)	No	20		83.2	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Roller	No	20		80.0	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	88.9	81.9	71.0	N/A	66.0	N/A	61.0	N/A	17.9	N/A	22.9	N/A	27.9	N/A
Grader	85.0	81.0	70.0	N/A	65.0	N/A	60.0	N/A	15.0	N/A	20.0	N/A	25.0	N/A
Excavator	80.7	76.7	70.0	N/A	65.0	N/A	60.0	N/A	10.7	N/A	15.7	N/A	20.7	N/A
Compactor (ground)	83.2	76.2	70.0	N/A	65.0	N/A	60.0	N/A	13.2	N/A	18.2	N/A	23.2	N/A
Front End Loader	79.1	75.1	70.0	N/A	65.0	N/A	60.0	N/A	9.1	N/A	14.1	N/A	19.1	N/A
Concrete Mixer Truck	78.8	74.8	70.0	N/A	65.0	N/A	60.0	N/A	8.8	N/A	13.8	N/A	18.8	N/A
Backhoe	77.6	73.6	70.0	N/A	65.0	N/A	60.0	N/A	7.6	N/A	12.6	N/A	17.6	N/A
Roller	80.0	73.0	70.0	N/A	65.0	N/A	60.0	N/A	10.0	N/A	15.0	N/A	20.0	N/A
Dump Truck	76.5	72.5	70.0	N/A	65.0	N/A	60.0	N/A	6.4	N/A	11.5	N/A	16.5	N/A
Total	88.9	86.9	70.0	N/A	65.0	N/A	60.0	N/A	18.9	N/A	23.9	N/A	28.9	N/A

**** Receptor #6 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	50.0	0.0
Grader	No	40	85.0		50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Compactor (ground)	No	20		83.2	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Roller	No	20		80.0	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	88.9	81.9	71.0	N/A	66.0	N/A	61.0	N/A	17.9	N/A	22.9	N/A	27.9	N/A
Grader	85.0	81.0	70.0	N/A	65.0	N/A	60.0	N/A	15.0	N/A	20.0	N/A	25.0	N/A
Excavator	80.7	76.7	70.0	N/A	65.0	N/A	60.0	N/A	10.7	N/A	15.7	N/A	20.7	N/A
Compactor (ground)	83.2	76.2	70.0	N/A	65.0	N/A	60.0	N/A	13.2	N/A	18.2	N/A	23.2	N/A
Front End Loader	79.1	75.1	70.0	N/A	65.0	N/A	60.0	N/A	9.1	N/A	14.1	N/A	19.1	N/A
Concrete Mixer Truck	78.8	74.8	70.0	N/A	65.0	N/A	60.0	N/A	8.8	N/A	13.8	N/A	18.8	N/A
Backhoe	77.6	73.6	70.0	N/A	65.0	N/A	60.0	N/A	7.6	N/A	12.6	N/A	17.6	N/A
Roller	80.0	73.0	70.0	N/A	65.0	N/A	60.0	N/A	10.0	N/A	15.0	N/A	20.0	N/A
Dump Truck	76.5	72.5	70.0	N/A	65.0	N/A	60.0	N/A	6.4	N/A	11.5	N/A	16.5	N/A
Total	88.9	86.9	70.0	N/A	65.0	N/A	60.0	N/A	18.9	N/A	23.9	N/A	28.9	N/A

**** Receptor #7 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	50.0	0.0
Grader	No	40	85.0		50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Compactor (ground)	No	20		83.2	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Roller	No	20		80.0	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	88.9	81.9	71.0	N/A	71.0	N/A	71.0	N/A	17.9	N/A	17.9	N/A	17.9	N/A
Grader	85.0	81.0	70.0	N/A	70.0	N/A	70.0	N/A	15.0	N/A	15.0	N/A	15.0	N/A
Excavator	80.7	76.7	70.0	N/A	70.0	N/A	70.0	N/A	10.7	N/A	10.7	N/A	10.7	N/A
Compactor (ground)	83.2	76.2	70.0	N/A	70.0	N/A	70.0	N/A	13.2	N/A	13.2	N/A	13.2	N/A
Front End Loader	79.1	75.1	70.0	N/A	70.0	N/A	70.0	N/A	9.1	N/A	9.1	N/A	9.1	N/A
Concrete Mixer Truck	78.8	74.8	70.0	N/A	70.0	N/A	70.0	N/A	8.8	N/A	8.8	N/A	8.8	N/A
Backhoe	77.6	73.6	70.0	N/A	70.0	N/A	70.0	N/A	7.6	N/A	7.6	N/A	7.6	N/A
Roller	80.0	73.0	70.0	N/A	70.0	N/A	70.0	N/A	10.0	N/A	10.0	N/A	10.0	N/A
Dump Truck	76.5	72.5	70.0	N/A	70.0	N/A	70.0	N/A	6.4	N/A	6.4	N/A	6.4	N/A
Total	88.9	86.9	70.0	N/A	70.0	N/A	70.0	N/A	18.9	N/A	18.9	N/A	18.9	N/A

**** Receptor #8 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	50.0	0.0
Grader	No	40	85.0		50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Compactor (ground)	No	20		83.2	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Roller	No	20		80.0	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq

Jackhammer	88.9	81.9	71.0	N/A	66.0	N/A	61.0	N/A	17.9	N/A	22.9	N/A	27.9	N/A
Grader	85.0	81.0	70.0	N/A	65.0	N/A	60.0	N/A	15.0	N/A	20.0	N/A	25.0	N/A
Excavator	80.7	76.7	70.0	N/A	65.0	N/A	60.0	N/A	10.7	N/A	15.7	N/A	20.7	N/A
Compactor (ground)	83.2	76.2	70.0	N/A	65.0	N/A	60.0	N/A	13.2	N/A	18.2	N/A	23.2	N/A
Front End Loader	79.1	75.1	70.0	N/A	65.0	N/A	60.0	N/A	9.1	N/A	14.1	N/A	19.1	N/A
Concrete Mixer Truck	78.8	74.8	70.0	N/A	65.0	N/A	60.0	N/A	8.8	N/A	13.8	N/A	18.8	N/A
Backhoe	77.6	73.6	70.0	N/A	65.0	N/A	60.0	N/A	7.6	N/A	12.6	N/A	17.6	N/A
Roller	80.0	73.0	70.0	N/A	65.0	N/A	60.0	N/A	10.0	N/A	15.0	N/A	20.0	N/A
Dump Truck	76.5	72.5	70.0	N/A	65.0	N/A	60.0	N/A	6.4	N/A	11.5	N/A	16.5	N/A
Total	88.9	86.9	70.0	N/A	65.0	N/A	60.0	N/A	18.9	N/A	23.9	N/A	28.9	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Phases 1 through 5

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	100.0	0.0
Grader	No	40	85.0		100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Compactor (ground)	No	20		83.2	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Roller	No	20		80.0	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
			Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
Jackhammer	82.9	75.9	66.0	N/A	61.0	N/A	56.0	N/A	16.9	N/A	21.9	N/A	26.9	N/A
Grader	79.0	75.0	65.0	N/A	60.0	N/A	55.0	N/A	14.0	N/A	19.0	N/A	24.0	N/A
Excavator	74.7	70.7	65.0	N/A	60.0	N/A	55.0	N/A	9.7	N/A	14.7	N/A	19.7	N/A
Compactor (ground)	77.2	70.2	65.0	N/A	60.0	N/A	55.0	N/A	12.2	N/A	17.2	N/A	22.2	N/A
Front End Loader	73.1	69.1	65.0	N/A	60.0	N/A	55.0	N/A	8.1	N/A	13.1	N/A	18.1	N/A
Concrete Mixer Truck	72.8	68.8	65.0	N/A	60.0	N/A	55.0	N/A	7.8	N/A	12.8	N/A	17.8	N/A
Backhoe	71.5	67.6	65.0	N/A	60.0	N/A	55.0	N/A	6.5	N/A	11.5	N/A	16.5	N/A
Roller	74.0	67.0	65.0	N/A	60.0	N/A	55.0	N/A	9.0	N/A	14.0	N/A	19.0	N/A
Dump Truck	70.4	66.5	65.0	N/A	60.0	N/A	55.0	N/A	5.4	N/A	10.4	N/A	15.4	N/A
Total	82.9	80.9	65.0	N/A	60.0	N/A	55.0	N/A	17.9	N/A	22.9	N/A	27.9	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	100.0	0.0
Grader	No	40	85.0		100.0	0.0
Excavator	No	40		80.7	100.0	0.0

Compactor (ground)	No	20	83.2	100.0	0.0
Front End Loader	No	40	79.1	100.0	0.0
Concrete Mixer Truck	No	40	78.8	100.0	0.0
Backhoe	No	40	77.6	100.0	0.0
Roller	No	20	80.0	100.0	0.0
Dump Truck	No	40	76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	82.9	75.9	66.0	N/A	61.0	N/A	56.0	N/A	16.9	N/A	21.9	N/A	26.9	N/A
Grader	79.0	75.0	65.0	N/A	60.0	N/A	55.0	N/A	14.0	N/A	19.0	N/A	24.0	N/A
Excavator	74.7	70.7	65.0	N/A	60.0	N/A	55.0	N/A	9.7	N/A	14.7	N/A	19.7	N/A
Compactor (ground)	77.2	70.2	65.0	N/A	60.0	N/A	55.0	N/A	12.2	N/A	17.2	N/A	22.2	N/A
Front End Loader	73.1	69.1	65.0	N/A	60.0	N/A	55.0	N/A	8.1	N/A	13.1	N/A	18.1	N/A
Concrete Mixer Truck	72.8	68.8	65.0	N/A	60.0	N/A	55.0	N/A	7.8	N/A	12.8	N/A	17.8	N/A
Backhoe	71.5	67.6	65.0	N/A	60.0	N/A	55.0	N/A	6.5	N/A	11.5	N/A	16.5	N/A
Roller	74.0	67.0	65.0	N/A	60.0	N/A	55.0	N/A	9.0	N/A	14.0	N/A	19.0	N/A
Dump Truck	70.4	66.5	65.0	N/A	60.0	N/A	55.0	N/A	5.4	N/A	10.4	N/A	15.4	N/A
Total	82.9	80.9	65.0	N/A	60.0	N/A	55.0	N/A	17.9	N/A	22.9	N/A	27.9	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	100.0	0.0
Grader	No	40	85.0		100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Compactor (ground)	No	20		83.2	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Roller	No	20		80.0	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	82.9	75.9	71.0	N/A	66.0	N/A	61.0	N/A	11.9	N/A	16.9	N/A	21.9	N/A
Grader	79.0	75.0	70.0	N/A	65.0	N/A	60.0	N/A	9.0	N/A	14.0	N/A	19.0	N/A
Excavator	74.7	70.7	70.0	N/A	65.0	N/A	60.0	N/A	4.7	N/A	9.7	N/A	14.7	N/A
Compactor (ground)	77.2	70.2	70.0	N/A	65.0	N/A	60.0	N/A	7.2	N/A	12.2	N/A	17.2	N/A
Front End Loader	73.1	69.1	70.0	N/A	65.0	N/A	60.0	N/A	3.1	N/A	8.1	N/A	13.1	N/A
Concrete Mixer Truck	72.8	68.8	70.0	N/A	65.0	N/A	60.0	N/A	2.8	N/A	7.8	N/A	12.8	N/A

Backhoe	71.5	67.6	70.0	N/A	65.0	N/A	60.0	N/A	1.5	N/A	6.5	N/A	11.5	N/A
Roller	74.0	67.0	70.0	N/A	65.0	N/A	60.0	N/A	4.0	N/A	9.0	N/A	14.0	N/A
Dump Truck	70.4	66.5	70.0	N/A	65.0	N/A	60.0	N/A	0.4	N/A	5.4	N/A	10.4	N/A
Total	82.9	80.9	70.0	N/A	65.0	N/A	60.0	N/A	12.9	N/A	17.9	N/A	22.9	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	100.0	0.0
Grader	No	40	85.0		100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Compactor (ground)	No	20		83.2	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Roller	No	20		80.0	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Jackhammer	82.9	75.9	71.0	N/A	71.0	N/A	71.0	N/A	11.9	N/A	11.9	N/A	11.9	N/A
Grader	79.0	75.0	70.0	N/A	70.0	N/A	70.0	N/A	9.0	N/A	9.0	N/A	9.0	N/A
Excavator	74.7	70.7	70.0	N/A	70.0	N/A	70.0	N/A	4.7	N/A	4.7	N/A	4.7	N/A
Compactor (ground)	77.2	70.2	70.0	N/A	70.0	N/A	70.0	N/A	7.2	N/A	7.2	N/A	7.2	N/A
Front End Loader	73.1	69.1	70.0	N/A	70.0	N/A	70.0	N/A	3.1	N/A	3.1	N/A	3.1	N/A
Concrete Mixer Truck	72.8	68.8	70.0	N/A	70.0	N/A	70.0	N/A	2.8	N/A	2.8	N/A	2.8	N/A
Backhoe	71.5	67.6	70.0	N/A	70.0	N/A	70.0	N/A	1.5	N/A	1.5	N/A	1.5	N/A
Roller	74.0	67.0	70.0	N/A	70.0	N/A	70.0	N/A	4.0	N/A	4.0	N/A	4.0	N/A
Dump Truck	70.4	66.5	70.0	N/A	70.0	N/A	70.0	N/A	0.4	N/A	0.4	N/A	0.4	N/A
Total	82.9	80.9	70.0	N/A	70.0	N/A	70.0	N/A	12.9	N/A	12.9	N/A	12.9	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	100.0	0.0
Grader	No	40	85.0		100.0	0.0
Excavator	No	40		80.7	100.0	0.0

Compactor (ground)	No	20	83.2	100.0	0.0
Front End Loader	No	40	79.1	100.0	0.0
Concrete Mixer Truck	No	40	78.8	100.0	0.0
Backhoe	No	40	77.6	100.0	0.0
Roller	No	20	80.0	100.0	0.0
Dump Truck	No	40	76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	82.9	75.9	71.0	N/A	66.0	N/A	61.0	N/A	11.9	N/A	16.9	N/A	21.9	N/A
Grader	79.0	75.0	70.0	N/A	65.0	N/A	60.0	N/A	9.0	N/A	14.0	N/A	19.0	N/A
Excavator	74.7	70.7	70.0	N/A	65.0	N/A	60.0	N/A	4.7	N/A	9.7	N/A	14.7	N/A
Compactor (ground)	77.2	70.2	70.0	N/A	65.0	N/A	60.0	N/A	7.2	N/A	12.2	N/A	17.2	N/A
Front End Loader	73.1	69.1	70.0	N/A	65.0	N/A	60.0	N/A	3.1	N/A	8.1	N/A	13.1	N/A
Concrete Mixer Truck	72.8	68.8	70.0	N/A	65.0	N/A	60.0	N/A	2.8	N/A	7.8	N/A	12.8	N/A
Backhoe	71.5	67.6	70.0	N/A	65.0	N/A	60.0	N/A	1.5	N/A	6.5	N/A	11.5	N/A
Roller	74.0	67.0	70.0	N/A	65.0	N/A	60.0	N/A	4.0	N/A	9.0	N/A	14.0	N/A
Dump Truck	70.4	66.5	70.0	N/A	65.0	N/A	60.0	N/A	0.4	N/A	5.4	N/A	10.4	N/A
Total	82.9	80.9	70.0	N/A	65.0	N/A	60.0	N/A	12.9	N/A	17.9	N/A	22.9	N/A

**** Receptor #6 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	100.0	0.0
Grader	No	40	85.0		100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Compactor (ground)	No	20		83.2	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Roller	No	20		80.0	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	82.9	75.9	71.0	N/A	66.0	N/A	61.0	N/A	11.9	N/A	16.9	N/A	21.9	N/A
Grader	79.0	75.0	70.0	N/A	65.0	N/A	60.0	N/A	9.0	N/A	14.0	N/A	19.0	N/A
Excavator	74.7	70.7	70.0	N/A	65.0	N/A	60.0	N/A	4.7	N/A	9.7	N/A	14.7	N/A
Compactor (ground)	77.2	70.2	70.0	N/A	65.0	N/A	60.0	N/A	7.2	N/A	12.2	N/A	17.2	N/A
Front End Loader	73.1	69.1	70.0	N/A	65.0	N/A	60.0	N/A	3.1	N/A	8.1	N/A	13.1	N/A
Concrete Mixer Truck	72.8	68.8	70.0	N/A	65.0	N/A	60.0	N/A	2.8	N/A	7.8	N/A	12.8	N/A

Backhoe	71.5	67.6	70.0	N/A	65.0	N/A	60.0	N/A	1.5	N/A	6.5	N/A	11.5	N/A
Roller	74.0	67.0	70.0	N/A	65.0	N/A	60.0	N/A	4.0	N/A	9.0	N/A	14.0	N/A
Dump Truck	70.4	66.5	70.0	N/A	65.0	N/A	60.0	N/A	0.4	N/A	5.4	N/A	10.4	N/A
Total	82.9	80.9	70.0	N/A	65.0	N/A	60.0	N/A	12.9	N/A	17.9	N/A	22.9	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	100.0	0.0
Grader	No	40	85.0		100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Compactor (ground)	No	20		83.2	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Roller	No	20		80.0	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Jackhammer	82.9	75.9	71.0	N/A	71.0	N/A	71.0	N/A	11.9	N/A	11.9	N/A	11.9	N/A
Grader	79.0	75.0	70.0	N/A	70.0	N/A	70.0	N/A	9.0	N/A	9.0	N/A	9.0	N/A
Excavator	74.7	70.7	70.0	N/A	70.0	N/A	70.0	N/A	4.7	N/A	4.7	N/A	4.7	N/A
Compactor (ground)	77.2	70.2	70.0	N/A	70.0	N/A	70.0	N/A	7.2	N/A	7.2	N/A	7.2	N/A
Front End Loader	73.1	69.1	70.0	N/A	70.0	N/A	70.0	N/A	3.1	N/A	3.1	N/A	3.1	N/A
Concrete Mixer Truck	72.8	68.8	70.0	N/A	70.0	N/A	70.0	N/A	2.8	N/A	2.8	N/A	2.8	N/A
Backhoe	71.5	67.6	70.0	N/A	70.0	N/A	70.0	N/A	1.5	N/A	1.5	N/A	1.5	N/A
Roller	74.0	67.0	70.0	N/A	70.0	N/A	70.0	N/A	4.0	N/A	4.0	N/A	4.0	N/A
Dump Truck	70.4	66.5	70.0	N/A	70.0	N/A	70.0	N/A	0.4	N/A	0.4	N/A	0.4	N/A
Total	82.9	80.9	70.0	N/A	70.0	N/A	70.0	N/A	12.9	N/A	12.9	N/A	12.9	N/A

**** Receptor #8 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	100.0	0.0
Grader	No	40	85.0		100.0	0.0
Excavator	No	40		80.7	100.0	0.0

Compactor (ground)	No	20	83.2	100.0	0.0
Front End Loader	No	40	79.1	100.0	0.0
Concrete Mixer Truck	No	40	78.8	100.0	0.0
Backhoe	No	40	77.6	100.0	0.0
Roller	No	20	80.0	100.0	0.0
Dump Truck	No	40	76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	82.9	75.9	71.0	N/A	66.0	N/A	61.0	N/A	11.9	N/A	16.9	N/A	21.9	N/A
Grader	79.0	75.0	70.0	N/A	65.0	N/A	60.0	N/A	9.0	N/A	14.0	N/A	19.0	N/A
Excavator	74.7	70.7	70.0	N/A	65.0	N/A	60.0	N/A	4.7	N/A	9.7	N/A	14.7	N/A
Compactor (ground)	77.2	70.2	70.0	N/A	65.0	N/A	60.0	N/A	7.2	N/A	12.2	N/A	17.2	N/A
Front End Loader	73.1	69.1	70.0	N/A	65.0	N/A	60.0	N/A	3.1	N/A	8.1	N/A	13.1	N/A
Concrete Mixer Truck	72.8	68.8	70.0	N/A	65.0	N/A	60.0	N/A	2.8	N/A	7.8	N/A	12.8	N/A
Backhoe	71.5	67.6	70.0	N/A	65.0	N/A	60.0	N/A	1.5	N/A	6.5	N/A	11.5	N/A
Roller	74.0	67.0	70.0	N/A	65.0	N/A	60.0	N/A	4.0	N/A	9.0	N/A	14.0	N/A
Dump Truck	70.4	66.5	70.0	N/A	65.0	N/A	60.0	N/A	0.4	N/A	5.4	N/A	10.4	N/A
Total	82.9	80.9	70.0	N/A	65.0	N/A	60.0	N/A	12.9	N/A	17.9	N/A	22.9	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Phases 1 through 5

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	200.0	0.0
Grader	No	40	85.0		200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Compactor (ground)	No	20		83.2	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Roller	No	20		80.0	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	76.8	69.9	66.0	N/A	61.0	N/A	56.0	N/A	10.8	N/A	15.8	N/A	20.8	N/A
Grader	73.0	69.0	65.0	N/A	60.0	N/A	55.0	N/A	8.0	N/A	13.0	N/A	18.0	N/A
Excavator	68.7	64.7	65.0	N/A	60.0	N/A	55.0	N/A	3.7	N/A	8.7	N/A	13.7	N/A
Compactor (ground)	71.2	64.2	65.0	N/A	60.0	N/A	55.0	N/A	6.2	N/A	11.2	N/A	16.2	N/A
Front End Loader	67.1	63.1	65.0	N/A	60.0	N/A	55.0	N/A	2.1	N/A	7.1	N/A	12.1	N/A
Concrete Mixer Truck	66.8	62.8	65.0	N/A	60.0	N/A	55.0	N/A	1.8	N/A	6.8	N/A	11.8	N/A
Backhoe	65.5	61.5	65.0	N/A	60.0	N/A	55.0	N/A	0.5	N/A	5.5	N/A	10.5	N/A
Roller	68.0	61.0	65.0	N/A	60.0	N/A	55.0	N/A	3.0	N/A	8.0	N/A	13.0	N/A
Dump Truck	64.4	60.4	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	4.4	N/A	9.4	N/A
Total	76.8	74.9	65.0	N/A	60.0	N/A	55.0	N/A	11.8	N/A	16.8	N/A	21.8	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	200.0	0.0
Grader	No	40	85.0		200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Compactor (ground)	No	20		83.2	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0

Backhoe	No	40	77.6	200.0	0.0
Roller	No	20	80.0	200.0	0.0
Dump Truck	No	40	76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	76.8	69.9	66.0	N/A	61.0	N/A	56.0	N/A	10.8	N/A	15.8	N/A	20.8	N/A
Grader	73.0	69.0	65.0	N/A	60.0	N/A	55.0	N/A	8.0	N/A	13.0	N/A	18.0	N/A
Excavator	68.7	64.7	65.0	N/A	60.0	N/A	55.0	N/A	3.7	N/A	8.7	N/A	13.7	N/A
Compactor (ground)	71.2	64.2	65.0	N/A	60.0	N/A	55.0	N/A	6.2	N/A	11.2	N/A	16.2	N/A
Front End Loader	67.1	63.1	65.0	N/A	60.0	N/A	55.0	N/A	2.1	N/A	7.1	N/A	12.1	N/A
Concrete Mixer Truck	66.8	62.8	65.0	N/A	60.0	N/A	55.0	N/A	1.8	N/A	6.8	N/A	11.8	N/A
Backhoe	65.5	61.5	65.0	N/A	60.0	N/A	55.0	N/A	0.5	N/A	5.5	N/A	10.5	N/A
Roller	68.0	61.0	65.0	N/A	60.0	N/A	55.0	N/A	3.0	N/A	8.0	N/A	13.0	N/A
Dump Truck	64.4	60.4	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	4.4	N/A	9.4	N/A
Total	76.8	74.9	65.0	N/A	60.0	N/A	55.0	N/A	11.8	N/A	16.8	N/A	21.8	N/A

**** Receptor #3 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	200.0	0.0
Grader	No	40	85.0		200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Compactor (ground)	No	20		83.2	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Roller	No	20		80.0	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	76.8	69.9	71.0	N/A	66.0	N/A	61.0	N/A	5.8	N/A	10.8	N/A	15.8	N/A
Grader	73.0	69.0	70.0	N/A	65.0	N/A	60.0	N/A	3.0	N/A	8.0	N/A	13.0	N/A
Excavator	68.7	64.7	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.7	N/A	8.7	N/A
Compactor (ground)	71.2	64.2	70.0	N/A	65.0	N/A	60.0	N/A	1.2	N/A	6.2	N/A	11.2	N/A
Front End Loader	67.1	63.1	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	2.1	N/A	7.1	N/A
Concrete Mixer Truck	66.8	62.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Backhoe	65.5	61.5	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	0.5	N/A	5.5	N/A
Roller	68.0	61.0	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.0	N/A	8.0	N/A
Dump Truck	64.4	60.4	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Total	76.8	74.9	70.0	N/A	65.0	N/A	60.0	N/A	6.8	N/A	11.8	N/A	16.8	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	200.0	0.0
Grader	No	40	85.0		200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Compactor (ground)	No	20		83.2	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Roller	No	20		80.0	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	76.8	69.9	71.0	N/A	71.0	N/A	71.0	N/A	5.8	N/A	5.8	N/A	5.8	N/A
Grader	73.0	69.0	70.0	N/A	70.0	N/A	70.0	N/A	3.0	N/A	3.0	N/A	3.0	N/A
Excavator	68.7	64.7	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Compactor (ground)	71.2	64.2	70.0	N/A	70.0	N/A	70.0	N/A	1.2	N/A	1.2	N/A	1.2	N/A
Front End Loader	67.1	63.1	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	66.8	62.8	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	65.5	61.5	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Roller	68.0	61.0	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	64.4	60.4	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	76.8	74.9	70.0	N/A	70.0	N/A	70.0	N/A	6.8	N/A	6.8	N/A	6.8	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	200.0	0.0
Grader	No	40	85.0		200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Compactor (ground)	No	20		83.2	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Roller	No	20		80.0	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	76.8	69.9	71.0	N/A	66.0	N/A	61.0	N/A	5.8	N/A	10.8	N/A	15.8	N/A
Grader	73.0	69.0	70.0	N/A	65.0	N/A	60.0	N/A	3.0	N/A	8.0	N/A	13.0	N/A
Excavator	68.7	64.7	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.7	N/A	8.7	N/A
Compactor (ground)	71.2	64.2	70.0	N/A	65.0	N/A	60.0	N/A	1.2	N/A	6.2	N/A	11.2	N/A
Front End Loader	67.1	63.1	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	2.1	N/A	7.1	N/A
Concrete Mixer Truck	66.8	62.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Backhoe	65.5	61.5	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	0.5	N/A	5.5	N/A
Roller	68.0	61.0	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.0	N/A	8.0	N/A
Dump Truck	64.4	60.4	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Total	76.8	74.9	70.0	N/A	65.0	N/A	60.0	N/A	6.8	N/A	11.8	N/A	16.8	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	200.0	0.0
Grader	No	40	85.0		200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Compactor (ground)	No	20		83.2	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Roller	No	20		80.0	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	76.8	69.9	71.0	N/A	66.0	N/A	61.0	N/A	5.8	N/A	10.8	N/A	15.8	N/A
Grader	73.0	69.0	70.0	N/A	65.0	N/A	60.0	N/A	3.0	N/A	8.0	N/A	13.0	N/A
Excavator	68.7	64.7	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.7	N/A	8.7	N/A
Compactor (ground)	71.2	64.2	70.0	N/A	65.0	N/A	60.0	N/A	1.2	N/A	6.2	N/A	11.2	N/A
Front End Loader	67.1	63.1	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	2.1	N/A	7.1	N/A
Concrete Mixer Truck	66.8	62.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Backhoe	65.5	61.5	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	0.5	N/A	5.5	N/A
Roller	68.0	61.0	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.0	N/A	8.0	N/A
Dump Truck	64.4	60.4	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Total	76.8	74.9	70.0	N/A	65.0	N/A	60.0	N/A	6.8	N/A	11.8	N/A	16.8	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	200.0	0.0
Grader	No	40	85.0		200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Compactor (ground)	No	20		83.2	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Roller	No	20		80.0	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	76.8	69.9	71.0	N/A	71.0	N/A	71.0	N/A	5.8	N/A	5.8	N/A	5.8	N/A
Grader	73.0	69.0	70.0	N/A	70.0	N/A	70.0	N/A	3.0	N/A	3.0	N/A	3.0	N/A
Excavator	68.7	64.7	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Compactor (ground)	71.2	64.2	70.0	N/A	70.0	N/A	70.0	N/A	1.2	N/A	1.2	N/A	1.2	N/A
Front End Loader	67.1	63.1	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	66.8	62.8	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	65.5	61.5	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Roller	68.0	61.0	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	64.4	60.4	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	76.8	74.9	70.0	N/A	70.0	N/A	70.0	N/A	6.8	N/A	6.8	N/A	6.8	N/A

**** Receptor #8 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	200.0	0.0
Grader	No	40	85.0		200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Compactor (ground)	No	20		83.2	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Roller	No	20		80.0	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq

Jackhammer	76.8	69.9	71.0	N/A	66.0	N/A	61.0	N/A	5.8	N/A	10.8	N/A	15.8	N/A
Grader	73.0	69.0	70.0	N/A	65.0	N/A	60.0	N/A	3.0	N/A	8.0	N/A	13.0	N/A
Excavator	68.7	64.7	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.7	N/A	8.7	N/A
Compactor (ground)	71.2	64.2	70.0	N/A	65.0	N/A	60.0	N/A	1.2	N/A	6.2	N/A	11.2	N/A
Front End Loader	67.1	63.1	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	2.1	N/A	7.1	N/A
Concrete Mixer Truck	66.8	62.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Backhoe	65.5	61.5	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	0.5	N/A	5.5	N/A
Roller	68.0	61.0	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.0	N/A	8.0	N/A
Dump Truck	64.4	60.4	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Total	76.8	74.9	70.0	N/A	65.0	N/A	60.0	N/A	6.8	N/A	11.8	N/A	16.8	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Phases 1 through 5

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	500.0	0.0
Grader	No	40	85.0		500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Compactor (ground)	No	20		83.2	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0
Backhoe	No	40		77.6	500.0	0.0
Roller	No	20		80.0	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	68.9	61.9	66.0	N/A	61.0	N/A	56.0	N/A	2.9	N/A	7.9	N/A	12.9	N/A
Grader	65.0	61.0	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	5.0	N/A	10.0	N/A
Excavator	60.7	56.7	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	0.7	N/A	5.7	N/A
Compactor (ground)	63.2	56.2	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	3.2	N/A	8.2	N/A
Front End Loader	59.1	55.1	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	4.1	N/A
Concrete Mixer Truck	58.8	54.8	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	3.8	N/A
Backhoe	57.6	53.6	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	2.6	N/A
Roller	60.0	53.0	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	5.0	N/A
Dump Truck	56.5	52.5	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	1.4	N/A
Total	68.9	66.9	65.0	N/A	60.0	N/A	55.0	N/A	3.9	N/A	8.9	N/A	13.9	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	500.0	0.0
Grader	No	40	85.0		500.0	0.0
Excavator	No	40		80.7	500.0	0.0

Compactor (ground)	No	20	83.2	500.0	0.0
Front End Loader	No	40	79.1	500.0	0.0
Concrete Mixer Truck	No	40	78.8	500.0	0.0
Backhoe	No	40	77.6	500.0	0.0
Roller	No	20	80.0	500.0	0.0
Dump Truck	No	40	76.5	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	68.9	61.9	66.0	N/A	61.0	N/A	56.0	N/A	2.9	N/A	7.9	N/A	12.9	N/A
Grader	65.0	61.0	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	5.0	N/A	10.0	N/A
Excavator	60.7	56.7	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	0.7	N/A	5.7	N/A
Compactor (ground)	63.2	56.2	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	3.2	N/A	8.2	N/A
Front End Loader	59.1	55.1	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	4.1	N/A
Concrete Mixer Truck	58.8	54.8	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	3.8	N/A
Backhoe	57.6	53.6	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	2.6	N/A
Roller	60.0	53.0	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	5.0	N/A
Dump Truck	56.5	52.5	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	1.4	N/A
Total	68.9	66.9	65.0	N/A	60.0	N/A	55.0	N/A	3.9	N/A	8.9	N/A	13.9	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	500.0	0.0
Grader	No	40	85.0		500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Compactor (ground)	No	20		83.2	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0
Backhoe	No	40		77.6	500.0	0.0
Roller	No	20		80.0	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	68.9	61.9	71.0	N/A	66.0	N/A	61.0	N/A	None	N/A	2.9	N/A	7.9	N/A
Grader	65.0	61.0	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	5.0	N/A
Excavator	60.7	56.7	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	0.7	N/A
Compactor (ground)	63.2	56.2	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	3.2	N/A
Front End Loader	59.1	55.1	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	58.8	54.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A

Backhoe	57.6	53.6	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Roller	60.0	53.0	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	56.5	52.5	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	68.9	66.9	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.9	N/A	8.9	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	500.0	0.0
Grader	No	40	85.0		500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Compactor (ground)	No	20		83.2	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0
Backhoe	No	40		77.6	500.0	0.0
Roller	No	20		80.0	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Jackhammer	68.9	61.9	71.0	N/A	71.0	N/A	71.0	N/A	None	N/A	None	N/A	None	N/A
Grader	65.0	61.0	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Excavator	60.7	56.7	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Compactor (ground)	63.2	56.2	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Front End Loader	59.1	55.1	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	58.8	54.8	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	57.6	53.6	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Roller	60.0	53.0	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	56.5	52.5	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	68.9	66.9	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	500.0	0.0
Grader	No	40	85.0		500.0	0.0
Excavator	No	40		80.7	500.0	0.0

Compactor (ground)	No	20	83.2	500.0	0.0
Front End Loader	No	40	79.1	500.0	0.0
Concrete Mixer Truck	No	40	78.8	500.0	0.0
Backhoe	No	40	77.6	500.0	0.0
Roller	No	20	80.0	500.0	0.0
Dump Truck	No	40	76.5	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	68.9	61.9	71.0	N/A	66.0	N/A	61.0	N/A	None	N/A	2.9	N/A	7.9	N/A
Grader	65.0	61.0	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	5.0	N/A
Excavator	60.7	56.7	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	0.7	N/A
Compactor (ground)	63.2	56.2	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	3.2	N/A
Front End Loader	59.1	55.1	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	58.8	54.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	57.6	53.6	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Roller	60.0	53.0	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	56.5	52.5	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	68.9	66.9	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.9	N/A	8.9	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	500.0	0.0
Grader	No	40	85.0		500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Compactor (ground)	No	20		83.2	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0
Backhoe	No	40		77.6	500.0	0.0
Roller	No	20		80.0	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	68.9	61.9	71.0	N/A	66.0	N/A	61.0	N/A	None	N/A	2.9	N/A	7.9	N/A
Grader	65.0	61.0	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	5.0	N/A
Excavator	60.7	56.7	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	0.7	N/A
Compactor (ground)	63.2	56.2	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	3.2	N/A
Front End Loader	59.1	55.1	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	58.8	54.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A

Backhoe	57.6	53.6	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Roller	60.0	53.0	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	56.5	52.5	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	68.9	66.9	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.9	N/A	8.9	N/A

**** Receptor #7 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	500.0	0.0
Grader	No	40	85.0		500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Compactor (ground)	No	20		83.2	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0
Backhoe	No	40		77.6	500.0	0.0
Roller	No	20		80.0	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	68.9	61.9	71.0	N/A	71.0	N/A	71.0	N/A	None	N/A	None	N/A	None	N/A
Grader	65.0	61.0	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Excavator	60.7	56.7	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Compactor (ground)	63.2	56.2	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Front End Loader	59.1	55.1	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	58.8	54.8	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	57.6	53.6	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Roller	60.0	53.0	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	56.5	52.5	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	68.9	66.9	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A

**** Receptor #8 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	500.0	0.0
Grader	No	40	85.0		500.0	0.0
Excavator	No	40		80.7	500.0	0.0

Compactor (ground)	No	20	83.2	500.0	0.0
Front End Loader	No	40	79.1	500.0	0.0
Concrete Mixer Truck	No	40	78.8	500.0	0.0
Backhoe	No	40	77.6	500.0	0.0
Roller	No	20	80.0	500.0	0.0
Dump Truck	No	40	76.5	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	68.9	61.9	71.0	N/A	66.0	N/A	61.0	N/A	None	N/A	2.9	N/A	7.9	N/A
Grader	65.0	61.0	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	5.0	N/A
Excavator	60.7	56.7	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	0.7	N/A
Compactor (ground)	63.2	56.2	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	3.2	N/A
Front End Loader	59.1	55.1	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	58.8	54.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	57.6	53.6	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Roller	60.0	53.0	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	56.5	52.5	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	68.9	66.9	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.9	N/A	8.9	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Phase 6

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	65.0	N/A	60.0	N/A	55.0	N/A	19.4	N/A	24.4	N/A	29.4	N/A
Concrete Mixer Truck	78.8	74.8	65.0	N/A	60.0	N/A	55.0	N/A	13.8	N/A	18.8	N/A	23.8	N/A
Total	84.4	79.3	65.0	N/A	60.0	N/A	55.0	N/A	19.4	N/A	24.4	N/A	29.4	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	65.0	N/A	60.0	N/A	55.0	N/A	19.4	N/A	24.4	N/A	29.4	N/A
Concrete Mixer Truck	78.8	74.8	65.0	N/A	60.0	N/A	55.0	N/A	13.8	N/A	18.8	N/A	23.8	N/A
Total	84.4	79.3	65.0	N/A	60.0	N/A	55.0	N/A	19.4	N/A	24.4	N/A	29.4	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Description	Impact Device	Usage (%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Auger Drill Rig	84.4	77.4	70.0	N/A	65.0	N/A	60.0	N/A	14.4	N/A	19.4	N/A	24.4	N/A
Concrete Mixer Truck	78.8	74.8	70.0	N/A	65.0	N/A	60.0	N/A	8.8	N/A	13.8	N/A	18.8	N/A
Total	84.4	79.3	70.0	N/A	65.0	N/A	60.0	N/A	14.4	N/A	19.4	N/A	24.4	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Description	Impact Device	Usage (%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Auger Drill Rig	84.4	77.4	70.0	N/A	70.0	N/A	70.0	N/A	14.4	N/A	14.4	N/A	14.4	N/A
Concrete Mixer Truck	78.8	74.8	70.0	N/A	70.0	N/A	70.0	N/A	8.8	N/A	8.8	N/A	8.8	N/A
Total	84.4	79.3	70.0	N/A	70.0	N/A	70.0	N/A	14.4	N/A	14.4	N/A	14.4	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	70.0	N/A	65.0	N/A	60.0	N/A	14.4	N/A	19.4	N/A	24.4	N/A
Concrete Mixer Truck	78.8	74.8	70.0	N/A	65.0	N/A	60.0	N/A	8.8	N/A	13.8	N/A	18.8	N/A
Total	84.4	79.3	70.0	N/A	65.0	N/A	60.0	N/A	14.4	N/A	19.4	N/A	24.4	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	70.0	N/A	65.0	N/A	60.0	N/A	14.4	N/A	19.4	N/A	24.4	N/A
Concrete Mixer Truck	78.8	74.8	70.0	N/A	65.0	N/A	60.0	N/A	8.8	N/A	13.8	N/A	18.8	N/A
Total	84.4	79.3	70.0	N/A	65.0	N/A	60.0	N/A	14.4	N/A	19.4	N/A	24.4	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	70.0	N/A	70.0	N/A	70.0	N/A	14.4	N/A	14.4	N/A	14.4	N/A
Concrete Mixer Truck	78.8	74.8	70.0	N/A	70.0	N/A	70.0	N/A	8.8	N/A	8.8	N/A	8.8	N/A
Total	84.4	79.3	70.0	N/A	70.0	N/A	70.0	N/A	14.4	N/A	14.4	N/A	14.4	N/A

**** Receptor #8 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	70.0	N/A	65.0	N/A	60.0	N/A	14.4	N/A	19.4	N/A	24.4	N/A
Concrete Mixer Truck	78.8	74.8	70.0	N/A	65.0	N/A	60.0	N/A	8.8	N/A	13.8	N/A	18.8	N/A
Total	84.4	79.3	70.0	N/A	65.0	N/A	60.0	N/A	14.4	N/A	19.4	N/A	24.4	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Phase 6

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	65.0	N/A	60.0	N/A	55.0	N/A	13.3	N/A	18.3	N/A	23.3	N/A
Concrete Mixer Truck	72.8	68.8	65.0	N/A	60.0	N/A	55.0	N/A	7.8	N/A	12.8	N/A	17.8	N/A
Total	78.3	73.3	65.0	N/A	60.0	N/A	55.0	N/A	13.3	N/A	18.3	N/A	23.3	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	65.0	N/A	60.0	N/A	55.0	N/A	13.3	N/A	18.3	N/A	23.3	N/A
Concrete Mixer Truck	72.8	68.8	65.0	N/A	60.0	N/A	55.0	N/A	7.8	N/A	12.8	N/A	17.8	N/A
Total	78.3	73.3	65.0	N/A	60.0	N/A	55.0	N/A	13.3	N/A	18.3	N/A	23.3	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night

R10 Stables Commercial 68.0 68.0 68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	70.0	N/A	65.0	N/A	60.0	N/A	8.3	N/A	13.3	N/A	18.3	N/A
Concrete Mixer Truck	72.8	68.8	70.0	N/A	65.0	N/A	60.0	N/A	2.8	N/A	7.8	N/A	12.8	N/A
Total	78.3	73.3	70.0	N/A	65.0	N/A	60.0	N/A	8.3	N/A	13.3	N/A	18.3	N/A

**** Receptor #4 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	70.0	N/A	70.0	N/A	70.0	N/A	8.3	N/A	8.3	N/A	8.3	N/A
Concrete Mixer Truck	72.8	68.8	70.0	N/A	70.0	N/A	70.0	N/A	2.8	N/A	2.8	N/A	2.8	N/A
Total	78.3	73.3	70.0	N/A	70.0	N/A	70.0	N/A	8.3	N/A	8.3	N/A	8.3	N/A

**** Receptor #5 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	78.3	71.3	70.0	N/A	65.0	N/A	60.0	N/A	8.3	N/A	13.3	N/A	18.3	N/A
Concrete Mixer Truck	72.8	68.8	70.0	N/A	65.0	N/A	60.0	N/A	2.8	N/A	7.8	N/A	12.8	N/A
Total	78.3	73.3	70.0	N/A	65.0	N/A	60.0	N/A	8.3	N/A	13.3	N/A	18.3	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	78.3	71.3	70.0	N/A	65.0	N/A	60.0	N/A	8.3	N/A	13.3	N/A	18.3	N/A
Concrete Mixer Truck	72.8	68.8	70.0	N/A	65.0	N/A	60.0	N/A	2.8	N/A	7.8	N/A	12.8	N/A
Total	78.3	73.3	70.0	N/A	65.0	N/A	60.0	N/A	8.3	N/A	13.3	N/A	18.3	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	78.3	71.3	70.0	N/A	70.0	N/A	70.0	N/A	8.3	N/A	8.3	N/A	8.3	N/A

Concrete Mixer Truck	72.8	68.8	70.0	N/A	70.0	N/A	70.0	N/A	2.8	N/A	2.8	N/A	
Total	78.3	73.3	70.0	N/A	70.0	N/A	70.0	N/A	8.3	N/A	8.3	N/A	

**** Receptor #8 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	70.0	N/A	65.0	N/A	60.0	N/A	8.3	N/A	13.3	N/A	18.3	N/A
Concrete Mixer Truck	72.8	68.8	70.0	N/A	65.0	N/A	60.0	N/A	2.8	N/A	7.8	N/A	12.8	N/A
Total	78.3	73.3	70.0	N/A	65.0	N/A	60.0	N/A	8.3	N/A	13.3	N/A	18.3	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Phase 6

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	65.0	N/A	60.0	N/A	55.0	N/A	7.3	N/A	12.3	N/A	17.3	N/A
Concrete Mixer Truck	66.8	62.8	65.0	N/A	60.0	N/A	55.0	N/A	1.8	N/A	6.8	N/A	11.8	N/A
Total	72.3	67.2	65.0	N/A	60.0	N/A	55.0	N/A	7.3	N/A	12.3	N/A	17.3	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	65.0	N/A	60.0	N/A	55.0	N/A	7.3	N/A	12.3	N/A	17.3	N/A
Concrete Mixer Truck	66.8	62.8	65.0	N/A	60.0	N/A	55.0	N/A	1.8	N/A	6.8	N/A	11.8	N/A
Total	72.3	67.2	65.0	N/A	60.0	N/A	55.0	N/A	7.3	N/A	12.3	N/A	17.3	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Description	Impact Device	Usage (%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	70.0	N/A	65.0	N/A	60.0	N/A	2.3	N/A	7.3	N/A	12.3	N/A
Concrete Mixer Truck	66.8	62.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Total	72.3	67.2	70.0	N/A	65.0	N/A	60.0	N/A	2.3	N/A	7.3	N/A	12.3	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Description	Impact Device	Usage (%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	70.0	N/A	70.0	N/A	70.0	N/A	2.3	N/A	2.3	N/A	2.3	N/A
Concrete Mixer Truck	66.8	62.8	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	72.3	67.2	70.0	N/A	70.0	N/A	70.0	N/A	2.3	N/A	2.3	N/A	2.3	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	70.0	N/A	65.0	N/A	60.0	N/A	2.3	N/A	7.3	N/A	12.3	N/A
Concrete Mixer Truck	66.8	62.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Total	72.3	67.2	70.0	N/A	65.0	N/A	60.0	N/A	2.3	N/A	7.3	N/A	12.3	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	70.0	N/A	65.0	N/A	60.0	N/A	2.3	N/A	7.3	N/A	12.3	N/A
Concrete Mixer Truck	66.8	62.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Total	72.3	67.2	70.0	N/A	65.0	N/A	60.0	N/A	2.3	N/A	7.3	N/A	12.3	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	70.0	N/A	70.0	N/A	70.0	N/A	2.3	N/A	2.3	N/A	2.3	N/A
Concrete Mixer Truck	66.8	62.8	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	72.3	67.2	70.0	N/A	70.0	N/A	70.0	N/A	2.3	N/A	2.3	N/A	2.3	N/A

**** Receptor #8 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	70.0	N/A	65.0	N/A	60.0	N/A	2.3	N/A	7.3	N/A	12.3	N/A
Concrete Mixer Truck	66.8	62.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Total	72.3	67.2	70.0	N/A	65.0	N/A	60.0	N/A	2.3	N/A	7.3	N/A	12.3	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Phase 6

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	64.4	57.4	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	4.4	N/A	9.4	N/A
Concrete Mixer Truck	58.8	54.8	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	3.8	N/A
Total	64.4	59.3	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	4.4	N/A	9.4	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	64.4	57.4	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	4.4	N/A	9.4	N/A
Concrete Mixer Truck	58.8	54.8	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	3.8	N/A
Total	64.4	59.3	65.0	N/A	60.0	N/A	55.0	N/A	None	N/A	4.4	N/A	9.4	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night

R10 Stables Commercial 68.0 68.0 68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	64.4	57.4	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Concrete Mixer Truck	58.8	54.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.4	59.3	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A

**** Receptor #4 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	64.4	57.4	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	58.8	54.8	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.4	59.3	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A

**** Receptor #5 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	64.4	57.4	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Concrete Mixer Truck	58.8	54.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.4	59.3	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	64.4	57.4	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Concrete Mixer Truck	58.8	54.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.4	59.3	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	64.4	57.4	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A

Concrete Mixer Truck	58.8	54.8	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.4	59.3	70.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A

**** Receptor #8 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0

Results

			Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	64.4	57.4	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Concrete Mixer Truck	58.8	54.8	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.4	59.3	70.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Pedestrian Overcrossing

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Pump Truck	No	20		81.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Crane	No	16		80.6	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Auger Drill Rig	84.4	77.4	80.0	N/A	60.0	N/A	55.0	N/A	4.4	N/A	24.4	N/A	29.4	N/A
Excavator	80.7	76.7	80.0	N/A	60.0	N/A	55.0	N/A	0.7	N/A	20.7	N/A	25.7	N/A
Front End Loader	79.1	75.1	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	19.1	N/A	24.1	N/A
Concrete Pump Truck	81.4	74.4	80.0	N/A	60.0	N/A	55.0	N/A	1.4	N/A	21.4	N/A	26.4	N/A
Concrete Mixer Truck	78.8	74.8	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	18.8	N/A	23.8	N/A
Backhoe	77.6	73.6	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	17.6	N/A	22.6	N/A
Crane	80.6	72.6	80.0	N/A	60.0	N/A	55.0	N/A	0.6	N/A	20.6	N/A	25.6	N/A
Dump Truck	76.5	72.5	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	16.5	N/A	21.5	N/A
Total	84.4	84.0	80.0	N/A	60.0	N/A	55.0	N/A	4.4	N/A	24.4	N/A	29.4	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Pump Truck	No	20		81.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Crane	No	16		80.6	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	84.4	77.4	80.0	N/A	60.0	N/A	55.0	N/A	4.4	N/A	24.4	N/A	29.4	N/A
Excavator	80.7	76.7	80.0	N/A	60.0	N/A	55.0	N/A	0.7	N/A	20.7	N/A	25.7	N/A
Front End Loader	79.1	75.1	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	19.1	N/A	24.1	N/A
Concrete Pump Truck	81.4	74.4	80.0	N/A	60.0	N/A	55.0	N/A	1.4	N/A	21.4	N/A	26.4	N/A
Concrete Mixer Truck	78.8	74.8	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	18.8	N/A	23.8	N/A
Backhoe	77.6	73.6	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	17.6	N/A	22.6	N/A
Crane	80.6	72.6	80.0	N/A	60.0	N/A	55.0	N/A	0.6	N/A	20.6	N/A	25.6	N/A
Dump Truck	76.5	72.5	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	16.5	N/A	21.5	N/A
Total	84.4	84.0	80.0	N/A	60.0	N/A	55.0	N/A	4.4	N/A	24.4	N/A	29.4	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Pump Truck	No	20		81.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Crane	No	16		80.6	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	84.4	77.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	19.4	N/A	24.4	N/A
Excavator	80.7	76.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	15.7	N/A	20.7	N/A
Front End Loader	79.1	75.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	14.1	N/A	19.1	N/A
Concrete Pump Truck	81.4	74.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	16.4	N/A	21.4	N/A
Concrete Mixer Truck	78.8	74.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	13.8	N/A	18.8	N/A
Backhoe	77.6	73.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	12.6	N/A	17.6	N/A
Crane	80.6	72.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	15.6	N/A	20.6	N/A
Dump Truck	76.5	72.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	11.5	N/A	16.5	N/A
Total	84.4	84.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	19.4	N/A	24.4	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Pump Truck	No	20		81.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Crane	No	16		80.6	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	14.4	N/A	14.4	N/A
Excavator	80.7	76.7	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	10.7	N/A	10.7	N/A
Front End Loader	79.1	75.1	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	9.1	N/A	9.1	N/A
Concrete Pump Truck	81.4	74.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	11.4	N/A	11.4	N/A
Concrete Mixer Truck	78.8	74.8	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	8.8	N/A	8.8	N/A
Backhoe	77.6	73.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	7.6	N/A	7.6	N/A
Crane	80.6	72.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	10.6	N/A	10.6	N/A
Dump Truck	76.5	72.5	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	6.4	N/A	6.4	N/A
Total	84.4	84.0	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	14.4	N/A	14.4	N/A

**** Receptor #5 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Pump Truck	No	20		81.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Crane	No	16		80.6	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	19.4	N/A	24.4	N/A
Excavator	80.7	76.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	15.7	N/A	20.7	N/A
Front End Loader	79.1	75.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	14.1	N/A	19.1	N/A

Concrete Pump Truck	81.4	74.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	16.4	N/A	21.4	N/A
Concrete Mixer Truck	78.8	74.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	13.8	N/A	18.8	N/A
Backhoe	77.6	73.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	12.6	N/A	17.6	N/A
Crane	80.6	72.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	15.6	N/A	20.6	N/A
Dump Truck	76.5	72.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	11.5	N/A	16.5	N/A
Total	84.4	84.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	19.4	N/A	24.4	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Pump Truck	No	20		81.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Crane	No	16		80.6	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	19.4	N/A	24.4	N/A
Excavator	80.7	76.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	15.7	N/A	20.7	N/A
Front End Loader	79.1	75.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	14.1	N/A	19.1	N/A
Concrete Pump Truck	81.4	74.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	16.4	N/A	21.4	N/A
Concrete Mixer Truck	78.8	74.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	13.8	N/A	18.8	N/A
Backhoe	77.6	73.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	12.6	N/A	17.6	N/A
Crane	80.6	72.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	15.6	N/A	20.6	N/A
Dump Truck	76.5	72.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	11.5	N/A	16.5	N/A
Total	84.4	84.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	19.4	N/A	24.4	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Pump Truck	No	20		81.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0

Crane	No	16	80.6	50.0	0.0
Dump Truck	No	40	76.5	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	14.4	N/A	14.4	N/A
Excavator	80.7	76.7	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	10.7	N/A	10.7	N/A
Front End Loader	79.1	75.1	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	9.1	N/A	9.1	N/A
Concrete Pump Truck	81.4	74.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	11.4	N/A	11.4	N/A
Concrete Mixer Truck	78.8	74.8	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	8.8	N/A	8.8	N/A
Backhoe	77.6	73.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	7.6	N/A	7.6	N/A
Crane	80.6	72.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	10.6	N/A	10.6	N/A
Dump Truck	76.5	72.5	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	6.4	N/A	6.4	N/A
Total	84.4	84.0	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	14.4	N/A	14.4	N/A

**** Receptor #8 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Concrete Pump Truck	No	20		81.4	50.0	0.0
Concrete Mixer Truck	No	40		78.8	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Crane	No	16		80.6	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	19.4	N/A	24.4	N/A
Excavator	80.7	76.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	15.7	N/A	20.7	N/A
Front End Loader	79.1	75.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	14.1	N/A	19.1	N/A
Concrete Pump Truck	81.4	74.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	16.4	N/A	21.4	N/A
Concrete Mixer Truck	78.8	74.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	13.8	N/A	18.8	N/A
Backhoe	77.6	73.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	12.6	N/A	17.6	N/A
Crane	80.6	72.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	15.6	N/A	20.6	N/A
Dump Truck	76.5	72.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	11.5	N/A	16.5	N/A
Total	84.4	84.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	19.4	N/A	24.4	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Pedestrian Overcrossing

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Pump Truck	No	20		81.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Crane	No	16		80.6	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	18.3	N/A	23.3	N/A
Excavator	74.7	70.7	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	14.7	N/A	19.7	N/A
Front End Loader	73.1	69.1	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	13.1	N/A	18.1	N/A
Concrete Pump Truck	75.4	68.4	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	15.4	N/A	20.4	N/A
Concrete Mixer Truck	72.8	68.8	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	12.8	N/A	17.8	N/A
Backhoe	71.5	67.6	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	11.5	N/A	16.5	N/A
Crane	74.5	66.6	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	14.5	N/A	19.5	N/A
Dump Truck	70.4	66.5	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	10.4	N/A	15.4	N/A
Total	78.3	78.0	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	18.3	N/A	23.3	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Pump Truck	No	20		81.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0

Backhoe	No	40	77.6	100.0	0.0
Crane	No	16	80.6	100.0	0.0
Dump Truck	No	40	76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	18.3	N/A	23.3	N/A
Excavator	74.7	70.7	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	14.7	N/A	19.7	N/A
Front End Loader	73.1	69.1	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	13.1	N/A	18.1	N/A
Concrete Pump Truck	75.4	68.4	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	15.4	N/A	20.4	N/A
Concrete Mixer Truck	72.8	68.8	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	12.8	N/A	17.8	N/A
Backhoe	71.5	67.6	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	11.5	N/A	16.5	N/A
Crane	74.5	66.6	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	14.5	N/A	19.5	N/A
Dump Truck	70.4	66.5	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	10.4	N/A	15.4	N/A
Total	78.3	78.0	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	18.3	N/A	23.3	N/A

**** Receptor #3 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Pump Truck	No	20		81.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Crane	No	16		80.6	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	13.3	N/A	18.3	N/A
Excavator	74.7	70.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	9.7	N/A	14.7	N/A
Front End Loader	73.1	69.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	8.1	N/A	13.1	N/A
Concrete Pump Truck	75.4	68.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	10.4	N/A	15.4	N/A
Concrete Mixer Truck	72.8	68.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	7.8	N/A	12.8	N/A
Backhoe	71.5	67.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	6.5	N/A	11.5	N/A
Crane	74.5	66.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	9.5	N/A	14.5	N/A
Dump Truck	70.4	66.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	5.4	N/A	10.4	N/A
Total	78.3	78.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	13.3	N/A	18.3	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Pump Truck	No	20		81.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Crane	No	16		80.6	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	8.3	N/A	8.3	N/A
Excavator	74.7	70.7	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	4.7	N/A	4.7	N/A
Front End Loader	73.1	69.1	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	3.1	N/A	3.1	N/A
Concrete Pump Truck	75.4	68.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	5.4	N/A	5.4	N/A
Concrete Mixer Truck	72.8	68.8	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	2.8	N/A	2.8	N/A
Backhoe	71.5	67.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	1.5	N/A	1.5	N/A
Crane	74.5	66.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	4.5	N/A	4.5	N/A
Dump Truck	70.4	66.5	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	0.4	N/A	0.4	N/A
Total	78.3	78.0	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	8.3	N/A	8.3	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Pump Truck	No	20		81.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Crane	No	16		80.6	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	13.3	N/A	18.3	N/A
Excavator	74.7	70.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	9.7	N/A	14.7	N/A
Front End Loader	73.1	69.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	8.1	N/A	13.1	N/A
Concrete Pump Truck	75.4	68.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	10.4	N/A	15.4	N/A
Concrete Mixer Truck	72.8	68.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	7.8	N/A	12.8	N/A
Backhoe	71.5	67.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	6.5	N/A	11.5	N/A
Crane	74.5	66.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	9.5	N/A	14.5	N/A
Dump Truck	70.4	66.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	5.4	N/A	10.4	N/A
Total	78.3	78.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	13.3	N/A	18.3	N/A

**** Receptor #6 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

			Equipment			
Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Pump Truck	No	20		81.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Crane	No	16		80.6	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	13.3	N/A	18.3	N/A
Excavator	74.7	70.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	9.7	N/A	14.7	N/A
Front End Loader	73.1	69.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	8.1	N/A	13.1	N/A
Concrete Pump Truck	75.4	68.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	10.4	N/A	15.4	N/A
Concrete Mixer Truck	72.8	68.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	7.8	N/A	12.8	N/A
Backhoe	71.5	67.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	6.5	N/A	11.5	N/A
Crane	74.5	66.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	9.5	N/A	14.5	N/A
Dump Truck	70.4	66.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	5.4	N/A	10.4	N/A
Total	78.3	78.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	13.3	N/A	18.3	N/A

**** Receptor #7 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Pump Truck	No	20		81.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Crane	No	16		80.6	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	78.3	71.3	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	8.3	N/A	8.3	N/A
Excavator	74.7	70.7	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	4.7	N/A	4.7	N/A
Front End Loader	73.1	69.1	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	3.1	N/A	3.1	N/A
Concrete Pump Truck	75.4	68.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	5.4	N/A	5.4	N/A
Concrete Mixer Truck	72.8	68.8	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	2.8	N/A	2.8	N/A
Backhoe	71.5	67.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	1.5	N/A	1.5	N/A
Crane	74.5	66.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	4.5	N/A	4.5	N/A
Dump Truck	70.4	66.5	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	0.4	N/A	0.4	N/A
Total	78.3	78.0	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	8.3	N/A	8.3	N/A

**** Receptor #8 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Excavator	No	40		80.7	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Concrete Pump Truck	No	20		81.4	100.0	0.0
Concrete Mixer Truck	No	40		78.8	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Crane	No	16		80.6	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq

Auger Drill Rig	78.3	71.3	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	13.3	N/A	18.3	N/A
Excavator	74.7	70.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	9.7	N/A	14.7	N/A
Front End Loader	73.1	69.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	8.1	N/A	13.1	N/A
Concrete Pump Truck	75.4	68.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	10.4	N/A	15.4	N/A
Concrete Mixer Truck	72.8	68.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	7.8	N/A	12.8	N/A
Backhoe	71.5	67.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	6.5	N/A	11.5	N/A
Crane	74.5	66.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	9.5	N/A	14.5	N/A
Dump Truck	70.4	66.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	5.4	N/A	10.4	N/A
Total	78.3	78.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	13.3	N/A	18.3	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Pedestrian Overcrossing

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Pump Truck	No	20		81.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)			Noise Limit Exceedance (dBA)		
	Day		Evening		Night	Day	Evening	Night
Equipment	Lmax	Leq	Lmax	Leq	Lmax Leq	Lmax Leq	Lmax Leq	Lmax Leq	Lmax Leq	Lmax Leq	Lmax Leq
Auger Drill Rig	72.3	65.3	80.0	N/A	60.0 N/A	55.0 N/A	None N/A	12.3 N/A	17.3 N/A
Excavator	68.7	64.7	80.0	N/A	60.0 N/A	55.0 N/A	None N/A	8.7 N/A	13.7 N/A
Front End Loader	67.1	63.1	80.0	N/A	60.0 N/A	55.0 N/A	None N/A	7.1 N/A	12.1 N/A
Concrete Pump Truck	69.4	62.4	80.0	N/A	60.0 N/A	55.0 N/A	None N/A	9.4 N/A	14.4 N/A
Concrete Mixer Truck	66.8	62.8	80.0	N/A	60.0 N/A	55.0 N/A	None N/A	6.8 N/A	11.8 N/A
Backhoe	65.5	61.5	80.0	N/A	60.0 N/A	55.0 N/A	None N/A	5.5 N/A	10.5 N/A
Crane	68.5	60.6	80.0	N/A	60.0 N/A	55.0 N/A	None N/A	8.5 N/A	13.5 N/A
Dump Truck	64.4	60.4	80.0	N/A	60.0 N/A	55.0 N/A	None N/A	4.4 N/A	9.4 N/A
Total	72.3	72.0	80.0	N/A	60.0 N/A	55.0 N/A	None N/A	12.3 N/A	17.3 N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Pump Truck	No	20		81.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	72.3	65.3	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	12.3	N/A	17.3	N/A
Excavator	68.7	64.7	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	8.7	N/A	13.7	N/A
Front End Loader	67.1	63.1	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	7.1	N/A	12.1	N/A
Concrete Pump Truck	69.4	62.4	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	9.4	N/A	14.4	N/A
Concrete Mixer Truck	66.8	62.8	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	6.8	N/A	11.8	N/A
Backhoe	65.5	61.5	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	5.5	N/A	10.5	N/A
Crane	68.5	60.6	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	8.5	N/A	13.5	N/A
Dump Truck	64.4	60.4	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	4.4	N/A	9.4	N/A
Total	72.3	72.0	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	12.3	N/A	17.3	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Pump Truck	No	20		81.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	72.3	65.3	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	7.3	N/A	12.3	N/A
Excavator	68.7	64.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.7	N/A	8.7	N/A
Front End Loader	67.1	63.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	2.1	N/A	7.1	N/A
Concrete Pump Truck	69.4	62.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	4.4	N/A	9.4	N/A
Concrete Mixer Truck	66.8	62.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Backhoe	65.5	61.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	0.5	N/A	5.5	N/A
Crane	68.5	60.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.5	N/A	8.5	N/A
Dump Truck	64.4	60.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Total	72.3	72.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	7.3	N/A	12.3	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Pump Truck	No	20		81.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	2.3	N/A	2.3	N/A
Excavator	68.7	64.7	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Front End Loader	67.1	63.1	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Pump Truck	69.4	62.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	66.8	62.8	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	65.5	61.5	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Crane	68.5	60.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	64.4	60.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	72.3	72.0	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	2.3	N/A	2.3	N/A

**** Receptor #5 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Pump Truck	No	20		81.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	7.3	N/A	12.3	N/A
Excavator	68.7	64.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.7	N/A	8.7	N/A
Front End Loader	67.1	63.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	2.1	N/A	7.1	N/A

Concrete Pump Truck	69.4	62.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	4.4	N/A	9.4	N/A
Concrete Mixer Truck	66.8	62.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Backhoe	65.5	61.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	0.5	N/A	5.5	N/A
Crane	68.5	60.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.5	N/A	8.5	N/A
Dump Truck	64.4	60.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Total	72.3	72.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	7.3	N/A	12.3	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Pump Truck	No	20		81.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	7.3	N/A	12.3	N/A
Excavator	68.7	64.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.7	N/A	8.7	N/A
Front End Loader	67.1	63.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	2.1	N/A	7.1	N/A
Concrete Pump Truck	69.4	62.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	4.4	N/A	9.4	N/A
Concrete Mixer Truck	66.8	62.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Backhoe	65.5	61.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	0.5	N/A	5.5	N/A
Crane	68.5	60.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.5	N/A	8.5	N/A
Dump Truck	64.4	60.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Total	72.3	72.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	7.3	N/A	12.3	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Pump Truck	No	20		81.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0

Crane	No	16	80.6	200.0	0.0
Dump Truck	No	40	76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	2.3	N/A	2.3	N/A
Excavator	68.7	64.7	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Front End Loader	67.1	63.1	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Pump Truck	69.4	62.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	66.8	62.8	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	65.5	61.5	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Crane	68.5	60.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	64.4	60.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	72.3	72.0	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	2.3	N/A	2.3	N/A

**** Receptor #8 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Concrete Pump Truck	No	20		81.4	200.0	0.0
Concrete Mixer Truck	No	40		78.8	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	7.3	N/A	12.3	N/A
Excavator	68.7	64.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.7	N/A	8.7	N/A
Front End Loader	67.1	63.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	2.1	N/A	7.1	N/A
Concrete Pump Truck	69.4	62.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	4.4	N/A	9.4	N/A
Concrete Mixer Truck	66.8	62.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	1.8	N/A	6.8	N/A
Backhoe	65.5	61.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	0.5	N/A	5.5	N/A
Crane	68.5	60.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	3.5	N/A	8.5	N/A
Dump Truck	64.4	60.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Total	72.3	72.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	7.3	N/A	12.3	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2018
Case Description: I-80/Gilman Pedestrian Overcrossing

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R5 Sports Complex	Residential	65.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Pump Truck	No	20		81.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0
Backhoe	No	40		77.6	500.0	0.0
Crane	No	16		80.6	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	64.4	57.4	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	4.4	N/A	9.4	N/A
Excavator	60.7	56.7	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	0.7	N/A	5.7	N/A
Front End Loader	59.1	55.1	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	4.1	N/A
Concrete Pump Truck	61.4	54.4	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	1.4	N/A	6.4	N/A
Concrete Mixer Truck	58.8	54.8	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	3.8	N/A
Backhoe	57.6	53.6	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	2.6	N/A
Crane	60.6	52.6	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	0.6	N/A	5.6	N/A
Dump Truck	56.5	52.5	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	1.4	N/A
Total	64.4	64.0	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	4.4	N/A	9.4	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R6 Trail	Residential	67.0	67.0	67.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Pump Truck	No	20		81.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0

Backhoe	No	40	77.6	500.0	0.0
Crane	No	16	80.6	500.0	0.0
Dump Truck	No	40	76.5	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	64.4	57.4	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	4.4	N/A	9.4	N/A
Excavator	60.7	56.7	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	0.7	N/A	5.7	N/A
Front End Loader	59.1	55.1	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	4.1	N/A
Concrete Pump Truck	61.4	54.4	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	1.4	N/A	6.4	N/A
Concrete Mixer Truck	58.8	54.8	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	3.8	N/A
Backhoe	57.6	53.6	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	2.6	N/A
Crane	60.6	52.6	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	0.6	N/A	5.6	N/A
Dump Truck	56.5	52.5	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	None	N/A	1.4	N/A
Total	64.4	64.0	80.0	N/A	60.0	N/A	55.0	N/A	None	N/A	4.4	N/A	9.4	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R10 Stables	Commercial	68.0	68.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Pump Truck	No	20		81.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0
Backhoe	No	40		77.6	500.0	0.0
Crane	No	16		80.6	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	64.4	57.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Excavator	60.7	56.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	0.7	N/A
Front End Loader	59.1	55.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Pump Truck	61.4	54.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	1.4	N/A
Concrete Mixer Truck	58.8	54.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	57.6	53.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Crane	60.6	52.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	0.6	N/A
Dump Truck	56.5	52.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.4	64.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R13 Industrial	Industrial	72.0	72.0	72.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Pump Truck	No	20		81.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0
Backhoe	No	40		77.6	500.0	0.0
Crane	No	16		80.6	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	64.4	57.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Excavator	60.7	56.7	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Front End Loader	59.1	55.1	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Pump Truck	61.4	54.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	58.8	54.8	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	57.6	53.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Crane	60.6	52.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	56.5	52.5	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.4	64.0	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R15 Commercial	Commercial	64.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Pump Truck	No	20		81.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0
Backhoe	No	40		77.6	500.0	0.0
Crane	No	16		80.6	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	64.4	57.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Excavator	60.7	56.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	0.7	N/A
Front End Loader	59.1	55.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Pump Truck	61.4	54.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	1.4	N/A
Concrete Mixer Truck	58.8	54.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	57.6	53.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Crane	60.6	52.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	0.6	N/A
Dump Truck	56.5	52.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.4	64.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A

**** Receptor #6 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R18 Restaurant	Commercial	66.0	66.0	66.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Pump Truck	No	20		81.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0
Backhoe	No	40		77.6	500.0	0.0
Crane	No	16		80.6	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	64.4	57.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Excavator	60.7	56.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	0.7	N/A
Front End Loader	59.1	55.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Pump Truck	61.4	54.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	1.4	N/A
Concrete Mixer Truck	58.8	54.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	57.6	53.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Crane	60.6	52.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	0.6	N/A
Dump Truck	56.5	52.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.4	64.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A

**** Receptor #7 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R21 Industrial	Industrial	63.0	63.0	63.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Pump Truck	No	20		81.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0
Backhoe	No	40		77.6	500.0	0.0
Crane	No	16		80.6	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	64.4	57.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Excavator	60.7	56.7	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Front End Loader	59.1	55.1	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Pump Truck	61.4	54.4	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Mixer Truck	58.8	54.8	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	57.6	53.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Crane	60.6	52.6	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Dump Truck	56.5	52.5	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.4	64.0	85.0	N/A	70.0	N/A	70.0	N/A	None	N/A	None	N/A	None	N/A

**** Receptor #8 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R23 Commercial	Commercial	70.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	500.0	0.0
Excavator	No	40		80.7	500.0	0.0
Front End Loader	No	40		79.1	500.0	0.0
Concrete Pump Truck	No	20		81.4	500.0	0.0
Concrete Mixer Truck	No	40		78.8	500.0	0.0
Backhoe	No	40		77.6	500.0	0.0
Crane	No	16		80.6	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq

Auger Drill Rig	64.4	57.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A
Excavator	60.7	56.7	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	0.7	N/A
Front End Loader	59.1	55.1	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Concrete Pump Truck	61.4	54.4	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	1.4	N/A
Concrete Mixer Truck	58.8	54.8	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Backhoe	57.6	53.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Crane	60.6	52.6	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	0.6	N/A
Dump Truck	56.5	52.5	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	None	N/A
Total	64.4	64.0	85.0	N/A	65.0	N/A	60.0	N/A	None	N/A	None	N/A	4.4	N/A

Appendix I Train Pass-By Noise Measurements Used to Determine Reference Noise Level

Table I-1 – Train Pass-By Measurement Data

Meas. ID	Date	Start Time	Train Type	Train Direction	Track ID	Distance to Track (ft)	Number of Locomotives	Number of Cars	Speed (mph)	Lmax, dBA	SEL, dBA	L_{max} at 50 ft, dBA	SEL_{ref} at 50 ft, dBA[1]
P2	04/18/18	8:42	Amtrak	SB	2	50	1	5	40	99	103	99	102
P3	04/18/18	9:15	Amtrak	SB	2	50	2	11	53	104	107	104	107
P4	04/18/18	9:16	Amtrak	SB	1	37	1	4	35	98	104	96	102
P5	04/18/18	10:02	Amtrak	SB	1	37	1	4	50	102	106	99	104
P6	04/18/18	10:11	Amtrak	NB	1	37	1	4	62	100	105	97	104
P8	04/18/18	10:42	Amtrak	NB	1	37	1	4	40	104	108	101	106
P9	04/18/18	11:45	Amtrak	SB	1	37	1	4	64	103	106	100	106
P10	04/18/18	13:50	Amtrak	NB	1	37	1	5	47	100	105	97	103
P11	04/18/18	13:51	Amtrak	SB	2	50	1	4	64	104	106	104	107
P12	04/18/18	14:02	Amtrak	SB	1	37	1	4	60	105	108	102	107
P13	04/18/18	14:51	Amtrak	NB	1	37	1	4	53	108	109	105	108
P19	04/19/18	9:15	Amtrak	NB	1	37	2	11	65	106	110	103	109
P21	04/19/18	10:10	Amtrak	NB	2	50	1	4	61	106	108	106	109
P31	04/20/18	9:16	Amtrak	NB	2	50	2	8	62	101	105	101	106
											Average:	**101**	**106**

Note:

1 - SEL_{ref} is calculated using FTA procedures.

Table I-1 – Train Pass-By Measurement Data (Cont'd)

Meas. ID	Date	Start Time	Train Type	Train Direction	Track ID	Distance to Track (ft)	Number of Locomotives	Number of Cars	Speed (mph)	Lmax, dBA	SEL, dBA	L_{max} at 50 ft, dBA	SEL_{ref} at 50 ft, dBA[1]
F1	04/18/18	9:25	Freight	SB	2	50	1	4	30	105	108	105	106
F3	04/18/18	11:10	Freight	SB	2	50	2	22	34	102	104	102	103
F4	04/19/18	8:31	Freight	NB	2	50	1	1	44	104	107	104	106
F5	04/19/18	9:51	Freight	NB	2	50	3	100	44	106	110	106	109
F7	04/20/18	8:38	Freight	NB	2	50	2	0	28	105	109	105	106
											Average:	**104**	**106**

Note:

1 - SEL_{ref} is calculated using FTA procedures.