777 North Front Street Project

Noise Study

prepared for

City of Burbank
150 North Third Street
Burbank, California 91502

prepared with the assistance of

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1 Introduction and Project Summary

1.1 Introduction

This study is an analysis of the potential noise impacts of the proposed mixed-use Project (Project) located at 777 North Front Street, on the corner of North Front Street and West Burbank Boulevard in the City of Burbank, California. This report has been prepared by Rincon Consultants, Inc. (Rincon) under contract to the City of Burbank, in support of the environmental documentation being prepared pursuant to the California Environmental Quality Act (CEQA). This study includes noise reduction features from the Environmental Noise Evaluation & Recommendations Report prepared by SSA Acoustics for the proposed Project on October 24, 2017. The purpose of this study is to expand upon previous findings made by SSA Acoustics and further analyze the Project's noise impacts related to both temporary construction activity and long-term operation of the Project.

1.2 Project Summary

Project Location

The Project site encompasses approximately eight acres. The Project site is an irregularly-shaped parcel and is currently occupied predominately by concrete slabs and an abandoned section of old Front Street. The Project site currently contains mounds of soil and construction materials throughout as a result of its current use as a construction material storage site for the California Department of Transportation (Caltrans) during the Golden State Freeway (Interstate 5, or I-5) project. The Project site is generally bounded by Old Front Street and the I-5 freeway to the northeast, Magnolia Boulevard to the southeast, North Front Street to the southwest, and Burbank Boulevard to the northwest. The Project site is surrounded by primarily commercial and industrial uses to the west and southwest across North Front Street, including the United Water Services treatment facility located approximately 150 feet to the southwest. Commercial development, including Burbank Town Center, restaurants, and other retail uses, are located to the northeast across Burbank Boulevard, east across the I-5 freeway, and south across East Magnolia Boulevard. Existing site conditions are shown in Figure 1. As shown in Figure 1, the privately owned parcel makes up approximately 6.77 acres of the Project site and the City-owned parcel makes up approximately 1.22 acres.

Project Description

The proposed Project would involve clearing and excavation of the Project site and construction of three multistory buildings: two residential buildings and one building for a hotel. A total of 1,454 on-site parking spaces would also be developed as part of the Project.

The residential component of the Project would include construction of one 279,162 square-foot, seven-story building containing 252 units and one 346,644 square-foot, eight-story building containing 321 units for a total of 573 residential units. In addition, a total of 1,206 parking spaces would be provided for tenants of both residential buildings (including 63 tandem parking spaces). The proposed Project would also include 106,400 square feet of open space, including courtyards, a pool deck, publicly accessible ground floor plaza, and private balconies. Approximately 87,050 square feet would be common open space, a minimum of approximately 15 percent of which would be landscaped. Associated residential common areas and amenities constructed may include, but would not limited to a rooftop terrace, business center/internet café, coffee bar, demonstration kitchen, billiards room, resident lounge, fitness center with indoor exercise studio, resort-style pools with cabanas, Jacuzzis, public plaza and bike trail access, pet grooming station, pet park, concierge services, and bike storage. Residential courtyards and balconies would be located within the interior sides of the buildings.

The hotel component of the Project would include construction of one 212,250 square-foot, seven-story building at the southeastern end of the Project site containing 307 hotel rooms and ancillary uses and 327 associated parking spaces (including 20 tandem parking spaces). Associated hotel amenities may include, but would not be limited to 1,800 square feet of restaurant space, café, bar, pool terrace, fitness center, meeting rooms, and lounge. The hotel's ancillary commercial uses would include accessory retail and restaurant uses on the ground floor. In addition, a 1,067-square foot retail gallery would be provided on Front Street near the intersection of Burbank Boulevard that would have 4 total parking spaces. Additional ancillary uses would include public and private recreational spaces consisting of courtyards, residential balconies, and sky terraces at both parking structure roof levels. The proposed Project would include an approximately 27,800-square foot publicly accessible plaza area on the adjacent City-owned property located to the south of the project site.

The Project would include one subterranean level for parking at the southern half of the project site beneath a portion of the southern residential building and also beneath the hotel. One to two levels of parking would be between grade and the residential units in both residential buildings, as well as a seven-story parking structure between the residential buildings. There would also be a five-story parking structure adjacent to the hotel for hotel parking.

The Project would include bicycle parking spaces for both the residential, retail gallery and the hotel uses. The residential portion would provide 14 short term bicycle parking spaces near the main entrance and 43 long term spaces in the garage. The hotel and retail gallery portion would provide four short term bicycle parking spaces near the main entrance and 12 long term spaces in the garage. The total bicycle parking for the proposed Project would include 73 spaces.

The primary entries for the hotel, retail gallery, and apartments would be provided along Front Street. Loading for the residential units would be provided at two loading areas along the Project site's Front Street frontage lane, and loading for the hotel would be provided via a loading dock located at the northwest corner of the building with access along the fire truck access lane. The Project would include widening Front Street to include a turn lane and a bike lane.

See Figure 1 for the Project site boundary and configuration of the site and Figure 2 for the Project site plan.

Figure 1 Project Site Boundary

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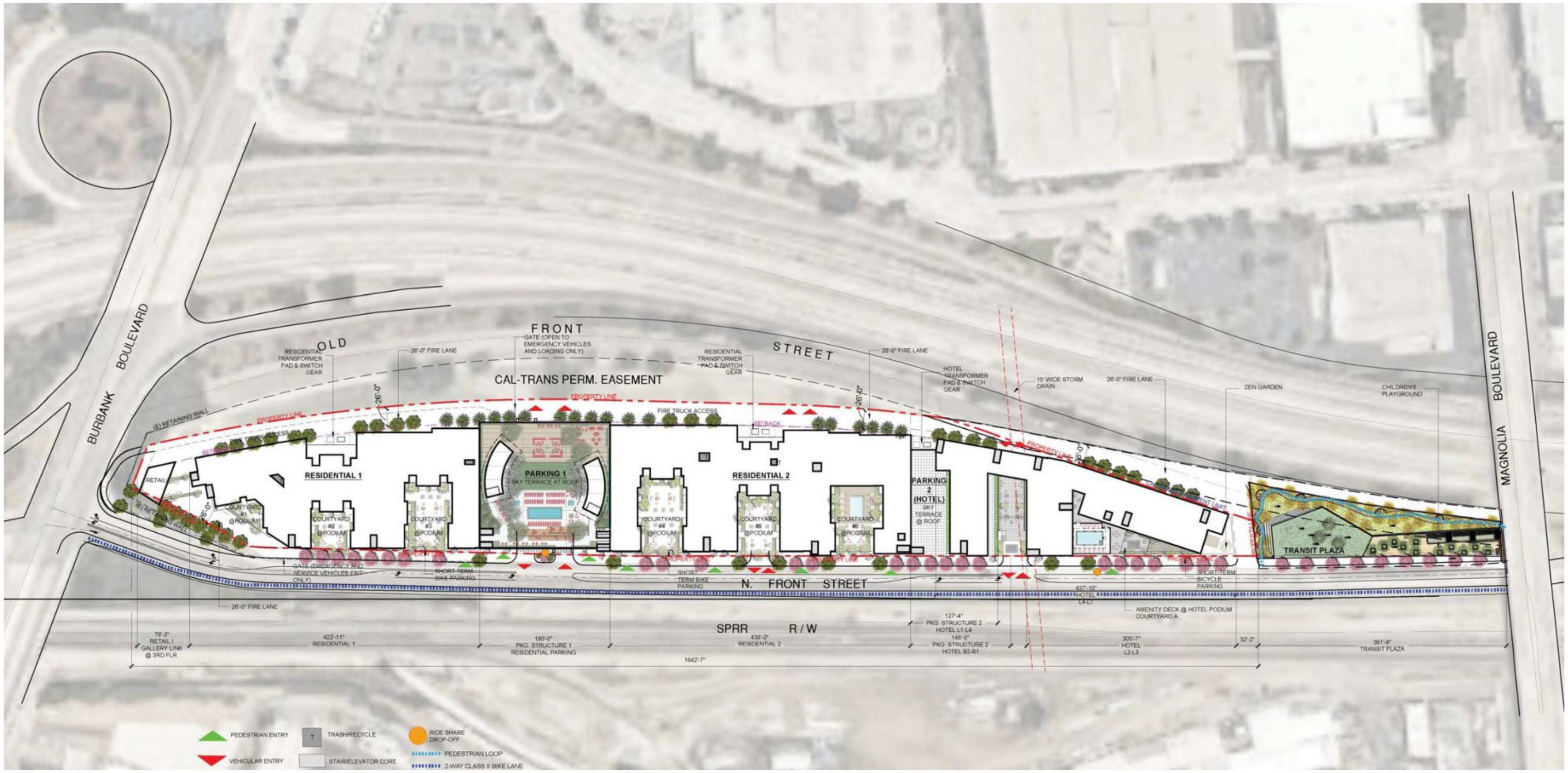
Figure 2 Project Site Plan



Source: LaTerra SELECT BURBANK, May 2018

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2 Background and Setting

2.1 Fundamentals of Noise and Vibration

Noise

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

Sound pressure level is measured on a logarithmic scale with the 0 dBA level based on the lowest detectable sound pressure level that people can perceive (an audible sound that is not zero sound pressure level). Based on the logarithmic scale, a doubling of sound energy is equivalent to an increase of 3 dBA, and a sound that is 10 dBA less than the ambient sound level has no effect on ambient noise. Because of the nature of the human ear, a sound must be about 10 dBA greater than the ambient noise level to be judged as twice as loud. In general, a 3 dBA change in the ambient noise level is noticeable, while 1-2 dBA changes generally are not perceived. Quiet suburban areas typically have noise levels in the range of 40-50 dBA, while areas adjacent to arterial streets are typically in the 50-60+ dBA range. Normal conversational levels are usually in the 60-65 dBA range, and ambient noise levels greater than 65 dBA can interrupt conversations.

Noise levels from point sources, such as those from individual pieces of machinery, typically attenuate (or drop off) at a rate of 6 dBA per doubling of distance from the noise source. Noise levels from lightly traveled roads typically attenuate at a rate of about 4.5 dBA per doubling of distance. Noise levels from heavily traveled roads typically attenuate at about 3 dBA per doubling of distance. Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces noise levels by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA (Federal Transit Administration [FTA] 2018). The manner in which homes in California are constructed generally provides a reduction of exterior-to-interior noise levels of approximately 20 to 25 dBA with closed windows (FTA 2018).

In addition to the instantaneous measurement of sound levels, the duration of sound is important since sounds that occur over a long period of time are more likely to be an annoyance or cause direct physical damage or environmental stress. One of the most frequently used noise metrics that considers both duration and sound power level is the equivalent noise level (Leq). The Leq is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). Typically, Leq is summed over a one-hour period. Lmax is the highest RMS (root mean squared) sound pressure level within the measurement period, and Lmin is the lowest RMS sound pressure level within the measurement period.

The time period in which noise occurs is also important since nighttime noise tends to disturb people more than daytime noise. Community noise is usually measured using Day-Night Average Level (Ldn) that is the 24-hour average noise level with a 10-dBA penalty for noise occurring during nighttime (10:00 PM to 7:00 AM) hours, or Community Noise Equivalent Level (CNEL) that is the 24-

hour average noise level with a 5 dBA penalty for noise occurring from 7:00 PM to 10:00 PM and a 10 dBA penalty for noise occurring from 10:00 PM to 7:00 AM. Noise levels described by Ldn and CNEL typically do not differ by more than 1 dBA. In practice, CNEL and Ldn are often used interchangeably.

Vibration

Vibration refers to groundborne noise and perceptible motion. Vibration is a unique form of noise because its energy is carried through buildings, structures, and the ground, whereas noise is simply carried through the air. Thus, vibration is generally felt rather than heard. Some vibration effects can be caused by noise, such as the rattling of windows from passing trucks. This phenomenon is caused by the coupling of the acoustic energy at frequencies that are close to the resonant frequency of the material being vibrated. Typically, groundborne vibration generated by manmade activities attenuates rapidly as distance from the source of the vibration increases. The ground motion caused by vibration is measured as peak particle velocity (PPV) in inches per second and is also referenced as vibration decibels (VdB) in the U.S.

According to the FTA Transit Noise and Vibration Impact Assessment (2018), the background vibration velocity level in residential areas is usually around 50 VdB. The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. Nonetheless, according to the FTA's criteria, buildings where people normally sleep would be impacted by frequent vibration events if vibration velocity levels exceed 72 VdB. In terms of ground-borne vibration impacts on structures, the FTA states that ground-borne vibration levels in excess of 100 VdB can damage fragile buildings, while levels in excess of 95 VdB can damage extremely fragile historic buildings (FTA 2018). Most perceptible indoor vibration is caused by sources within buildings such as operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel wheeled trains, and traffic on rough roads.

2.2 Sensitive Receptors

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with those uses. According to the Burbank2035 General Plan Noise Element, residential areas, hospitals, convalescent and day care facilities, schools, and libraries are considered noise-sensitive uses (Burbank2035 2013). The Project site is surrounded by industrial and commercial uses. The nearest noise-sensitive uses to the Project site are single-family residences located approximately 875 feet northwest of the Project site across the I-5, Burbank High School located approximately 1,320 feet (0.25 mile) northeast of the Project site, and single-family residences approximately 1,740 (0.33 mile) west of the Project site along West Burbank Boulevard. In addition, the Project would include residences, open space areas, and a hotel that would be considered new noise-sensitive receptors on the Project site.

2.3 Existing Project Area Noise Levels

The most common and primary existing sources of noise in the Project site vicinity are motor vehicles (i.e., automobiles, trucks, and buses) on North Front Street, West Burbank Boulevard, and the I-5. Motor vehicle noise is of concern because it is characterized by a high number of individual events that often create a sustained noise level, and its proximity to noise sensitive uses. Additional sources of noise in the Project site vicinity include activities associated with the adjacent Metrolink station (Downtown Burbank Station) and railroad line (i.e., passing commuter trains and train horns), and aircraft noise from overhead flights associated with the Hollywood-Burbank Airport located approximately two miles northwest of the Project site.

Two on-site continuous 24-hour noise measurements were conducted by SSA Acoustics on March 23 and March 24, 2017, as part of their Environmental Noise Evaluation & Recommendations Report (2017) for the Project to determine the ambient daily noise exposure levels of future structures at the Project site. Based on measured noise levels, the ambient daily noise level at uses with direct exposure to Front Street and the I-5 would be 76 dBA Ldn and 81 dBA Ldn, respectively (SSA Acoustics 2017).

In order to determine existing peak hour noise levels on the Project site and at adjacent noise-sensitive receptors, six additional peak hour weekday afternoon 10-minute noise measurements (Leq[10] dBA) were taken by Rincon using an ANSI Type II integrating sound level meter on January 30, 2018. Figure 3 shows the location of noise measurements in the Project area. Measurements 3, 4, and 5 were taken at the southeastern, center, and northwestern portions of the Project site, respectively. As shown in Table 1, the measured Leq[10] dBA levels on the Project site range from approximately 67 to 70 dBA Leq.

Table 1 Project Noise Monitoring Results - PM Peak Hour

Measurement Number	Measurement Location	Sample Times	Primary Noise Source, Distance to Centerline	Leq[10] (dBA)[1]
1	West Burbank Boulevard adjacent to single-family residences west of the Project site	4:13 PM – 4:23 PM	West Burbank Boulevard, 40 feet	66.7
2	3rd Street adjacent to Burbank High School northeast of the Project site	4:38 PM – 4:48 PM	3rd Street, 35 feet	66.2
3	On-site at the southeastern portion of the Project site	5:03 PM – 5:13 PM	I-5, 165 feet	70.0
4	On-site at the center portion of the Project site	5:28 PM – 5:38 PM	North Front Street, 50 feet	69.5[2]
5	On-site at the northwestern portion of the Project site	5:43 PM – 5:53 PM	I-5, 275 feet	66.9
6	Scott Road adjacent to single-family residences northwest of the Project site	6:09 PM – 6:19 PM	I-5, 150 feet	70.0

See Appendix A for noise monitoring data. See Figure 3 for a map of Noise Measurement Locations.

[1] The equivalent noise level (Leq) is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). For this measurement, the Leq was over a 10-minute period (Leq[10]).

[2] This noise measurement also captured a passing Metrolink commuter train departing from the Burbank Station at approximately 5:28 PM.

Source: Rincon Consultants, field measurements on January 30, 2018 field using ANSI Type II Integrating sound level meter

Figure 3 Noise Measurement and Sensitive Receptor Locations

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Regulatory Setting

Burbank 2035 General Plan Noise Element

The Noise Element of the Burbank2035 General Plan is intended to identify sources of noise and provide goals, objectives, and policies that ensure that noise from various sources, including transportation and stationary sources, does not create an unacceptable noise environment. As shown in Table 2, the City has adopted land use compatibility standards for use in assessing the compatibility of various land use types that are exposed to noise levels generated by transportation sources (e.g., traffic, railroad operations, and aircraft). According to the City’s standards shown in Table 2, ambient noise up to 65 dBA CNEL/Ldn is normally acceptable for mixed-use multi-family residential development and transient lodging land uses, while ambient noise up to 70 dBA CNEL/Ldn is normally acceptable for neighborhood parks. These standards also establish maximum interior noise levels for new residential development, requiring that enough insulation be provided to reduce interior ambient noise levels to 45 dBA CNEL/Ldn (Burbank2035 2013).

Table 2 Maximum Allowable Noise Exposure – Transportation Sources

Land Use Category	Exterior Normally Acceptable[1] (dBA CNEL/Ldn)	Exterior Possibly Acceptable[2] (dBA CNEL/Ldn)	Exterior Normally Unacceptable[3] (dBA CNEL/Ldn)	Interior Acceptable[4] (dBA CNEL/Ldn except where noted)
Residential, single-family	Up to 60	61-70	71 and higher	45
Residential, multi-family	Up to 65	66-70	71 and higher	45
Residential, multi-family mixed-use	Up to 65	66-70	71 and higher	45
Transient lodging	Up to 65	66-70	71 and higher	45
Hospitals; nursing homes	Up to 60	61-70	71 and higher	45
Theaters; auditoriums; Music halls	Up to 60	61-70	71 and higher	35 dBA Leq[5]
Churches; meeting halls	Up to 60	61-70	71 and higher	40 dBA Leq[5]
Playgrounds; neighborhood parks	Up to 70	71-75	75 and higher	–
Schools; libraries; museums[6]	–	–	–	45 dBA Leq[5]
Offices[7]	–	–	–	45 dBA Leq[5]
Retail/commercial[7]	–	–	–	–
Industrial	–	–	–	–

[1] Normally acceptable means that land uses may be established in areas with the stated ambient noise level, absent any unique noise circumstances.

[2] Possibly acceptable means that land uses should be established in areas with the stated ambient noise level only when exterior areas are omitted from the Project or noise levels in exterior areas can be mitigated to the normally acceptable level.

[3] Normally unacceptable means that land uses should generally not be established in areas with the stated ambient noise level. If the benefits of the Project in addressing other Burbank2035 goals and policies outweigh concerns about noise, the use should be established only where exterior areas are omitted from the Project or where exterior areas are located and shielded from noise sources to mitigate noise to the maximum extent feasible.

[4] Interior acceptable means that the building must be constructed so that interior noise levels do not exceed the stated maximum, regardless of the exterior noise level. Stated maximums are as determined for a typical worst-case hour during periods of use.

[5] dBA Leq is as determine for a typical worst-case hour during periods of use.

[6] Within the Airport Influence Area, these uses are not acceptable above 65 dBA CNEL if subject to the City's discretionary review procedures.

[7] Within the Airport Influence Area, these uses may be acceptable up to 75 dBA CNEL following review for additional noise attenuation; in excess of 75 dBA CNEL these uses are not acceptable.

Source: Burbank2035 2013

When stationary noise is the primary noise source, the City applies a second set of hourly daytime and nighttime performance standards (expressed in Leq) that are designed to protect noise-sensitive land uses adjacent to stationary sources from excessive noise (Burbank2035 2013). Table 3 summarizes stationary-source noise standards for various land use types that represent acceptable noise levels at exterior spaces of the sensitive receptor.

Table 3 Maximum Allowable Noise Exposure – Stationary Sources

Noise Source	Noise Level Descriptor	Exterior Spaces[1] – Daytime (7 AM to 10 PM)	Exterior Spaces[1] – Nighttime (10 PM to 7 AM)
Typical	Hourly dBA Leq	55[2]	45[2]
Tonal, impulsive, repetitive, or consisting primarily of speech or music	Hourly dBA Leq	50[2]	40[2]
Any	dBA Lmax	75	65

[1] Where the location of exterior spaces (i.e., outdoor activity areas) is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use. Where it is not practical to mitigate exterior noise levels at patio or balconies of apartment complexes, a common area such as a pool or recreation area may be designated as the exterior space.

[2] The City may impose noise level standards that are more or less restrictive than those specified above based upon determination of existing low or high ambient noise levels.

Source: Burbank2035 2013

Furthermore, the following goals, objectives, and policies from the City's General Plan Noise Element are applicable to the Project (Burbank2035 2013):

Goal 1: Noise Compatible Land Uses

Burbank's diverse land use pattern is compatible with current and future noise levels.

Policy 1.1: Ensure the noise compatibility of land uses when making land use planning decisions.

Policy 1.2: Provide spatial buffers in new development projects to separate excessive noise generating uses from noise-sensitive uses.

Policy 1.3: Incorporate design and construction features into residential and mixed-use projects that shield residents from excessive noise.

Policy 1.4: Maintain acceptable noise levels at existing noise-sensitive land uses.

Policy 1.5: Reduce noise from activity centers located near residential areas, in cases where noise standards are exceeded.

Policy 1.6: Consult with movie studios and residences that experience noise from filming activities to maintain a livable environment.

Goal 2: Noise in Mixed-Use Development

Noise from commercial activity is reduced in residential portions of mixed-use projects.

Policy 2.1: Require the design and construction of buildings to minimize commercial noise within indoor areas of residential components of mixed-use projects.

Policy 2.2: Locate the residential portion of new mixed-use projects away from noise generating sources such as mechanical equipment, gathering places, loading bays, parking lots, driveways, and trash enclosures.

Goal 3: Vehicular Traffic Noise

Burbank's vehicular transportation network reduces noise levels affecting sensitive land uses.

Policy 3.1: Support noise-compatible land uses along existing and future roadways, highways, and freeways.

Policy 3.2: Encourage coordinated site planning and traffic management that minimizes traffic noise affecting noise-sensitive land uses.

Policy 3.3: Advocate the use of alternative transportation modes such as walking, bicycling, mass transit, and non-motorized vehicles to minimize traffic noise.

Policy 3.4: Install, maintain, and renovate freeway and highway right-of-way buffers and sound walls through continued work with the California Department of Transportation (Caltrans) and Los Angeles County Metropolitan Transportation Authority (MTA).

Policy 3.5: Monitor noise levels in residential neighborhoods and reduce traffic noise exposure through implementation of the neighborhood protection plans.

Policy 3.6: Prohibit heavy trucks from driving through residential neighborhoods.

Policy 3.7: Where feasible, employ noise-cancelling technologies such as rubberized asphalt, fronting homes to the roadway, or sound walls to reduce the effects of roadway noise on sensitive receptors.

Policy 3.8: Within the Airport Influence Area, seek to inform residential property owners of airport generated noise and any land use restrictions associated with high noise exposure. Mixed-use development contributes to a thriving community, but can place sensitive receptors adjacent to noisy businesses.

Goal 4: Train Noise

Burbank's train service network reduces noise levels affecting residential areas and noise-sensitive land uses.

Policy 4.1: Support noise-compatible land uses along rail corridors.

Policy 4.2: Require noise-reducing design features as part of transit-oriented, mixed-use development located near rail corridors.

Policy 4.3: Promote the use of design features, such as directional warning horns or strobe lights, at railroad crossings that reduce noise from train warnings.

Goal 5: Aircraft Noise

Burbank achieves compatibility between airport-generated noise and adjacent land uses and reduces aircraft noise effects on residential areas and noise-sensitive land uses.

Policy 5.1: Prohibit incompatible land uses within the airport noise impact area.

Policy 5.2: Work with regional, state, and federal agencies, including officials at Bob Hope Airport, to implement noise reduction measures and to monitor and reduce noise associated with aircraft.

Policy 5.3: Coordinate with the Federal Aviation Administration and Caltrans Division of Aeronautics regarding the siting and operation of heliports and helistops to minimize excessive helicopter noise.

Policy 5.4: Within the Airport Influence Area, seek to inform residential property owners of airport generated noise and any land use restrictions associated with high noise exposure.

Goal 6: Industrial Noise

Noise generated by industrial activities is reduced in residential areas and at noise-sensitive land uses.

Policy 6.1: Minimize excessive noise from industrial land uses through incorporation of site and building design features.

Policy 6.2: Require industrial land uses to locate vehicular traffic and operations away from adjacent residential areas.

Goal 7: Construction, Maintenance, and Nuisance Noise

Construction, maintenance, and nuisance noise is reduced in residential areas and at noise-sensitive land uses.

Policy 7.1: Avoid scheduling city maintenance and construction projects during evening, nighttime, and early morning hours.

Policy 7.2: Require project applicants and contractors to minimize noise in construction activities and maintenance operations.

Policy 7.3: Limit the allowable hours of construction activities and maintenance operations located adjacent to noise-sensitive land uses.

Policy 7.4: Limit the allowable hours of operation for and deliveries to commercial, mixed-use, and industrial uses located adjacent to residential areas.

Burbank Municipal Code

The City's noise standards, found in the City of Burbank Municipal Code (BMC), set forth hours of operation for certain activities and standards for determining when noise is deemed to be a disturbance.

Chapter 9-3-208 of the BMC prohibits the operation of any machinery, equipment, pump, fan, air conditioning apparatus, or similar mechanical device in such a manner as to cause the ambient noise level at an adjacent noise-sensitive property to be exceeded by more than five (5) dBA.

According to Chapter 9-3-213 of the BMC, no person shall use or operate any radio receiving set, musical instrument, phonograph, television set or other machine or device for the producing or reproducing of sound in such manner as to cause disturbance and cause the ambient noise level at an adjacent noise-sensitive property to be exceeded by more than five (5) dBA.

Similarly, according to Chapter 9-3-213.5 of the BMC, no person in a park (including public parking lots) or on a right of way adjacent to a park shall use or operate any radio receiving set, musical instrument, phonograph, television set or other machine or device for the producing or reproducing of sound or other sound amplification systems in such manner as to disturb the peace, quiet, and comfort of neighboring residents or any reasonable person of normal sensitiveness residing in the area.

The BMC also designates hours of construction applicable to all construction, alteration, movement, enlargement, replacement, repair, equipment, maintenance, removal and demolition work. Chapter 9-1-1-105.8 of the BMC prohibits construction activity between 7:00 PM and 7:00 AM Monday through Friday, between 5:00 PM and 8:00 AM on Saturdays, and at any time on Sundays or national holidays.

3 Impact Analysis

3.1 Methodology and Significance Thresholds

The following analysis of noise impacts considers the effects of both temporary construction-related activities and long-term operation of the Project, including increased vehicle trips. The analysis includes noise reduction features from the Environmental Noise Evaluation & Recommendations (2017) Report prepared by SSA Acoustics for the proposed Project.

Construction Noise

Temporary construction activity would expose adjacent noise-sensitive receptors to construction noise generated by the use of on-site construction equipment. Construction noise was estimated using the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM). The RCNM uses baseline noise levels, distances to receptors, shielding information, and construction equipment utilized to calculate the construction noise level from each piece of construction equipment and overall construction noise at each receptor. To calculate noise generated by each piece of equipment, the model uses equipment noise levels from a study done by the Environmental Protection Agency (EPA) and acoustical usage factors for equipment (i.e., the fraction of time each equipment is operating at full power) from the Empire State Electric Energy Research Corp. Guide (FHWA 2006).

Project construction noise levels were estimated using RCNM at nearby noise-sensitive receptors, including single-family residences located approximately 875 feet northwest of the Project site across the I-5, Burbank High School located approximately 1,320 feet (0.25 mile) northeast of the Project site, and single-family residences approximately 1,740 feet (0.33 mile) west of the site along West Burbank Boulevard. However, construction activity would not operate exclusively along the Project boundary of the site. Rather, stationary construction activity would occur at various locations on the Project site and mobile construction equipment would operate throughout the site. To provide an overall estimate of the average hourly construction noise levels, the construction noise analysis assumes that on-site construction activity would occur, on average, 50 feet from the Project site boundaries. Therefore, the modeled distances between construction activity and nearby noise-sensitive receptors are 925 feet for single-family residences across the I-5, 1,370 feet for Burbank High School, and 1,790 feet for single-family residences along West Burbank Boulevard.

The modeled construction equipment for each construction phase was based on the California Emissions Estimator Model (CalEEMod) Version 2016.3.2 equipment defaults for construction of the proposed mixed-use Project as analyzed in the Air Quality and Greenhouse Gas Study prepared by Rincon in September 2018 for the Project. CalEEMod uses project characteristics, such as land use, building sizes, and lot acreage, to estimate a project's emissions and uses default equipment lists in its modeling based on empirical data. The RCNM results and equipment list from CalEEMod are included in Appendix B. As discussed in Section 2.4, *Regulatory Setting*, Chapter 9-1-1-105.8 of the BMC or prohibits construction activity between 7:00 PM and 7:00 AM Monday through Friday, between 5:00 PM and 8:00 AM on Saturdays, and at any time on Sundays or national holidays. In addition, Chapter 9-3-208 of the BMC prohibits the operation of any machinery, equipment, pump, or similar mechanical device in such a manner as to cause the ambient noise level at an adjacent noise-sensitive property to be exceeded by more than 5 dBA. Therefore, noise generated by construction activity would be significant if it occurs outside the construction hours specified in the BMC and if it increases ambient noise levels at the property line of nearby sensitive receptors by more than 5 dBA. For the purpose of this analysis, the ambient noise levels for adjacent noise-sensitive receptors are the measured noise levels shown in Table 1. Based on noise measurements in Table 1, the ambient noise at single-family residences across I-5 is 70 dBA Leq, the ambient noise level at Burbank High School is 66.2 dBA Leq, and the ambient noise level at single-family residences along West Burbank Boulevard is 66.7 dBA Leq. Therefore, the proposed Project would generate a significant impact if construction noise levels exceed 75 dBA Leq at single-family residences across I-5, approximately 71 dBA Leq at Burbank High School, and approximately 72 dBA Leq at single-family residences along West Burbank Boulevard.

Groundborne Vibration

The primary sources of vibration associated with operation of the Project would include vehicle circulation on the Project site that would be similar to the existing vibration levels on surrounding roadways and the I-5. Therefore, Project operations would not substantially increase the existing vibration levels in the immediate vicinity of the Project site. Construction activities also have the potential to generate ground-borne vibration near sensitive receptors, especially from grading and excavation of the Project site. Therefore, this analysis focuses on vibration impacts from Project construction that were evaluated by identifying the highest potential vibration sources from construction equipment, estimating the vibration levels at the potentially affected receptors, and comparing vibration levels with applicable significance thresholds.

Construction vibration estimates are based upon vibration levels reported by the FTA in the Transit Noise and Vibration Impact Assessment (2018) with an assumed standard attenuation rate of 6 VdB per doubling of distance. Similar to the methodology for estimating construction noise levels at nearby sensitive receptors, vibration levels were estimated under the assumption that construction activities would occur on average 50 feet within the Project boundary. Therefore, the modeled distances between construction activity and nearby noise-sensitive receptors are 925 feet for single-family residences across the I-5, 1,370 feet for Burbank High School, and 1,790 feet for single-family residences along West Burbank Boulevard. However, this analysis also models vibration levels at the nearest off-site building to the Project site to determine the worst-case level of vibration impact regardless of noise-sensitivity. Based on the location of the Project site and surrounding uses, the nearest non-residential off-site building is located approximately 175 feet southwest of the site across North Front Street. Vibration calculations are included in Appendix C. Based on impact criteria described in the FTA *Transit Noise and Vibration Impact Assessment* (2018), residences and buildings where people normally sleep would be impacted by frequent vibration events if vibration velocity levels exceed 72 VdB. In addition, Project-generated vibration would result in a significant impact if it would exceed 100 VdB (i.e., the threshold for damage to fragile buildings), or 95 VdB (i.e., the threshold for damage to extremely fragile historic buildings).

On-site Operational Noise

On-site operational noise associated with the Project would include noise from delivery trucks; trash hauling trucks; heating, ventilation and air conditioning (HVAC) equipment; and public and private recreational spaces consisting of courtyards, residential balconies, sky terraces at both parking structure roof levels, and the transit plaza area. As discussed in Section 2.2, *Sensitive Receptors*, noise-sensitive receptors in the area include single-family residences located approximately 875 feet northwest of the Project site across the I-5, Burbank High School located approximately 1,320 feet northeast of the Project site, and single-family residences approximately 1,740 feet west of the site along West Burbank Boulevard.

According to Chapter 9-3-208 and Chapter 9-3-213 of the BMC, the City prohibits the operation of any on-site machinery, mechanical devices, or sound-producing devices in a manner that causes the ambient noise level at an adjacent noise-sensitive property to be exceeded by more than 5 dBA. Although the 5 dBA noise standard outlined in the BMC is specific to the use of on-site mechanical equipment and sound-producing devices, this standard was applied to noise associated with use of on-site public and private recreational to determine impacts associated with all sources of on-site operational noise. Therefore, noise generated by operation of the Project would be significant if it increases ambient noise levels at the property line of nearby sensitive receptors by more than 5 dBA. Similar to the methodology for determining construction noise impacts at nearby sensitive receptors, the Project would generate a significant impact if on-site operational noise levels exceed approximately 72 dBA Leq at single-family residences along West Burbank Boulevard, approximately 71 dBA Leq at Burbank High School, and 75 dBA Leq at single-family residences across I-5. Operational noise level estimates do not account for the presence of intervening structures, topography, and the existing noise environment, which would reduce or mask operational noise levels at receptor locations. Therefore, the noise levels presented herein represent a worst-case estimate of actual operational noise.

Off-site Roadway Noise

Operation of the Project would also generate off-site vehicle trips, thereby increasing traffic on area roadways. Noise levels associated with existing and future traffic along area roadways were estimated using the U.S. Department of Transportation Federal Highway Administration's (FHWA) Traffic Noise Model 2.5 (TNM2.5) (FHWA 2004) (traffic noise model data is provided in Appendix D). TNM 2.5 was used to estimate noise levels generated by traffic on area roadways under existing and future conditions, with and without Project-added traffic. The analysis of anticipated noise levels from traffic generated by the Project utilizes traffic volume data for area roadways from the *Traffic Impact Analysis* prepared for the Project by Fehr & Peers (F&P) in March 2019 (F&P 2019). According to the *Transportation Impact Analysis*, the average daily trips (ADT) generated by the Project would be 5,261; including 314 AM peak hour trips and 398 PM peak hour trips. Due to the Project area's proximity to the I-5, freeway noise was also incorporated into the model. Existing peak hour volumes for this segment of the I-5 were based on the latest traffic year peak hour volume data from the California Department of Transportation (Caltrans) Traffic Census Program (Caltrans 2016).

The results of the TNM analysis for existing traffic in the Project area were compared to measured noise levels to ensure the accuracy of the model in the Project vicinity, shown in Table 4. According to the Caltrans Technical Noise Supplement to the Traffic Noise Analysis Protocol, TNM 2.5 for Project involving existing roadways should always be validated for accuracy by comparing measured sound levels to modeled sound levels. If modeled sound levels do not match measured sound levels within 3 dBA, the model parameters should be reviewed and adjusted to ensure that they accurately represent actual site conditions (Caltrans 2013).

Table 4 Comparison of Measured and Modeled Noise Levels

Measurement Number	Measurement Location	Existing Noise Level (dBA, Leq)		Difference in Noise Level (2 minus 1)
		Measured Ambient Noise (1)	Modeled Traffic Noise (2)	
1	West Burbank Boulevard adjacent to single-family residences west of the Project site	66.7	68.9	+2.2
2	3rd Street adjacent to Burbank High School northeast of the Project site	66.2	69.2	+3.0

See Appendix A for noise measurement data sheets and Appendix D for model results.

Source: Rincon Consultants, field measurements on January 30, 2018 field using ANSI Type II Integrating sound level meter; TNM2.5, FHWA 2004.

As shown in Table 4, modeled noise is within 3 dBA of the measurement noise levels. According to Caltrans guidance for validating the TNM 2.5 model results, no adjustments are necessary since the modeled results are within 3 dBA of measured traffic noise. Therefore, the model is an appropriate tool for determining existing ambient traffic noise levels and future noise levels caused by Project-generated traffic.

The nearest noise-sensitive receptors were included in the model that consist of Burbank High School located approximately 0.25 mile northeast of the Project site along 3rd Street, and single-family residences approximately 1,740 (0.33 mile) west of the site along West Burbank Boulevard. The single-family residences located approximately 875 feet northwest of the Project site were not included because these residences are located across the I-5 (see Figure 3). Therefore, Project-generated trips would not be directly distributed at roadways within this residential neighborhood.

The City of Burbank has not adopted specific thresholds to assess off-site Project-related traffic noise impacts. Therefore, this analysis uses thresholds contained in the FTA *Transit Noise and Vibration Impact Assessment* (2018) as guidance to determine whether or not a change in traffic would result in a significant permanent increase in roadway noise. Using the FTA criteria, the significance threshold is based on the existing ambient noise level. Roadways with lower ambient noise levels have a higher noise level increase threshold, while roadways with a higher ambient noise level have a lower noise level increase threshold. Traffic-related noise increases would result in a significant impact if roadway noise would increase by more than the levels indicated in Table 5.

Table 5 Significance of Changes in Operational Roadway Noise Exposure

Existing Noise Exposure (Ldn or Leq in dBA)	Significant Noise Exposure Increase (Ldn or Leq in dBA)
45-50	7
50-55	5
55-60	3
60-65	2
65-75	1
75+	0

Source: FTA 2018

Exposure of New Sensitive Receptors to Ambient Noise

Although CEQA does not require analysis of potential impacts of the environment on the Project, the following impact analysis of the ambient noise environment on the Project is provided for informational purposes and for disclosure of existing noise conditions in the vicinity of the Project site.

At buildout, the Project would be a noise-sensitive receptor due to its outdoor recreational spaces, residential units, and hotel rooms. The Project would be exposed to motor vehicles noise from area roadways and the I-5, train operational noise from the adjacent Metrolink station and railroad line, and aircraft noise from overhead flights associated with the Hollywood Burbank Airport. However, according to the Burbank2035 General Plan Noise Element, the Project site is located outside of the airport influence area and 65 dBA CNEL noise contour (Burbank2035 2013). Therefore, the Project would not be exposed to significant noise from overhead flights associated with daily airport operations.4444 parks. These standards also establish maximum interior noise levels for new residential development, requiring that sufficient insulation be provided to reduce interior ambient noise levels to 45 dBA CNEL (Burbank2035 2013). Therefore, the Project would be exposed to significant noise if on-site noise levels exceed land use compatibility standards shown in Table 2.

3.2 Project Impacts and Recommended Measures

Construction Noise

Construction of the Project would generate temporary noise that would exceed existing ambient noise levels on the Project site. Construction noise levels during all phases of construction (i.e., site preparation, grading, building construction, paving, and architectural coating) were modeled using the FHWA RCNM and CalEEMod construction equipment defaults to estimate construction noise levels at the nearest noise-sensitive receptors. Assuming that on-site construction activity would occur, on average, 50 feet from the Project site boundaries, the modeled distances between construction activity and nearby noise-sensitive receptors are 925 feet for single-family residences across the I-5, 1,370 feet for Burbank High School, and 1,790 feet for single-family residences along West Burbank Boulevard. Table 6 shows the average expected noise levels (Leq) at the nearest sensitive receptors based on the combined construction equipment anticipated to be used concurrently during each phase of construction as modeled in RCNM.

Table 6 Construction Noise Levels by Phase

Construction Phase	Construction Equipment	Construction Noise Level (dBA, Leq) at Noise-Sensitive Receptors		
		925 Feet[1]	1,370 Feet[2]	1,790 Feet[3]
Site Preparation	Tractors (2), Loader, Backhoe, Dozers (3)	61	58	55
Grading	Excavator, Dozer, Grader, Tractor, Loader, Backhoe	61	57	55
Building Construction	Crane, Forklifts (3), Generator Set, Tractor, Loader, Backhoe, Welder	63	60	58
Paving	Pavers (2), Rollers (2), Paving Equipment (2)	61	58	55
Architectural Coating	Air Compressor	48	45	43
Threshold[4]		**75**	**71**	**72**
Threshold Exceeded?		**No**	**No**	**No**

See Appendix B for RCNM results and CalEEMod equipment list.

[1] Modeled distance for single-family residences northwest of the Project site across the I-5.

[2] Modeled distance for Burbank High School located northeast of the Project site along 3rd Street.

[3] Modeled distance for single-family residences west of the Project site along West Burbank Boulevard.

[4] According to Chapter 9-3-208 of the BMC, noise generated by construction activity would be significant if it increases ambient noise levels at the property line of nearby sensitive receptors by more than 5 dBA.

Source: FTA 2018

As shown in Table 6, operation of equipment during various phases of construction could generate noise levels up to 63 dBA Leq at single-family residences northwest of the Project site across the I-5, 60 dBA Leq at Burbank High School northeast of the Project site, and 58 dBA Leq at single-family residences west of the Project site. Construction noise level estimates do not account for the presence of intervening structures or topography that could reduce noise levels at receptor locations. Therefore, the noise levels presented herein represent a worst-case estimate of actual construction noise.

According to Chapter 9-1-1-105.8 of the BMC, construction activity is prohibited in the City between the hours of 7:00 PM and 7:00 AM Monday through Friday, between the hours of 5:00 PM and 8:00 AM on Saturdays, and at any time on Sundays or national holidays. Compliance with the City's defined hours of construction would ensure that adjacent noise-sensitive residential receptors are not disturbed during nighttime sleep hours. As discussed in Section 3.1, *Methodology and Significance Thresholds*, the Project would generate a significant impact if construction noise levels exceed 75 dBA Leq at single-family residences across I-5, approximately 71 dBA Leq at Burbank High School, and approximately 72 dBA Leq at single-family residences along West Burbank Boulevard. As shown in Table 6, Project-generated construction noise levels would be lower than the identified construction noise thresholds based on Chapter 9-3-208 of the BMC. Therefore, temporary construction noise impacts would be less than significant.

Groundborne Vibration

Temporary construction activity associated with the Project would also create ground-borne vibration. Buildings in the vicinity of a construction site respond to vibration to varying degrees ranging from imperceptible effects at the lowest levels, to low rumbling sounds and perceptible vibrations at moderate levels, and up to minor damage at the highest vibrations levels. Similar to the construction noise analysis, the modeled distances between construction activity and nearby noise-sensitive receptors are 925 feet for single-family residences across the I-5, 1,370 feet for Burbank High School, and 1,790 feet for single-family residences along West Burbank Boulevard. As discussed under *Methodology and Significance Thresholds*, this analysis also models vibration levels at the nearest non-residential off-site building to the Project site to determine the worst-case level of vibration impact regardless of noise-sensitivity. Based on the location of the Project site and surrounding uses, the nearest off-site building is located approximately 175 feet southwest of the site across North Front Street.

To determine vibration impacts during Project construction, vibration levels were calculated at the nearest receptors using the PPV of the highest impact pieces of equipment that would be used during Project construction (see Appendix C for vibration calculations), which would be loading trucks, dozers, and rollers. Table 7 shows the estimated groundborne vibration levels from these pieces of equipment at various distances associated with the nearby receptors.

Table 7 Groundborne Vibration Levels by Equipment

		Vibration Level (VdB) at Noise-Sensitive Receptors		
Equipment	**175 Feet[1]**	**925 Feet [2]**	**1,370 Feet[3]**	**1,790 Feet[4]**
Loading Truck	60	39	33	30
Dozer	62	40	35	31
Roller	69	47	42	39

See Appendix C for vibration calculations.

[1] Modeled distance for industrial building southwest of the Project site across North Front Street.

[2] Modeled distance for single-family residences northwest of the Project site across the I-5.

[3] Modeled distance for Burbank High School located northeast of the Project site along 3rd Street.

[4] Modeled distance for single-family residences west of the Project site along West Burbank Boulevard.

Source: FTA 2018

Operation of a loaded truck, dozer, and roller would generate peak vibration levels up to 47 VdB at the nearest noise-sensitive receptor. As discussed in the construction noise analysis, compliance with the City's permitted hours of construction outlined in Chapter 9-1-1-105.8 of the BMC would ensure that adjacent noise-sensitive residential receptors are not disturbed by construction vibration during nighttime sleep hours. Furthermore, vibration levels would not exceed the FTA's vibration impact criterion of 72 VdB for residences or buildings where people normally sleep. In addition, construction vibration would not reach 100 VdB (i.e., the threshold for damage to fragile buildings) or 95 VdB (i.e., the threshold for damage to extremely fragile historic buildings) (FTA 2018). Therefore, construction vibration impacts would be temporary and less than significant.

On-site Operational Noise

The Project would introduce a new residential/retail mixed-use development with an open space plaza area. On-site operational noise associated with the Project would include noise from delivery trucks; trash hauling trucks; heating, ventilation and air conditioning (HVAC) equipment; and public and private recreational spaces consisting of courtyards, residential balconies, sky terraces at both parking structure roof levels, and the publically accessible plaza area. Because the parking activities would be enclosed within parking structures and subterranean parking, noise from on-site vehicle circulation and parking activities (i.e., tire squeals, alarms, and engine start-ups) would not be a significant source of on-site operational noise that would be audible to off-site receivers.

Due to the distances between the Project and the nearest noise-sensitive receptors as well as the existing noise environment (i.e., vehicles along North Front Street, West Burbank Boulevard, and I-5), it is not anticipated that adjacent noise-sensitive receptors would be subject to substantial or perceptible noise associated with operation of the Project. Nonetheless, each source of on-site operational noise is analyzed at the nearest noise-sensitive receptor for a conservative estimate of the Project's operational noise impacts. As discussed in Section 3.1, *Methodology and Significance Thresholds*, the Project would generate a significant impact if on-site operational noise levels exceed approximately 72 dBA Leq at single-family residences along West Burbank Boulevard, approximately 71 dBA Leq at Burbank High School, and 75 dBA Leq at single-family residences across I-5.

Delivery and Trash Trucks

The Project would require periodic delivery and trash hauling services that would use available areas for loading and unloading activities, generating noise throughout the Project site. Based on the site plan shown in Figure 2, delivery and trash trucks would access the Project site through North Front Street. The average noise level for a single idling truck is generally 70 dBA at a distance of 25 feet (Salter 2017). At the nearest distance to noise-sensitive receptors, delivery and trash trucks would be operating approximately 875 feet from single-family residences northwest of the Project site. At this distance, and based on an attenuation rate of 6 dBA per doubling of distance, truck noise would be approximately 39 dBA at the nearest noise-sensitive receptor. Operational truck noise would not generate noise levels in excess of the applicable threshold of 75 dBA at single-family residences to the northwest. In addition, the Project site is located in a developed urban area and is surrounded by industrial and commercial uses. Therefore, delivery and trash trucks are already a common occurrence in the vicinity of the Project site. Operational noise impacts associated delivery and trash trucks would be less than significant.

Commercial HVAC Equipment

Operation of mechanical equipment at the Project site would include HVAC equipment associated with the proposed mixed-use development. Commercial ventilation and air conditioning equipment typically has noise shielding cabinets, is placed on the roof or within mechanical equipment rooms, and is not usually a significant source of noise. Noise from rooftop-mounted HVAC equipment at commercial centers ranges from 60 to 70 dBA Leq at 15 feet from the source (Illingworth & Rodkin 2009). Based on the Project site plan (see Figure 2), the majority of the Project site would be developed with occupiable buildings that would likely include rooftop-mounted HVAC equipment. Therefore, at the nearest distance to noise-sensitive receptors, HVAC equipment would be operating approximately 875 feet from single-family residences northwest of the Project site. At this distance, and based on an attenuation rate of 6 dBA per doubling of distance, on-site HVAC equipment would generate noise levels up to 35 dBA Leq at the nearest noise-sensitive receptor. Operational HVAC equipment noise would not generate noise levels in excess of 75 dBA at single-family residences to the northwest. Because the Project site is located in a developed urban area and is surrounded by industrial and commercial uses, HVAC equipment is an existing noise source in the Project area. Operational noise impacts associated with HVAC equipment would be less than significant.

On-site Recreational Spaces

Other on-site operational noise would involve use of outdoor recreational spaces, particularly courtyards, residential balconies, sky terraces at both parking structure roof levels, and the open space plaza area. Because the proposed residential balconies would only have the capacity for a few people at a time, noise from on-site balconies (i.e., human conversation) would not be a significant source of on-site operational noise. For the purpose of this analysis, noise associated with the operation of on-site courtyards, sky terraces, and the transit plaza area was analyzed using a reference noise level for a park. According to a noise measurement taken by Rincon on April 9, 2017 near gathering areas at a local park, recreation noise was measured at 58.6 dBA Leq at 25 feet from the source (Rincon 2017). Based on the Project site plan (see Figure 2), the proposed sky terrace at the roof of the center parking structure would be located approximately 1,350 feet (0.25 mile) from Burbank High School that is located northeast of the Project site. At this distance, use of on-site recreational spaces would not generate noise levels in excess of 71 dBA at Burbank High School to the northeast. Operational noise impacts associated with on-site recreational spaces would be less than significant.

Off-site Roadway Noise

The Project would generate new vehicle trips and increase off-site traffic volumes on area roadways. Traffic generated by the Project was estimated by the *Transportation Impact Analysis* prepared for the Project by the F&P. Table 8 compares measured and modeled noise levels at the nearest off-site noise sensitive receptors that would be exposed to an increase in traffic volumes associated with the Project.

Project-generated vehicle traffic would result in a significant increase roadway noise levels if the noise increase would exceed the roadway noise increase thresholds shown in Table 5. Table 8 shows the increase in sound levels due to the Project-generated traffic under the existing and existing plus project scenario.

Table 8 Comparison of Existing and Plus Project Traffic Noise Levels on Local Roadways

Noise-Sensitive Receptor, Location	Existing Noise Level (dBA, Leq)	Existing Plus Project Noise Level (dBA, Leq)	Project Change	Significance Threshold	Significant?
Single-Family Residences, Burbank Boulevard	68.9	69.2	+0.3	1	No
Burbank High School (Classroom building), 3rd Street	69.2	69.7	+0.5	1	No
Burbank High School (Recreational uses), 3rd Street	68.7	69.1	+0.4	1	No

See Appendix D for noise model results.

Source: TNM2.5, FHWA 2004.

As shown in Table 8, the greatest estimated traffic noise increase caused by Project-generated traffic would be 0.5 dBA along 3rd Street. Other roadways in the vicinity of the Project would also experience an increase in traffic; however, the increase would not exceed the applicable significance thresholds for any of the evaluated roadways. Therefore, Project-generated traffic noise would not have a significant impact on noise-sensitive receptors in the vicinity of the Project site under the existing and existing plus project scenario.

Table 9 shows the Project's contribution to a cumulative increase in existing traffic noise levels for the year 2022. The Project would increase future traffic-related noise by up to 0.1 dBA at noise-sensitive residential receptors along West Burbank Boulevard that would not exceed applicable thresholds. Therefore, the Project would not have a significant contribution to cumulative traffic noise impacts.

Table 9 Comparison of Future and Plus Project Traffic Noise on Local Roadways

Noise-Sensitive Receptor, Location	Noise Level (dBA CNEL)			Cumulative Change in Noise Level [3] – [1]	Project Change [3] – [2]	Significance Threshold[1]	Significant?
	Existing [1]	Future [2]	Future Plus Project [3]				
Single-Family Residences, West Burbank Boulevard	68.9	69.4	69.5	+0.6	+0.1	1	No
Burbank High School (Classroom building), 3rd Street	69.2	69.9	69.9	+0.7	+0.0	1	No
Burbank High School (Recreational uses), 3rd Street	68.7	69.3	69.3	+0.6	+0.0	1	No

See Appendix D for noise model results.

Source: TNM2.5, FHWA 2004

Exposure of New Sensitive Receptors to Ambient Noise

As discussed in Section 3.1, *Methodology and Significance Thresholds*, CEQA does not require analysis of potential impacts of the environment on the Project. Therefore, the following impact analysis of the ambient noise environment on the project is provided for informational purposes and for disclosure of existing noise conditions in the vicinity of the Project site.

The Project would include residences, open space areas, and a hotel that would be considered new noise-sensitive receptors on the Project site. Based on two 24-hour noise measurements conducted by SSA Acoustics at the Project site, the ambient daily noise level at future uses with direct exposure to Front Street and the I-5 would be 76 dBA Ldn and 81 dBA Ldn, respectively (SSA Acoustics 2017). According to the City's standards shown in Table 2, ambient noise up to 65 dBA Ldn is normally acceptable for mixed-use multi-family residential development and transient lodging land uses, while ambient noise up to 70 dBA Ldn is normally acceptable for neighborhood parks. Based on a noise exposure level up to 81 dBA Ldn, the Project would be exposed to normally unacceptable noise levels, except where exterior areas are located and shielded from noise sources to mitigate nose to the maximum extent feasible. Furthermore, as discussed in Section 2.1, the manner in which homes in California are constructed generally provides a reduction of exterior-to-interior noise levels of approximately 20 to 25 dBA with closed windows (FTA 2018). Therefore, based on an exterior noise exposure level up to 81 dBA Ldn, interior noise levels at residential units and hotel rooms would be up to 61 dBA Ldn, which would exceed the City's standard of 45 dBA Ldn for interior noise. Therefore, the Project would require implementation of noise-reducing measures to reduce ambient noise at outdoor recreational spaces (i.e., residential and hotel balconies, open space public plaza) and exterior noise at interior spaces to acceptable levels per the City's standards.

3.3 Project Recommendations and Conclusions

As concluded in Section 3.2, *Impact Analysis*, the Project would not generate temporary construction noise and vibration impacts associated with Project construction, or long-term operational impacts associated with on-site noise sources or Project-generated traffic. However, based on the noise exposure levels at the Project site, the Project would be exposed to exterior and interior noise levels in excess of the City's standards. Therefore, Project design measures were recommended by SSA Acoustics in their Environmental Noise Evaluation & Recommendations Report (2017) to reduce exterior noise at proposed outdoor residential uses (i.e., balconies) to 65 dBA CNEL, to reduce exterior noise at the proposed transit plaza to 70 dBA CNEL, and reduce interior noise in habitable rooms to an acceptable level of 45 dBA CNEL. The following recommended measures were incorporated from SSA Acoustics' Environmental Noise Evaluation & Recommendations Report (2017) and expanded upon to ensure that noise levels at the Project site are reduced to levels consistent with the City's standards.

Recommended Measures

Cooling and Ventilation

- A cooling and ventilation system with an outdoor condensing unit and an interior ceiling-installed or wall-mounted fan coil unit shall be incorporated into the Project to allow tenants the option of climate control without opening windows.
- Sound barriers at least six feet high shall be placed around the outdoor condensing unit on the rooftop terrace.

Walls, Windows, and Balcony Doors

The following building materials shall be incorporated into the Project:

- Walls: 6-inch wood stud wall with two layers of 5/8" gypsum wallboard (GWB) in the interior, ½" plywood and 5/8" GWB on exterior and 6-inch glass fiber insulation in the cavity
- Windows and Sliding Glass Doors: ¼"-glass – ½" airspaces – ¼" glass (STC 35); windows and sliding glass doors shall be mounted in low air infiltration rated frames.
- Exterior Door: solid core door with ½" glass insert with perimeter weather stripping and threshold seals.

Outside Air Vents

The following design features shall be incorporated into the Project's exterior air vents:

- Ducted outside air path from rooftop or façade, to provide outside air to residential units without creating a direct entry path for ambient sound
- Minimum of 7 feet of ducting with 1-inch thick duct liner
- Minimum of 1 elbow between outside inlet and interior vent

- All roof and attic vents shall be boxed or provided with baffling.

Sound Wall

- The developer shall construct a Sound Wall located on either California Department of Transportation (Caltrans) right-of-way or on the Project site and City right-of-way adjacent to southbound Interstate 5. The northern limits of the Sound Wall shall be a point where the on-ramp to the southbound Interstate 5 is ten (10) feet above the finished grade of the mainline of Interstate 5, and the southern limit shall be a point where the Magnolia Boulevard Bridge intersects with the Caltrans right-of-way boundary.
- The Sound Wall shall be built consistent with the California Department of Transportation's "Sound Wall 1584" specifications and shall be a minimum of overall height of not less than ten (10) feet. The final design and construction of the Sound Wall is subject to review and approval by Caltrans (if located on State right right-of-way). If Caltrans does not approve the proposed Sound Wall to be placed on State right-of-way, then the developer shall construct the sound wall on private property and the adjacent City owned property with the final design of the Sound Wall being reviewed and approved by Community Development Department.

Deck Level Plexiglass Barriers

- The three outdoor decks which face the I-5 to the north shall include plexiglass noise barriers to deflect freeway noise. Specifically, the two lower decks shall include 8' plexiglass barriers and the upper deck shall include a 6' plexiglass barrier to maintain outdoor air flow and views while minimizing freeway noise. Figure 4 shows a rendering of the proposed plexiglass barrier on the outdoor deck.

Figure 4 Deck Level Plexiglass Barrier

Acoustic-Designed Public Plaza

- Acoustical shaping shall be incorporated into the design of the public plaza to deflect or absorb freeway noise thereby creating an artificially quiet community area directly adjacent to the freeway. The plaza shall be set at a lower elevation from the freeway, reducing the amount of sound that initially reaches the plaza in conjunction with the Sound Wall recommendation above. Figure 5 shows an example of an acoustic-designed open space area.

Figure 5 Acoustic-Designed Open Space Area

Hours of Operation and Maintenance

- Hours of operation for the commercial tenant spaces shall be limited to between 6:00 a.m. and 12:00 a.m. (midnight). Late night businesses and/or operations (including deliveries) shall be prohibited, unless otherwise approved in accordance with the BMC. The owner/operator of the Project shall be responsible for providing a written notice to all residents that they are located in a mixed-use development adjacent to retail and commercial land uses, and the residents could be affected by noise from adjacent uses.
- No exterior maintenance of the premises, including but not limited to lot sweeping and cleaning, landscaping and gardening, or washing of sidewalks shall be conducted on the premises before 7:00 a.m. or after 10:00 p.m. Monday through Saturday or before 9:00 a.m. or after 8:00 p.m. on Sunday.
- Any noise resulting from the operation of the business or conduct of the patrons, including the playing of musical instruments, whether live or mechanical, singing or other vocal sounds shall be kept at a level so as not to cause any disturbances or nuisances which would be detrimental to other properties in the area or to the welfare of the occupants thereof.

4 References

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Appendix A

Noise Measurement Data

- Freq Weight : A
- Time Weight : FAST
- Level Range : 40-100
- Max dB : 80.3 - 2018/01/30 17:08:58
- Level Range : 40-100
- SEL : 94.4
- Leq : 66.7
-

No.s	Date Time	(dB)
1	2018/01/30 17:07:55	57.0
2	2018/01/30 17:07:56	58.3
3	2018/01/30 17:07:57	59.0
4	2018/01/30 17:07:58	60.7
5	2018/01/30 17:07:59	64.1
6	2018/01/30 17:08:00	68.4
7	2018/01/30 17:08:01	68.7
8	2018/01/30 17:08:02	66.9
9	2018/01/30 17:08:03	70.9
10	2018/01/30 17:08:04	71.3
11	2018/01/30 17:08:05	69.7
12	2018/01/30 17:08:06	71.7
13	2018/01/30 17:08:07	71.5
14	2018/01/30 17:08:08	71.5
15	2018/01/30 17:08:09	70.1
16	2018/01/30 17:08:10	68.4
17	2018/01/30 17:08:11	70.6
18	2018/01/30 17:08:12	68.7
19	2018/01/30 17:08:13	67.5
20	2018/01/30 17:08:14	67.8
21	2018/01/30 17:08:15	67.8
22	2018/01/30 17:08:16	68.8
23	2018/01/30 17:08:17	68.2
24	2018/01/30 17:08:18	68.5
25	2018/01/30 17:08:19	69.3
26	2018/01/30 17:08:20	74.1
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466	2018/01/30	17:15:40	71.8
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478	2018/01/30	17:15:52	71.1
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596	2018/01/30	17:17:50	69.0
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599	2018/01/30	17:17:53	60.9
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- Freq Weight : A
- Time Weight : FAST
- Level Range : 40-100
- Max dB : 80.0 - 2018/01/30 17:40:04
- Level Range : 40-100
- SEL : 93.9
- Leq : 66.2
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3	2018/01/30 17:32:32	62.2
4	2018/01/30 17:32:33	59.3
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6	2018/01/30 17:32:35	58.9
7	2018/01/30 17:32:36	59.0
8	2018/01/30 17:32:37	63.1
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14	2018/01/30 17:32:43	68.9
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16	2018/01/30 17:32:45	63.0
17	2018/01/30 17:32:46	59.6
18	2018/01/30 17:32:47	58.7
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23	2018/01/30 17:32:52	56.8
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25	2018/01/30 17:32:54	56.4
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27	2018/01/30 17:32:56	64.2
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30	2018/01/30 17:32:59	67.0
31	2018/01/30 17:33:00	65.7
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287	2018/01/30	17:37:16	65.0
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289	2018/01/30	17:37:18	65.6
290	2018/01/30	17:37:19	65.0
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293	2018/01/30	17:37:22	66.5
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295	2018/01/30	17:37:24	65.6
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302	2018/01/30	17:37:31	69.3
303	2018/01/30	17:37:32	71.3
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317	2018/01/30	17:37:46	60.1
318	2018/01/30	17:37:47	55.7
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325	2018/01/30	17:37:54	70.0
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377	2018/01/30	17:38:46	66.1
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386	2018/01/30	17:38:55	69.4
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453	2018/01/30	17:40:02	71.5
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466	2018/01/30	17:40:15	63.2
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470	2018/01/30	17:40:19	60.7
471	2018/01/30	17:40:20	59.6
472	2018/01/30	17:40:21	60.0
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491	2018/01/30	17:40:40	70.9
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494	2018/01/30	17:40:43	70.1
495	2018/01/30	17:40:44	75.6
496	2018/01/30	17:40:45	70.5
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498	2018/01/30	17:40:47	67.5
499	2018/01/30	17:40:48	67.0
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503	2018/01/30	17:40:52	72.5
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511	2018/01/30	17:41:00	56.2
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526	2018/01/30	17:41:15	60.8
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531	2018/01/30	17:41:20	63.6
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543	2018/01/30	17:41:32	63.4
544	2018/01/30	17:41:33	59.9
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552	2018/01/30	17:41:41	70.0
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554	2018/01/30	17:41:43	68.3
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556	2018/01/30	17:41:45	66.6
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565	2018/01/30	17:41:54	65.2
566	2018/01/30	17:41:55	67.5
567	2018/01/30	17:41:56	68.2
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569	2018/01/30	17:41:58	68.9
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571	2018/01/30	17:42:00	71.6
572	2018/01/30	17:42:01	70.4
573	2018/01/30	17:42:02	70.3
574	2018/01/30	17:42:03	66.7
575	2018/01/30	17:42:04	65.7
576	2018/01/30	17:42:05	65.7
577	2018/01/30	17:42:06	70.4
578	2018/01/30	17:42:07	76.5
579	2018/01/30	17:42:08	75.7
580	2018/01/30	17:42:09	71.6

581	2018/01/30	17:42:10	66.1
582	2018/01/30	17:42:11	63.4
583	2018/01/30	17:42:12	62.4
584	2018/01/30	17:42:13	63.9
585	2018/01/30	17:42:14	63.9
586	2018/01/30	17:42:15	63.5
587	2018/01/30	17:42:16	61.8
588	2018/01/30	17:42:17	61.2
589	2018/01/30	17:42:18	62.0
590	2018/01/30	17:42:19	65.1
591	2018/01/30	17:42:20	67.7
592	2018/01/30	17:42:21	64.4
593	2018/01/30	17:42:22	63.0
594	2018/01/30	17:42:23	61.8
595	2018/01/30	17:42:24	62.9
596	2018/01/30	17:42:25	65.3
597	2018/01/30	17:42:26	67.0
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599	2018/01/30	17:42:28	71.2
600	2018/01/30	17:42:29	72.6

- Freq Weight : A
- Time Weight : FAST
- Level Range : 40-100
- Max dB : 86.3 - 2018/01/30 18:06:13
- Level Range : 40-100
- SEL : 97.7
- Leq : 70.0
-

No.s	Date Time	(dB)
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2	2018/01/30 17:57:22	71.0
3	2018/01/30 17:57:23	70.7
4	2018/01/30 17:57:24	70.8
5	2018/01/30 17:57:25	69.9
6	2018/01/30 17:57:26	70.2
7	2018/01/30 17:57:27	71.0
8	2018/01/30 17:57:28	70.5
9	2018/01/30 17:57:29	70.3
10	2018/01/30 17:57:30	70.7
11	2018/01/30 17:57:31	72.2
12	2018/01/30 17:57:32	70.4
13	2018/01/30 17:57:33	69.7
14	2018/01/30 17:57:34	70.9
15	2018/01/30 17:57:35	71.2
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17	2018/01/30 17:57:37	71.7
18	2018/01/30 17:57:38	73.9
19	2018/01/30 17:57:39	71.9
20	2018/01/30 17:57:40	69.8
21	2018/01/30 17:57:41	69.5
22	2018/01/30 17:57:42	70.5
23	2018/01/30 17:57:43	69.6
24	2018/01/30 17:57:44	71.1
25	2018/01/30 17:57:45	70.3
26	2018/01/30 17:57:46	70.7
27	2018/01/30 17:57:47	70.1
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32	2018/01/30 17:57:52	70.3
33	2018/01/30 17:57:53	70.9
34	2018/01/30 17:57:54	71.3
35	2018/01/30 17:57:55	72.1
36	2018/01/30 17:57:56	71.6
37	2018/01/30 17:57:57	71.0
38	2018/01/30 17:57:58	71.1
39	2018/01/30 17:57:59	71.0
40	2018/01/30 17:58:00	71.9
41	2018/01/30 17:58:01	71.3
42	2018/01/30 17:58:02	70.0
43	2018/01/30 17:58:03	71.1
44	2018/01/30 17:58:04	70.7
45	2018/01/30 17:58:05	70.9
46	2018/01/30 17:58:06	70.8
47	2018/01/30 17:58:07	70.4
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53	2018/01/30 17:58:13	70.3
54	2018/01/30 17:58:14	70.4
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56	2018/01/30 17:58:16	69.7
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60	2018/01/30 17:58:20	71.9
61	2018/01/30 17:58:21	72.0
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68	2018/01/30 17:58:28	69.4
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99	2018/01/30 17:58:59	71.0
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101	2018/01/30 17:59:01	71.6
102	2018/01/30 17:59:02	70.2
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561	2018/01/30	18:06:41	70.3
562	2018/01/30	18:06:42	70.1
563	2018/01/30	18:06:43	70.4
564	2018/01/30	18:06:44	70.5
565	2018/01/30	18:06:45	69.9
566	2018/01/30	18:06:46	70.2
567	2018/01/30	18:06:47	70.6
568	2018/01/30	18:06:48	70.8
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594	2018/01/30	18:07:14	69.5
595	2018/01/30	18:07:15	69.1
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597	2018/01/30	18:07:17	69.5
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599	2018/01/30	18:07:19	69.5
600	2018/01/30	18:07:20	69.3

- Freq Weight : A
- Time Weight : FAST
- Level Range : 40-100
- Max dB : 83.1 - 2018/01/30 18:23:18
- Level Range : 40-100
- SEL : 97.2
- Leq : 69.5
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3	2018/01/30 18:21:26	67.3
4	2018/01/30 18:21:27	68.9
5	2018/01/30 18:21:28	68.2
6	2018/01/30 18:21:29	68.9
7	2018/01/30 18:21:30	67.4
8	2018/01/30 18:21:31	66.2
9	2018/01/30 18:21:32	67.5
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39	2018/01/30 18:22:02	67.3
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43	2018/01/30 18:22:06	66.9
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395	2018/01/30	18:27:58	65.9
396	2018/01/30	18:27:59	64.6
397	2018/01/30	18:28:00	64.0
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399	2018/01/30	18:28:02	63.7
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401	2018/01/30	18:28:04	63.3
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425	2018/01/30	18:28:28	70.2
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429	2018/01/30	18:28:32	72.4
430	2018/01/30	18:28:33	71.4
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432	2018/01/30	18:28:35	67.2
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443	2018/01/30	18:28:46	61.9
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446	2018/01/30	18:28:49	62.1
447	2018/01/30	18:28:50	62.4
448	2018/01/30	18:28:51	62.1
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450	2018/01/30	18:28:53	62.4
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465	2018/01/30	18:29:08	62.4
466	2018/01/30	18:29:09	62.3
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469	2018/01/30	18:29:12	61.5
470	2018/01/30	18:29:13	60.6
471	2018/01/30	18:29:14	61.0
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487	2018/01/30	18:29:30	61.7
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491	2018/01/30	18:29:34	61.0
492	2018/01/30	18:29:35	62.0
493	2018/01/30	18:29:36	62.9
494	2018/01/30	18:29:37	63.9
495	2018/01/30	18:29:38	65.0
496	2018/01/30	18:29:39	68.3
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501	2018/01/30	18:29:44	68.7
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510	2018/01/30	18:29:53	71.4
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521	2018/01/30	18:30:04	64.7
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534	2018/01/30	18:30:17	60.8
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543	2018/01/30	18:30:26	60.1
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545	2018/01/30	18:30:28	61.6
546	2018/01/30	18:30:29	60.9
547	2018/01/30	18:30:30	60.8
548	2018/01/30	18:30:31	61.3
549	2018/01/30	18:30:32	61.2
550	2018/01/30	18:30:33	61.6
551	2018/01/30	18:30:34	62.4
552	2018/01/30	18:30:35	63.3
553	2018/01/30	18:30:36	64.9
554	2018/01/30	18:30:37	70.5
555	2018/01/30	18:30:38	75.3
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557	2018/01/30	18:30:40	72.4
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560	2018/01/30	18:30:43	77.3
561	2018/01/30	18:30:44	73.9
562	2018/01/30	18:30:45	69.5
563	2018/01/30	18:30:46	68.0
564	2018/01/30	18:30:47	67.8
565	2018/01/30	18:30:48	66.5
566	2018/01/30	18:30:49	63.1
567	2018/01/30	18:30:50	62.3
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571	2018/01/30	18:30:54	62.9
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573	2018/01/30	18:30:56	65.0
574	2018/01/30	18:30:57	66.4
575	2018/01/30	18:30:58	63.0
576	2018/01/30	18:30:59	61.8
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579	2018/01/30	18:31:02	63.5
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582	2018/01/30 18:31:05	62.6
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590	2018/01/30 18:31:13	61.3
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592	2018/01/30 18:31:15	61.7
593	2018/01/30 18:31:16	62.5
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- Freq Weight : A
- Time Weight : FAST
- Level Range : 40-100
- Max dB : 73.3 - 2018/01/30 18:41:49
- Level Range : 40-100
- SEL : 94.6
- Leq : 66.9
-

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3	2018/01/30 18:37:21	68.1
4	2018/01/30 18:37:22	68.0
5	2018/01/30 18:37:23	67.2
6	2018/01/30 18:37:24	67.5
7	2018/01/30 18:37:25	68.4
8	2018/01/30 18:37:26	68.1
9	2018/01/30 18:37:27	67.9
10	2018/01/30 18:37:28	68.4
11	2018/01/30 18:37:29	68.1
12	2018/01/30 18:37:30	67.7
13	2018/01/30 18:37:31	66.3
14	2018/01/30 18:37:32	66.7
15	2018/01/30 18:37:33	66.1
16	2018/01/30 18:37:34	66.4
17	2018/01/30 18:37:35	66.2
18	2018/01/30 18:37:36	67.7
19	2018/01/30 18:37:37	68.9
20	2018/01/30 18:37:38	67.7
21	2018/01/30 18:37:39	67.5
22	2018/01/30 18:37:40	68.4
23	2018/01/30 18:37:41	68.6
24	2018/01/30 18:37:42	67.6
25	2018/01/30 18:37:43	68.1
26	2018/01/30 18:37:44	69.7
27	2018/01/30 18:37:45	69.8
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37	2018/01/30 18:37:55	65.9
38	2018/01/30 18:37:56	64.7
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40	2018/01/30 18:37:58	65.1
41	2018/01/30 18:37:59	65.6
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44	2018/01/30 18:38:02	65.2
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229	2018/01/30	18:41:07	65.2
230	2018/01/30	18:41:08	65.8
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232	2018/01/30	18:41:10	66.0
233	2018/01/30	18:41:11	65.8
234	2018/01/30	18:41:12	66.1
235	2018/01/30	18:41:13	66.8
236	2018/01/30	18:41:14	65.7
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254	2018/01/30	18:41:32	66.3
255	2018/01/30	18:41:33	66.9
256	2018/01/30	18:41:34	66.0
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274	2018/01/30	18:41:52	67.6
275	2018/01/30	18:41:53	68.2
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277	2018/01/30	18:41:55	66.8
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279	2018/01/30	18:41:57	68.5
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282	2018/01/30	18:42:00	67.0
283	2018/01/30	18:42:01	70.1

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285	2018/01/30 18:42:03	66.9
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289	2018/01/30 18:42:07	67.9
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358	2018/01/30 18:43:16	72.4
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363	2018/01/30 18:43:21	66.2
364	2018/01/30 18:43:22	65.9
365	2018/01/30 18:43:23	67.9
366	2018/01/30 18:43:24	65.9
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374	2018/01/30 18:43:32	67.1
375	2018/01/30 18:43:33	66.8
376	2018/01/30 18:43:34	68.0
377	2018/01/30 18:43:35	69.4
378	2018/01/30 18:43:36	67.9
379	2018/01/30 18:43:37	67.9
380	2018/01/30 18:43:38	68.6
381	2018/01/30 18:43:39	68.2
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424	2018/01/30	18:44:22	67.9
425	2018/01/30	18:44:23	69.2
426	2018/01/30	18:44:24	68.0
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429	2018/01/30	18:44:27	68.2
430	2018/01/30	18:44:28	69.6
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436	2018/01/30	18:44:34	66.0
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446	2018/01/30	18:44:44	67.8
447	2018/01/30	18:44:45	68.0
448	2018/01/30	18:44:46	67.7
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450	2018/01/30	18:44:48	68.0
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454	2018/01/30	18:44:52	66.9
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456	2018/01/30	18:44:54	66.8
457	2018/01/30	18:44:55	68.1
458	2018/01/30	18:44:56	68.9
459	2018/01/30	18:44:57	67.2
460	2018/01/30	18:44:58	67.2
461	2018/01/30	18:44:59	68.3
462	2018/01/30	18:45:00	66.9
463	2018/01/30	18:45:01	68.2
464	2018/01/30	18:45:02	68.0
465	2018/01/30	18:45:03	69.3
466	2018/01/30	18:45:04	68.9
467	2018/01/30	18:45:05	67.5
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471	2018/01/30	18:45:09	66.1
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476	2018/01/30	18:45:14	66.0
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479	2018/01/30	18:45:17	66.5
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504	2018/01/30 18:45:42	66.1
505	2018/01/30 18:45:43	65.6
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520	2018/01/30 18:45:58	66.1
521	2018/01/30 18:45:59	66.2
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538	2018/01/30 18:46:16	67.0
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552	2018/01/30 18:46:30	65.7
553	2018/01/30 18:46:31	66.2
554	2018/01/30 18:46:32	66.3
555	2018/01/30 18:46:33	66.2
556	2018/01/30 18:46:34	66.9
557	2018/01/30 18:46:35	67.3
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566	2018/01/30 18:46:44	67.7
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575	2018/01/30 18:46:53	68.8
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577	2018/01/30 18:46:55	69.0
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580	2018/01/30 18:46:58	68.4

581	2018/01/30	18:46:59	68.2
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583	2018/01/30	18:47:01	67.8
584	2018/01/30	18:47:02	67.1
585	2018/01/30	18:47:03	67.3
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588	2018/01/30	18:47:06	66.3
589	2018/01/30	18:47:07	67.1
590	2018/01/30	18:47:08	67.0
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593	2018/01/30	18:47:11	67.1
594	2018/01/30	18:47:12	66.5
595	2018/01/30	18:47:13	66.7
596	2018/01/30	18:47:14	67.0
597	2018/01/30	18:47:15	67.3
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600	2018/01/30	18:47:18	67.8

- Freq Weight : A
- Time Weight : FAST
- Level Range : 40-100
- Max dB : 82.2 - 2018/01/30 19:07:19
- Level Range : 40-100
- SEL : 97.7
- Leq : 70.0
-

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3	2018/01/30 19:03:25	70.6
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6	2018/01/30 19:03:28	70.6
7	2018/01/30 19:03:29	71.1
8	2018/01/30 19:03:30	71.4
9	2018/01/30 19:03:31	74.5
10	2018/01/30 19:03:32	72.5
11	2018/01/30 19:03:33	71.0
12	2018/01/30 19:03:34	70.6
13	2018/01/30 19:03:35	71.2
14	2018/01/30 19:03:36	71.3
15	2018/01/30 19:03:37	71.2
16	2018/01/30 19:03:38	72.1
17	2018/01/30 19:03:39	72.6
18	2018/01/30 19:03:40	72.6
19	2018/01/30 19:03:41	72.4
20	2018/01/30 19:03:42	73.3
21	2018/01/30 19:03:43	72.9
22	2018/01/30 19:03:44	71.9
23	2018/01/30 19:03:45	73.6
24	2018/01/30 19:03:46	73.2
25	2018/01/30 19:03:47	72.7
26	2018/01/30 19:03:48	73.7
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31	2018/01/30 19:03:53	70.6
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33	2018/01/30 19:03:55	73.0
34	2018/01/30 19:03:56	71.3
35	2018/01/30 19:03:57	71.5
36	2018/01/30 19:03:58	72.5
37	2018/01/30 19:03:59	71.3
38	2018/01/30 19:04:00	71.5
39	2018/01/30 19:04:01	71.4
40	2018/01/30 19:04:02	71.4
41	2018/01/30 19:04:03	72.9
42	2018/01/30 19:04:04	74.3
43	2018/01/30 19:04:05	74.7
44	2018/01/30 19:04:06	73.2
45	2018/01/30 19:04:07	73.6
46	2018/01/30 19:04:08	72.3
47	2018/01/30 19:04:09	73.8
48	2018/01/30 19:04:10	73.5
49	2018/01/30 19:04:11	73.4
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51	2018/01/30 19:04:13	71.9
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53	2018/01/30 19:04:15	71.4
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59	2018/01/30 19:04:21	70.6
60	2018/01/30 19:04:22	69.3
61	2018/01/30 19:04:23	70.8
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492	2018/01/30	19:11:34	69.7
493	2018/01/30	19:11:35	70.9
494	2018/01/30	19:11:36	72.3
495	2018/01/30	19:11:37	73.2
496	2018/01/30	19:11:38	72.6
497	2018/01/30	19:11:39	71.5
498	2018/01/30	19:11:40	70.9
499	2018/01/30	19:11:41	69.8
500	2018/01/30	19:11:42	71.1
501	2018/01/30	19:11:43	71.8
502	2018/01/30	19:11:44	72.2
503	2018/01/30	19:11:45	71.7
504	2018/01/30	19:11:46	71.3
505	2018/01/30	19:11:47	70.7
506	2018/01/30	19:11:48	71.5
507	2018/01/30	19:11:49	72.3
508	2018/01/30	19:11:50	73.5
509	2018/01/30	19:11:51	75.3
510	2018/01/30	19:11:52	74.1
511	2018/01/30	19:11:53	75.0
512	2018/01/30	19:11:54	74.1
513	2018/01/30	19:11:55	73.2
514	2018/01/30	19:11:56	73.5
515	2018/01/30	19:11:57	73.9
516	2018/01/30	19:11:58	73.0
517	2018/01/30	19:11:59	70.8
518	2018/01/30	19:12:00	71.2
519	2018/01/30	19:12:01	72.5
520	2018/01/30	19:12:02	71.3
521	2018/01/30	19:12:03	71.2
522	2018/01/30	19:12:04	70.3
523	2018/01/30	19:12:05	70.9
524	2018/01/30	19:12:06	71.7
525	2018/01/30	19:12:07	71.5
526	2018/01/30	19:12:08	71.8
527	2018/01/30	19:12:09	72.1
528	2018/01/30	19:12:10	71.3
529	2018/01/30	19:12:11	71.2
530	2018/01/30	19:12:12	71.7
531	2018/01/30	19:12:13	70.9
532	2018/01/30	19:12:14	72.8
533	2018/01/30	19:12:15	73.2
534	2018/01/30	19:12:16	72.2
535	2018/01/30	19:12:17	71.8
536	2018/01/30	19:12:18	71.4
537	2018/01/30	19:12:19	72.3
538	2018/01/30	19:12:20	71.0
539	2018/01/30	19:12:21	70.6
540	2018/01/30	19:12:22	70.2
541	2018/01/30	19:12:23	69.0
542	2018/01/30	19:12:24	68.8
543	2018/01/30	19:12:25	68.7
544	2018/01/30	19:12:26	69.5
545	2018/01/30	19:12:27	70.9
546	2018/01/30	19:12:28	70.9
547	2018/01/30	19:12:29	71.1
548	2018/01/30	19:12:30	71.5
549	2018/01/30	19:12:31	70.8
550	2018/01/30	19:12:32	70.4
551	2018/01/30	19:12:33	71.3
552	2018/01/30	19:12:34	70.9
553	2018/01/30	19:12:35	70.3
554	2018/01/30	19:12:36	70.8
555	2018/01/30	19:12:37	70.5
556	2018/01/30	19:12:38	71.9
557	2018/01/30	19:12:39	71.1
558	2018/01/30	19:12:40	70.8
559	2018/01/30	19:12:41	70.8
560	2018/01/30	19:12:42	70.2
561	2018/01/30	19:12:43	70.1
562	2018/01/30	19:12:44	70.8
563	2018/01/30	19:12:45	69.6
564	2018/01/30	19:12:46	70.4
565	2018/01/30	19:12:47	69.9
566	2018/01/30	19:12:48	71.7
567	2018/01/30	19:12:49	71.5
568	2018/01/30	19:12:50	71.1
569	2018/01/30	19:12:51	71.1
570	2018/01/30	19:12:52	71.4
571	2018/01/30	19:12:53	71.8
572	2018/01/30	19:12:54	72.0
573	2018/01/30	19:12:55	72.3
574	2018/01/30	19:12:56	72.5
575	2018/01/30	19:12:57	73.6
576	2018/01/30	19:12:58	73.0
577	2018/01/30	19:12:59	73.1
578	2018/01/30	19:13:00	74.1
579	2018/01/30	19:13:01	75.2
580	2018/01/30	19:13:02	74.9

581	2018/01/30 19:13:03	74.5
582	2018/01/30 19:13:04	76.1
583	2018/01/30 19:13:05	76.3
584	2018/01/30 19:13:06	76.3
585	2018/01/30 19:13:07	76.7
586	2018/01/30 19:13:08	74.9
587	2018/01/30 19:13:09	75.8
588	2018/01/30 19:13:10	75.9
589	2018/01/30 19:13:11	73.7
590	2018/01/30 19:13:12	73.1
591	2018/01/30 19:13:13	71.9
592	2018/01/30 19:13:14	71.8
593	2018/01/30 19:13:15	71.1
594	2018/01/30 19:13:16	71.8
595	2018/01/30 19:13:17	71.3
596	2018/01/30 19:13:18	70.2
597	2018/01/30 19:13:19	70.8
598	2018/01/30 19:13:20	71.7
599	2018/01/30 19:13:21	70.4
600	2018/01/30 19:13:22	70.9

Appendix B

RCNM Construction Noise Modeling

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 02/26/2019
Case Description: Site Preparation

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single-Family Residences	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		1790.0	0.0
Tractor	No	40	84.0		1790.0	0.0
Front End Loader	No	40		79.1	1790.0	0.0
Backhoe	No	40		77.6	1790.0	0.0
Dozer	No	40		81.7	1790.0	0.0
Dozer	No	40		81.7	1790.0	0.0
Dozer	No	40		81.7	1790.0	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
Tractor	52.9	48.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	52.9	48.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	48.0	44.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	46.5	42.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	50.6	46.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	50.6	46.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	50.6	46.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	52.9	55.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night

Burbank High School	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		1370.0	0.0
Tractor	No	40	84.0		1370.0	0.0
Front End Loader	No	40		79.1	1370.0	0.0
Backhoe	No	40		77.6	1370.0	0.0
Dozer	No	40		81.7	1370.0	0.0
Dozer	No	40		81.7	1370.0	0.0
Dozer	No	40		81.7	1370.0	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
Tractor	55.2	51.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	55.2	51.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	50.4	46.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	48.8	44.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	52.9	48.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	52.9	48.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	52.9	48.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	55.2	57.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single-Family Residences	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)

Tractor	No	40	84.0		925.0	0.0
Tractor	No	40	84.0		925.0	0.0
Front End Loader	No	40		79.1	925.0	0.0
Backhoe	No	40		77.6	925.0	0.0
Dozer	No	40		81.7	925.0	0.0
Dozer	No	40		81.7	925.0	0.0
Dozer	No	40		81.7	925.0	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
Tractor	58.7	54.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	58.7	54.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	53.8	49.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	52.2	48.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	56.3	52.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	56.3	52.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	56.3	52.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	58.7	61.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 02/26/2019
Case Description: Grading

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single-Family Residences	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	1790.0	0.0
Dozer	No	40		81.7	1790.0	0.0
Grader	No	40	85.0		1790.0	0.0
Tractor	No	40	84.0		1790.0	0.0
Front End Loader	No	40		79.1	1790.0	0.0
Backhoe	No	40		77.6	1790.0	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
Excavator	49.6	45.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	50.6	46.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	53.9	49.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	52.9	48.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	48.0	44.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	46.5	42.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	53.9	54.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Burbank High School	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	1370.0	0.0
Dozer	No	40		81.7	1370.0	0.0
Grader	No	40	85.0		1370.0	0.0
Tractor	No	40	84.0		1370.0	0.0
Front End Loader	No	40		79.1	1370.0	0.0
Backhoe	No	40		77.6	1370.0	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
Excavator	52.0	48.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	52.9	48.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	56.2	52.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	55.2	51.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	50.4	46.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	48.8	44.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	56.2	57.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single-Family Residences	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	925.0	0.0
Dozer	No	40		81.7	925.0	0.0
Grader	No	40	85.0		925.0	0.0
Tractor	No	40	84.0		925.0	0.0
Front End Loader	No	40		79.1	925.0	0.0
Backhoe	No	40		77.6	925.0	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
Excavator	55.4	51.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	56.3	52.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	58.7	54.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	53.8	49.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	52.2	48.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	59.7	60.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 02/26/2019
Case Description: Grading

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single-Family Residences	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	1790.0	0.0
All Other Equipment > 5 HP	No	50	85.0		1790.0	0.0
All Other Equipment > 5 HP	No	50	85.0		1790.0	0.0
All Other Equipment > 5 HP	No	50	85.0		1790.0	0.0
Generator	No	50		80.6	1790.0	0.0
Tractor	No	40	84.0		1790.0	0.0
Front End Loader	No	40		79.1	1790.0	0.0
Backhoe	No	40		77.6	1790.0	0.0
Welder / Torch	No	40		74.0	1790.0	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
Crane	49.5	41.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	53.9	50.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	53.9	50.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	53.9	50.9	N/A	N/A	N/A	N/A								

Equipment	Calculated Lmax	Calculated Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Exceedance Day Lmax	Exceedance Day Leq	Exceedance Evening Lmax	Exceedance Evening Leq	Exceedance Night Lmax	Exceedance Night Leq
							N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	49.6	46.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	52.9	48.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	48.0	44.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	46.5	42.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	42.9	38.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	53.9	57.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

****** Receptor #2 ******

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Burbank High School	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	1370.0	0.0
All Other Equipment > 5 HP	No	50	85.0		1370.0	0.0
All Other Equipment > 5 HP	No	50	85.0		1370.0	0.0
All Other Equipment > 5 HP	No	50	85.0		1370.0	0.0
Generator	No	50		80.6	1370.0	0.0
Tractor	No	40	84.0		1370.0	0.0
Front End Loader	No	40		79.1	1370.0	0.0
Backhoe	No	40		77.6	1370.0	0.0
Welder / Torch	No	40		74.0	1370.0	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

Crane	51.8	43.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	56.2	53.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	56.2	53.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	56.2	53.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	51.9	48.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	55.2	51.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	50.4	46.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	48.8	44.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	45.2	41.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	56.2	59.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single-Family Residences	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	925.0	0.0
All Other Equipment > 5 HP	No	50	85.0		925.0	0.0
All Other Equipment > 5 HP	No	50	85.0		925.0	0.0
All Other Equipment > 5 HP	No	50	85.0		925.0	0.0
Generator	No	50		80.6	925.0	0.0
Tractor	No	40	84.0		925.0	0.0
Front End Loader	No	40		79.1	925.0	0.0
Backhoe	No	40		77.6	925.0	0.0
Welder / Torch	No	40		74.0	925.0	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
Crane	55.2	47.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	59.7	56.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	59.7	56.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	59.7	56.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	55.3	52.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	58.7	54.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	53.8	49.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	52.2	48.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	48.7	44.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	59.7	63.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 02/26/2019
Case Description: Paving

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single-Family Residences	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	1790.0	0.0
Paver	No	50		77.2	1790.0	0.0
Roller	No	20		80.0	1790.0	0.0
Roller	No	20		80.0	1790.0	0.0
Pavement Scarafier	No	20		89.5	1790.0	0.0
Pavement Scarafier	No	20		89.5	1790.0	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
Paver	46.1	43.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	46.1	43.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	48.9	41.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	48.9	41.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	58.4	51.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	58.4	51.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	58.4	55.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Burbank High School	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	1370.0	0.0
Paver	No	50		77.2	1370.0	0.0
Roller	No	20		80.0	1370.0	0.0
Roller	No	20		80.0	1370.0	0.0
Pavement Scarafier	No	20		89.5	1370.0	0.0
Pavement Scarafier	No	20		89.5	1370.0	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
Paver	48.5	45.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	48.5	45.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	51.2	44.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	51.2	44.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	60.7	53.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	60.7	53.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	60.7	57.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single-Family Residences	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	925.0	0.0
Paver	No	50		77.2	925.0	0.0
Roller	No	20		80.0	925.0	0.0
Roller	No	20		80.0	925.0	0.0
Pavement Scarafier	No	20		89.5	925.0	0.0
Pavement Scarafier	No	20		89.5	925.0	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
Paver	51.9	48.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	51.9	48.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	54.7	47.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	54.7	47.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	64.2	57.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	64.2	57.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	64.2	61.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 02/26/2019
Case Description: Architectural Coating

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single-Family Residences	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	1790.0	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
Compressor (air)	46.6	42.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	46.6	42.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Burbank High School	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	1370.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Compressor (air)	48.9	44.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	48.9	44.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single-Family Residences	Residential	55.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	925.0	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
Compressor (air)	52.3	48.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	52.3	48.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Appendix C

Vibration Analysis

Vibration Analysis - Burbank LaTerra Mixed Use

PPV (in/sec) = PPV {ref} * (25/D)^1.5
Where PPV = Peak Particle Velocity
{ref} = PPV at the reference distance of 25 feet
D = distance to the receptor

Equipment =	**Vibratory Roller**		
PPV{ref} =	0.21 in/sec		
D =	175 feet		
PPV at receptor =	***0.011 in/sec***		
PPV is 1.7x to 6x larger than RMS velocity			
Assume typical conversion factor of		4	PPV:RMS
Therefore estimated RMS velocity =		***0.003***	***in/sec***
Receptor Lv =		***69***	***VdB***

Equipment =	**Bulldozer - Large**		
PPV{ref} =	0.089 in/sec		
D =	175 feet		
PPV at receptor =	***0.005 in/sec***		
PPV is 1.7x to 6x larger than RMS velocity			
Assume typical conversion factor of		4	PPV:RMS
Therefore estimated RMS velocity =		***0.001***	***in/sec***
Receptor Lv =		***62***	***VdB***

Equipment =	**Loaded Trucks**		
PPV{ref} =	0.076 in/sec		
D =	175 feet		
PPV at receptor =	***0.004 in/sec***		
PPV is 1.7x to 6x larger than RMS velocity			
Assume typical conversion factor of		4	PPV:RMS
Therefore estimated RMS velocity =		***0.001***	***in/sec***
Receptor Lv =		***60***	***VdB***

Source: Section 5 Transit Vibration
Section 6 Vibration Impact Analysis
Section 7 Noise and Vibration during Construction
Transit Noise and Vibration Assessment , September 2018
John A. Volpe National Transportation Systems Center
Prepared For: USDOT Federal Transit Administration

* RMS Velocity in decibels VdB with Vref of 1E-6 in/sec and PPV:RMS of ~4

Criterion

Building Damage	
Type	VdB
Extremely susceptible to vibration damage	90
Non-engineered timber and masonry buildings	94
Engineered concrete and masonry buildings	98
Typical buildings	100
Reinforced concrete, steel, or timber buildings	102

Canmet, Bauer, and Calder, 1977		
Equipment	PPV Threshold, in/sec	Type of Damage
Rigid Mercury Switches	0.5	Trip Out
House	2	Cracked Plaster
Concrete Block	8	Crack in Block
Cased Drill Holes	15	Horizontol Offset
Pumps, Compressors	40	Shaft Misalignment

Human Response Criteria

Level, Lv in VdB	Equivalent Noise Level, dBA		Human Response
	Low Freq (30 Hz)	Mid Freq (60 Hz)	
65	25	40	Approximate threshold of perception, low-freq inaudible, but mid-freq excessive for sleeping
75	35	50	Approx. dividing line between barely perceptible and distinctly perceptible. Annoying vibration for most people. Low-freq acceptable for sleeping areas. Mid-freq excessive in most quiet occupied space.
85	45	60	Vibration tolerable only if infrequent number of events/day. Low-freq excessive for sleeping areas; mid-freq excessive even for infrequent events for some activities.

Impact Criteria

Land Use	Lv in VdB		
	Frequent Events (70+/day)	Occasional Events (30-70/day)	Infrequent (<30 events/day)
Category 1: Vibration Sensitive	65	65	65
Concert Halls	65	65	65
TV Studios	65	65	65
Recording Studios	65	65	65
Category 2: Residences, hotels, sleeping areas	72	75	80
Auditoriums	72	80	80
Theaters	72	80	80
Category 3: Institutional with primarily daytime use only (i.e. schools and churches)	75	78	83

Vibration Source Levels For Construction Equipment

Equipment	PPV at 25 ft (in/sec)	Approximate Lv at 25 feet *
Impact Pile Driver - Upper Range	1.518	112
Impact Pile Driver - Typical	0.644	104
Sonic Pile Driver - Upper Range	0.734	105
Sonic Pile Driver - Typical	0.17	93
Clam Shovel Drop (slurry wall construction)	0.202	94
Hydromill (slurry wall construction) - in Soil	0.008	66
Hydromill (slurry wall construction) - in Rock	0.017	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Bulldozer - Large	0.089	87
Bulldozer - Small	0.003	58
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79

Vibration Analysis - Burbank LaTerra Mixed Use

PPV (in/sec) = PPV {ref} * (25/D)^1.5
Where PPV = Peak Particle Velocity
{ref} = PPV at the reference distance of 25 feet
D = distance to the receptor

Equipment =	**Vibratory Roller**		
PPV{ref} =	0.21	in/sec	
D =	925	feet	
PPV at receptor =	***0.001***	***in/sec***	
PPV is 1.7x to 6x larger than RMS velocity			
Assume typical conversion factor of		4	PPV:RMS
Therefore estimated RMS velocity =		***0.000***	***in/sec***
Receptor Lv =		***47***	***VdB***

Equipment =	**Bulldozer - Large**		
PPV{ref} =	0.089	in/sec	
D =	925	feet	
PPV at receptor =	***0.000***	***in/sec***	
PPV is 1.7x to 6x larger than RMS velocity			
Assume typical conversion factor of		4	PPV:RMS
Therefore estimated RMS velocity =		***0.000***	***in/sec***
Receptor Lv =		***40***	***VdB***

Equipment =	**Loaded Trucks**		
PPV{ref} =	0.076	in/sec	
D =	925	feet	
PPV at receptor =	***0.000***	***in/sec***	
PPV is 1.7x to 6x larger than RMS velocity			
Assume typical conversion factor of		4	PPV:RMS
Therefore estimated RMS velocity =		***0.000***	***in/sec***
Receptor Lv =		***39***	***VdB***

Source: Section 5 Transit Vibration
Section 6 Vibration Impact Analysis
Section 7 Noise and Vibration during Construction
Transit Noise and Vibration Assessment , September 2018
John A. Volpe National Transportation Systems Center
Prepared For: USDOT Federal Transit Administration

* RMS Velocity in decibels VdB with Vref of 1E-6 in/sec and PPV:RMS of ~4

Criterion

Building Damage	
Type	VdB
Extremely susceptible to vibration damage	90
Non-engineered timber and masonry buildings	94
Engineered concrete and masonry buildings	98
Typical buildings	100
Reinforced concrete, steel, or timber buildings	102

Canmet, Bauer, and Calder, 1977		
Equipment	PPV Threshold, in/sec	Type of Damage
Rigid Mercury Switches	0.5	Trip Out
House	2	Cracked Plaster
Concrete Block	8	Crack in Block
Cased Drill Holes	15	Horizontol Offset
Pumps, Compressors	40	Shaft Misalignment

Human Response Criteria

Level, Lv in VdB	Equivalent Noise Level, dBA		Human Response
	Low Freq (30 Hz)	Mid Freq (60 Hz)	
65	25	40	Approximate threshold of perception, low-freq inaudible, but mid-freq excessive for sleeping
75	35	50	Approx. dividing line between barely perceptible and distinctly perceptible. Annoying vibration for most people. Low-freq acceptable for sleeping areas. Mid-freq excessive in most quiet occupied space.
85	45	60	Vibration tolerable only if infrequent number of events/day. Low-freq excessive for sleeping areas; mid-freq excessive even for infrequent events for some activities.

Impact Criteria

Land Use	Lv in VdB		
	Frequent Events (70+/day)	Occasional Events (30-70/day)	Infrequent (<30 events/day)
Category 1: Vibration Sensitive	65	65	65
Concert Halls	65	65	65
TV Studios	65	65	65
Recording Studios	65	65	65
Category 2: Residences, hotels, sleeping areas	72	75	80
Auditoriums	72	80	80
Theaters	72	80	80
Category 3: Institutional with primarily daytime use only (i.e. schools and churches)	75	78	83

Vibration Source Levels For Construction Equipment

Equipment	PPV at 25 ft (in/sec)	Approximate Lv at 25 feet *
Impact Pile Driver - Upper Range	1.518	112
Impact Pile Driver - Typical	0.644	104
Sonic Pile Driver - Upper Range	0.734	105
Sonic Pile Driver - Typical	0.17	93
Clam Shovel Drop (slurry wall construction)	0.202	94
Hydromill (slurry wall construction) - in Soil	0.008	66
Hydromill (slurry wall construction) - in Rock	0.017	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Bulldozer - Large	0.089	87
Bulldozer - Small	0.003	58
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79

Vibration Analysis - Burbank LaTerra Mixed Use

PPV (in/sec) = PPV {ref} * (25/D)^1.5
Where PPV = Peak Particle Velocity
{ref} = PPV at the reference distance of 25 feet
D = distance to the receptor

Equipment =	**Vibratory Roller**		
PPV{ref} =	0.21	in/sec	
D =	1370	feet	
PPV at receptor =	***0.001***	***in/sec***	
PPV is 1.7x to 6x larger than RMS velocity			
Assume typical conversion factor of		4	PPV:RMS
Therefore estimated RMS velocity =		***0.000***	***in/sec***
Receptor Lv =		***42***	***VdB***

Equipment =	**Bulldozer - Large**		
PPV{ref} =	0.089	in/sec	
D =	1370	feet	
PPV at receptor =	***0.000***	***in/sec***	
PPV is 1.7x to 6x larger than RMS velocity			
Assume typical conversion factor of		4	PPV:RMS
Therefore estimated RMS velocity =		***0.000***	***in/sec***
Receptor Lv =		***35***	***VdB***

Equipment =	**Loaded Trucks**		
PPV{ref} =	0.076	in/sec	
D =	1370	feet	
PPV at receptor =	***0.000***	***in/sec***	
PPV is 1.7x to 6x larger than RMS velocity			
Assume typical conversion factor of		4	PPV:RMS
Therefore estimated RMS velocity =		***0.000***	***in/sec***
Receptor Lv =		***33***	***VdB***

Source: Section 5 Transit Vibration
Section 6 Vibration Impact Analysis
Section 7 Noise and Vibration during Construction
Transit Noise and Vibration Assessment , September 2018
John A. Volpe National Transportation Systems Center
Prepared For: USDOT Federal Transit Administration

* RMS Velocity in decibels VdB with Vref of 1E-6 in/sec and PPV:RMS of ~4

Criterion

Building Damage	
Type	VdB
Extremely susceptible to vibration damage	90
Non-engineered timber and masonry buildings	94
Engineered concrete and masonry buildings	98
Typical buildings	100
Reinforced concrete, steel, or timber buildings	102

Canmet, Bauer, and Calder, 1977		
Equipment	PPV Threshold, in/sec	Type of Damage
Rigid Mercury Switches	0.5	Trip Out
House	2	Cracked Plaster
Concrete Block	8	Crack in Block
Cased Drill Holes	15	Horizontol Offset
Pumps, Compressors	40	Shaft Misalignment

Human Response Criteria

Level, Lv in VdB	Equivalent Noise Level, dBA		Human Response
	Low Freq (30 Hz)	Mid Freq (60 Hz)	
65	25	40	Approximate threshold of perception, low-freq inaudible, but mid-freq excessive for sleeping
75	35	50	Approx. dividing line between barely perceptible and distinctly perceptible. Annoying vibration for most people. Low-freq acceptable for sleeping areas. Mid-freq excessive in most quiet occupied space.
85	45	60	Vibration tolerable only if infrequent number of events/day. Low-freq excessive for sleeping areas; mid-freq excessive even for infrequent events for some activities.

Impact Criteria

Land Use	Lv in VdB		
	Frequent Events (70+/day)	Occasional Events (30-70/day)	Infrequent (<30 events/day)
Category 1: Vibration Sensitive	65	65	65
Concert Halls	65	65	65
TV Studios	65	65	65
Recording Studios	65	65	65
Category 2: Residences, hotels, sleeping areas	72	75	80
Auditoriums	72	80	80
Theaters	72	80	80
Category 3: Institutional with primarily daytime use only (i.e. schools and churches)	75	78	83

Vibration Source Levels For Construction Equipment

Equipment	PPV at 25 ft (in/sec)	Approximate Lv at 25 feet *
Impact Pile Driver - Upper Range	1.518	112
Impact Pile Driver - Typical	0.644	104
Sonic Pile Driver - Upper Range	0.734	105
Sonic Pile Driver - Typical	0.17	93
Clam Shovel Drop (slurry wall construction)	0.202	94
Hydromill (slurry wall construction) - in Soil	0.008	66
Hydromill (slurry wall construction) - in Rock	0.017	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Bulldozer - Large	0.089	87
Bulldozer - Small	0.003	58
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79

Vibration Analysis - Burbank LaTerra Mixed Use

PPV (in/sec) = PPV {ref} * (25/D)^1.5
Where PPV = Peak Particle Velocity
{ref} = PPV at the reference distance of 25 feet
D = distance to the receptor

Equipment =	**Vibratory Roller**		
PPV{ref} =	0.21	in/sec	
D =	1790	feet	
PPV at receptor =	***0.000***	***in/sec***	
PPV is 1.7x to 6x larger than RMS velocity			
Assume typical conversion factor of		4	PPV:RMS
Therefore estimated RMS velocity =		***0.000***	***in/sec***
Receptor Lv =		***39***	***VdB***

Equipment =	**Bulldozer - Large**		
PPV{ref} =	0.089	in/sec	
D =	1790	feet	
PPV at receptor =	***0.000***	***in/sec***	
PPV is 1.7x to 6x larger than RMS velocity			
Assume typical conversion factor of		4	PPV:RMS
Therefore estimated RMS velocity =		***0.000***	***in/sec***
Receptor Lv =		***31***	***VdB***

Equipment =	**Loaded Trucks**		
PPV{ref} =	0.076	in/sec	
D =	1790	feet	
PPV at receptor =	***0.000***	***in/sec***	
PPV is 1.7x to 6x larger than RMS velocity			
Assume typical conversion factor of		4	PPV:RMS
Therefore estimated RMS velocity =		***0.000***	***in/sec***
Receptor Lv =		***30***	***VdB***

Source: Section 5 Transit Vibration
Section 6 Vibration Impact Analysis
Section 7 Noise and Vibration during Construction
Transit Noise and Vibration Assessment , September 2018
John A. Volpe National Transportation Systems Center
Prepared For: USDOT Federal Transit Administration

* RMS Velocity in decibels VdB with Vref of 1E-6 in/sec and PPV:RMS of ~4

Criterion

Building Damage	
Type	VdB
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Impact Criteria

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Category 2: Residences, hotels, sleeping areas	72	75	80
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Hoe Ram	0.089	87
Bulldozer - Large	0.089	87
Bulldozer - Small	0.003	58
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79

Appendix D

TNM Roadway Noise Modeling

<Organization?>			30 August 2018		
<Analysis By?>			TNM 2.5		
			Calculated with TNM 2.5		
RESULTS: SOUND LEVELS					
PROJECT/CONTRACT:	<Project Name?>				
RUN:	Burbank Mixed Use - Existing				
BARRIER DESIGN:	INPUT HEIGHTS		Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.		
ATMOSPHERICS:	20 deg C, 50% RH				

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Single-Family Residences (Burbank Blvd)	34	1	0.0	68.9	66	68.9	10	Snd Lvl	68.9	0.0	8	-8.0
Burbank HS Building (3rd St)	64	1	0.0	69.2	66	69.2	10	Snd Lvl	69.2	0.0	8	-8.0
Burbank HS Rec. Uses (3rd St)	67	1	0.0	68.7	66	68.7	10	Snd Lvl	68.7	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	3	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

<Organization?> 30 August 2018
<Analysis By?> TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: <Project Name?>
RUN: Burbank Mixed Use - Existing + Project
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 20 deg C, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Single-Family Residences (Burbank Blvd)	34	1	0.0	69.2	66	69.2	10	Snd Lvl	69.2	0.0	8	-8.0
Burbank HS Building (3rd St)	64	1	0.0	69.7	66	69.7	10	Snd Lvl	69.7	0.0	8	-8.0
Burbank HS Rec. Uses (3rd St)	67	1	0.0	69.1	66	69.1	10	Snd Lvl	69.1	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	3	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

<Organization?> 30 August 2018
<Analysis By?> TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT: <Project Name?>
RUN: Burbank Mixed Use - Future
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 20 deg C, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Single-Family Residences (Burbank Blvd)	34	1	0.0	69.4	66	69.4	10	Snd Lvl	69.4	0.0	8	-8.0
Burbank HS Building (3rd St)	64	1	0.0	69.9	66	69.9	10	Snd Lvl	69.9	0.0	8	-8.0
Burbank HS Rec. Uses (3rd St)	67	1	0.0	69.3	66	69.3	10	Snd Lvl	69.3	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	3	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

<Organization?> 30 August 2018
<Analysis By?> TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT: <Project Name?>
RUN: Burbank Mixed Use - Future + Project
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 20 deg C, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Single-Family Residences (Burbank Blvd)	34	1	0.0	69.5	66	69.5	10	Snd Lvl	69.5	0.0	8	-8.0
Burbank HS Building (3rd St)	64	1	0.0	69.9	66	69.9	10	Snd Lvl	69.9	0.0	8	-8.0
Burbank HS Rec. Uses (3rd St)	67	1	0.0	69.3	66	69.3	10	Snd Lvl	69.3	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	3	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Environmental Noise Evaluation & Recommendations Report (v6)

777 N. Front Street | Burbank, CA

Submitted to:
Kimberly Paperin, President
4TERRA Los Angeles/Ventura

Submitted by:
William Stewart, MP, INSE
SSA Acoustics, LLP
222 Etruria St, Suite 100
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December 10, 2018

Table of Contents

Introduction

This report presents assessment of environmental noise issues for 777 North Front Street project planned for Burbank. The project is planned as a mixed-use development including a total of 572 residential units, 1.67 sf of retail gallery space, and 317 hotel rooms in four separate buildings, a one-story building, a 7-story building, an *-story building, and a 15-story building. Parking is planned at subgrade levels for each portion of the project.

It contains an evaluation of the noise sources present at the site and mitigation measures for controlling noise levels exceeding the established design criteria. The process used to develop this report included collecting environmental noise data from the site, reviewing applicable codes and criteria, and providing recommendations to reduce noise levels inside the units to an acceptable level.

The site is located along North Front Street to the south and the Golden State Parkway (I-5). The principal source of noise at the site is traffic along I-5 with lesser contributors being from North Front Street, East Burbank Blvd. the rail lines to the southwest, and auto traffic in the surrounding community. I-5 is active with auto, truck and bus traffic throughout the day and evening with peak sound levels when traffic is moving at higher speeds between 10 am and 2 pm and after evening rush hour traffic until 11 pm.

Environmental Criteria & Standards

Exterior and interior noise levels in residential projects are commonly quantified using the Daytime Nighttime Equivalent Sound Level (Ldn) descriptor. This is a 24-hour descriptor of sound levels in decibels (dBA) that averages sound during each hour and assigns a 10 dB penalty for noise made during sleeping hours between 10:00 pm and 7:00 am. The CNEL is identical to the Ldn, except it also adds a 5 dB penalty for noise occurring during the evening (7:00 pm to 10:00 pm).

California Green Building Standards Code. Title 24of the California Code of Regulations establishes building standards applicable to all occupancies throughout the state. The code provides acoustical regulations for exterior-to-interior sound insulation, as well as for sound and impact isolation between adjacent spaces of occupied units. Title 24, Part 2, Chapter 12, Section 1207.11.2, states that interior noise levels generated by exterior noise sources shall not exceed 45 dBA L_{dn} in any habitable room.

City of Burbank. The Noise Element of the Burbank General Plan includes noise level guidelines for a range of land uses. These guidelines, shown in Table 1 include “normally acceptable,” “possibly acceptable,” and “normally unacceptable” exterior noise ranges for uses that may be proposed in the City. For multi-family residential exterior noise up to 65 dBA CNEL is normally acceptable, noise in the 66-70 dBA CNEL range is possibly acceptable, and noise of 71 dBA and higher is normally unacceptable. Land uses are generally not to be established in areas where noise is within the normally unacceptable range. However, if the benefits of the Project in addressing other City of Burbank General Plan goals and policies out-weigh concerns about noise, the use can be established, but only where exterior areas are omitted from the Project or where exterior areas are located and shielded from noise sources to mitigate noise to the maximum extent feasible.

The City of Burbank has completed noise level measurements at locations throughout the city for long range planning. These measurements identified areas exposed to high levels of aircraft and traffic noise. Exhibit 2 provides modeled noise contours for the baseline year 2010 of major arterials and freeway networks.

Based on the study, completed 6-years ago, the project is shown in a contour 70-75 CNEL near traffic associated with I-5 and East Burbank Blvd. This places the site, with regard to views of the City of Burbank, “Exterior Normally Unacceptable” category. Developing this site for residential use will require close coordination and permission of the City.

Maximum Allowable Noise Exposure

Land Use Category	Exterior Normally Acceptable[1] (dBA CNEL/L_{dn})	Exterior Possibly Acceptable[2] (dBA CNEL/L_{dn})	Exterior Normally Unacceptable[3] (dBA CNEL/L_{dn})	Interior Acceptable[4] (dBA CNEL/L_{dn} except where noted)
Residential, single-family	Up to 60	61-70	71 and higher	45
Residential, multi-family	Up to 65	66-70	71 and higher	45
Residential, multi-family mixed use	Up to 65	66-70	71 and higher	45
Transient lodging	Up to 65	66-70	71 and higher	45
Hospitals; nursing homes	Up to 60	61-70	71 and higher	45
Theaters; auditoriums; music halls	Up to 60	61-70	71 and higher	35 dBA L_{eq}[5]
Churches; meeting halls	Up to 60	61-70	71 and higher	40 dBA L_{eq}
Playgrounds; neighborhood parks	Up to 70	71-75	75 and higher	--
Schools; Libraries; museums[6]	--	--	--	45 dBA L_{eq}
Offices[7]	--	--	--	45 dBA L_{eq}
Retail/commercial[7]	--	--	--	--
Industrial	--	--	--	--

Notes:

[1] Normally acceptable means that land uses may be established in areas with the stated ambient noise level, absent any unique noise circumstances.

[2] Possibly acceptable means that land uses should be established in areas with the stated ambient noise level only when exterior areas are omitted from the project or noise levels in exterior areas can be mitigated to the normally acceptable level.

[3]. Normally unacceptable means that land uses should generally not be established in areas with the stated ambient noise level. If the benefits of the project in addressing other Burbank2035 goals and policies outweigh concerns about noise, the use should be established only where exterior areas are committed from the project or where exterior areas are located and shielded from noise sources to mitigate noise to the maximum extent feasible.

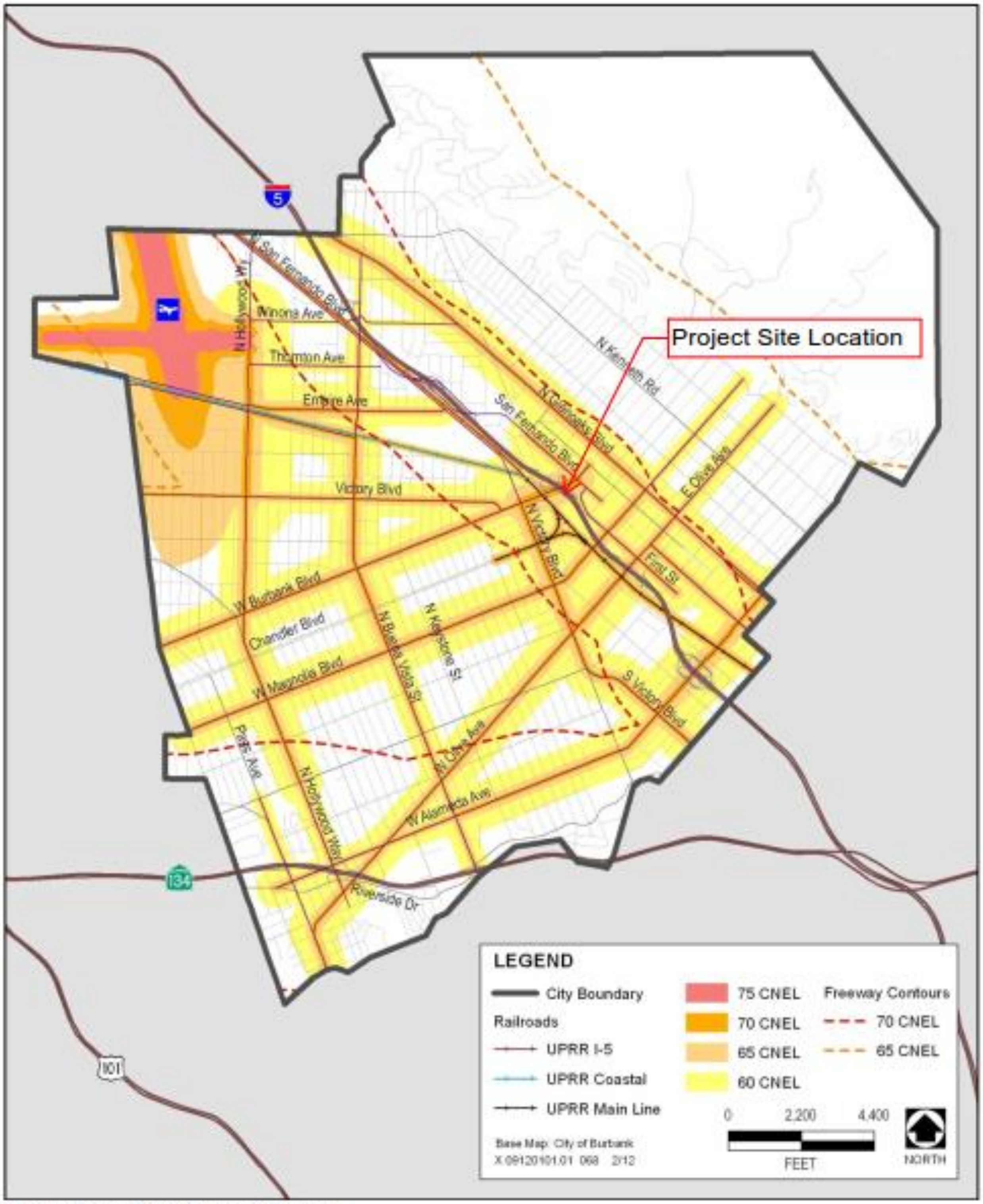
[4] Interior acceptable means that the building must be constructed so that interior noise levels do not exceed the stated maximum, regardless of the exterior noise level. Stated maximums are as determined for a typical worst-case hour during periods of use.

[5] dBA L_{eq} is as determined for a typical worst-case hour during periods of use.

[6] Within the Airport Influence Area, these uses are not acceptable above 65 dBA CNEL if subject to the City's discretionary review procedures. Within the Airport Influence Area, these uses may be acceptable up to 75 dBA CNEL following review for additional noise attenuation; in excess of 75 dBA CNEL these uses are not acceptable.

Source: City of Burbank General Plan, 2013.

Table 1: Maximum Allowable Noise Exposure for the City of Burbank



Source: Data compiled by AECOM in 2010

Exhibit 2: Noise Contours from 2010

Additionally, criteria for exterior and interior noise levels are recommended by the Housing and

Urban Development (HUD) report "The Noise Guidebook". The recommended noise levels and corresponding land uses documented in the "The Noise Guidebook", which are also in agreement with the Federal Interagency on Urban Noise (FICUN) [1] report, are as follows:

Table 1
HUD Exterior Noise Goals

Exterior DNL	Recommended Land Use
0-55 dBA	Residential without restrictions.
55-65 dBA	Residential property generally acceptable. The guidelines note that some people may find noise levels in this category objectionable, but considering the cost of mitigating measures, these noise levels are generally acceptable for residential use
65-75 dBA	Generally unacceptable for residential use. Acceptable for commercial use. Residential use in this environment requires special construction techniques to achieve a minimum Noise Level Reduction (NLR) of 25 dB for noise levels between 65 dBA and 70 dBA and a NLR of 30 dB for noise levels between 70 dBA and 75 dBA

[1] "Guidelines for Considering Noise in Land Use Planning and Control", Federal Interagency Committee on Urban Noise, June 1980.

On-site Noise Measurements

A continuous 24-hour noise measurement was conducted at two location on the property during a 24-hour period between Wednesday, March 23rd and Thursday, March 24th to determine noise levels from automobile and rail traffic. The measurement locations were selected to provide exposures representing the future structures at the site and the worst case of exposure from Interstate -5 and Front Street. The measurements location from Interstate-5 165 Feet south of the edge of the road at a location shown on the attached site plan. This was selected at a mid-way point to the residential/guest portion of the structures. On the south side of the site a location was selected that was 65 feet north Front Street at a location shown on the attached drawing and was selected to represent noise exposure to the planned apartment structure.

Measurements was taken using Larson Davis 820 Environmental Noise monitor, which conforms to American National Standards Institute (ANSI) requirements for Type I instruments.

As shown in the table below, the hourly Leq ranged from a low of 58 dBA to 67 dBA during the period covered. The calculated DNL value was 70 dB(A).

Date	Environmental Noise Levels	
	Exposure to I-5	Exposure Front Street
Hourly Leq	**75.7 dB(A)**	**72.4 dB(A)**
Ldn	**81 dB(A)**	**76 dB(A)**
Minimum/Maximum	**70.4 dB(A)/ 81.3 dB(A)**	**67.5 dB(A)/ 74.2 dB(A)**

These levels are shown for noise levels on an hourly basis on the attached graphs. These noise levels are consistent with exposures that are documented by the City in their noise survey. Based on the Maximum Exposure Noise Table, they are normally considered unacceptable for residential use. To achieve approval from the City will require mitigation to 45 dBA CNEL.

Noise Impact Analysis

To evaluate the impact environmental noise will have on the building a source-path-receiver model was constructed for each side of the building. Based on the "source" level and the "receiver" criteria, design a path that achieve the desired sound level. In this consideration, the primary source is the ambient noise levels generated by auto and truck traffic.

Our "path" for this model is the distance to the building façade and to the interior receiver locations using the envelope as a barrier. With the source being along the length of the building and the building being multiple stories, erecting a barrier to the sound is not feasible and mitigation measure to the envelope is necessary with barriers as secondary elements.

To complete an evaluation of the building is a study of all the materials working together to achieve a single barrier to the source levels. It is a composite evaluation based on ratios of different elements. For example, to evaluate the building's west façade to exposure to the interior offices, a wall/window ratio of the assemblies is calculated and then our source levels applied to derive the interior noise levels. With sound, the weakest path is taken full advantage so it requires choices for smaller windows and better walls to be cost effective.

For this façade, the surface area that is associated with the interior residential environment is 11,250 sf. There are 66 windows totaling 1,896 sf. This provides 83% wall to window ratio which is excellent start to controlling sound within the building. This portion of the building is exposed to the worst case of noise from Interstate-5.

North Evaluation – Using the following wall, window, and door elements, the following interior noise levels are achieved:

Wall: 6-inch wood stud wall with two layers of 5/8" GWB in the interior, ½" plywood and 5/8 inch GWB on exterior and 6-inch glass fiber insulation in the cavity.
Window: ¼" glass – ½" airspace – ¼" Glass, (STC 35)
Door: Solid core door with ½" glass insert

Properly constructed and caulked and sealed properly will provide a DNL 38 during peak traffic period and a DNL 33 during off peak hours before 11 pm. Early morning hours will be lower.

Additional Evaluation – When considering the increase to the size of window, assumptions regarding the performance of the wall need to be provided and the type of window. The following table provides window STC ratings that can be used:

	Window Area as a Percentage of Total Wall Area		
Wall	20%	40%	60%
40	40	40	40
45	34	37	39
50	33	36	39
55	32	35	38

Using laminated glass in a standard 1-inch thermal window assembly will provide assemblies as high as an STC 40 for values shown on this table.

On the residential side facing South, along front street, performances for these assemblies can be reduced as the overall noise levels are significantly lower:

South Evaluation – Using the following wall, window, and door elements, the following interior noise levels are achieved:

Wall: 6-inch wood stud wall with one layer of 5/8" GWB in the interior, ½" plywood and 5/8 inch GWB on exterior and 6-inch glass fiber insulation in the cavity.
Window: ¼" glass – ½" airspace – 3/16" Glass, (STC 33)
Door: Solid core door with ½" glass insert

Properly constructed and caulked and sealed properly will provide a DNL 40 during peak traffic period and a DNL 36 during off peak hours before 11 pm. Early morning hours will be lower.

Additional Evaluation – When considering the increase to the size of window, assumptions regarding the performance of the wall need to be provided and the type of window. The following table provides window STC ratings that can be used:

	Window Area as a Percentage of Total Wall Area		
Wall	20%	40%	60%
40	38	38	38
45	33	36	37
50	32	35	37
55	31	34	35

Using laminated glass in a standard 1-inch thermal window assembly will provide assemblies as high as an STC 40 for values shown on this table.

Recommendations

The following plan outlines the necessary noise mitigation measures to reduce the noise to the design criteria from the auto and rail traffic.

1. Cooling and Ventilation

The building mechanical ventilation and cooling should support all occupied spaces to allow tenants the option for climate control without opening the windows. A split system type with an outdoor dedicated condensing unit and an interior ceiling installed or wall mounted fan coil unit,

For the rooftop terrace utilizing the structure as a barrier to the environmental noise, should be augmented to the north and south with extended height barriers to 6 feet or higher if possible. These can be selected as glass wall barriers if desired, but must run continuously from the deck to a height of 6 feet or greater.

2. Walls, Windows & Balcony Doors

To effectively mitigate the peak sound levels from environmental noise to meet the design criteria the following is recommended:

North Façade and Recessed Elements. (Blue)

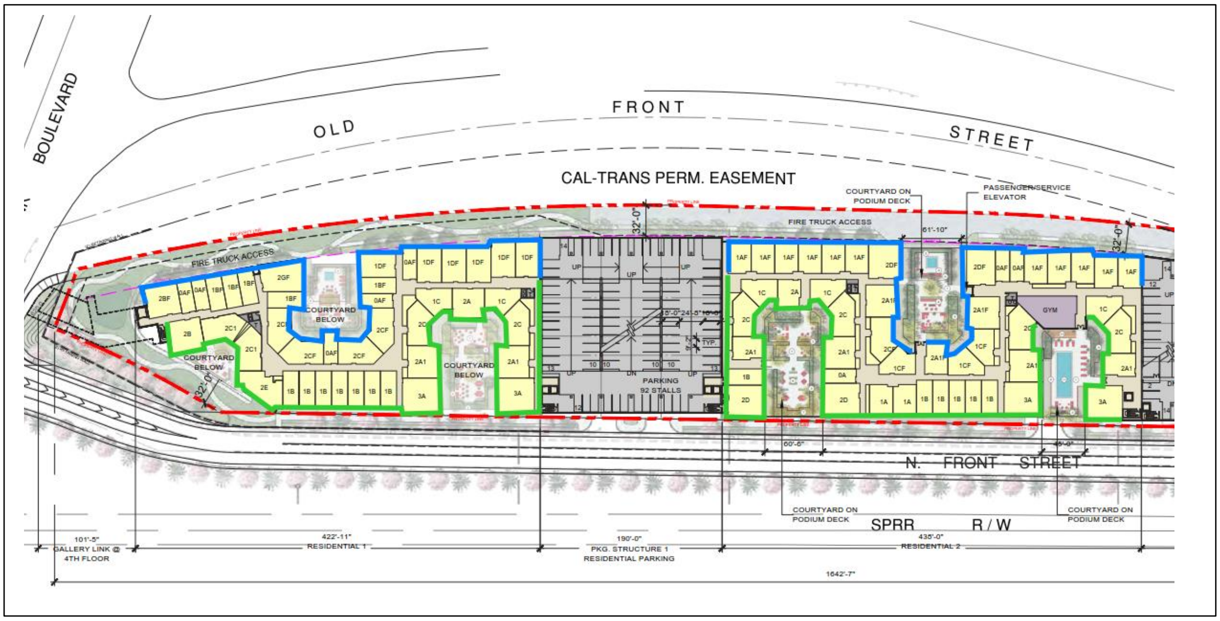
Wall: 6-inch wood stud wall with two layers of 5/8” GWB in the interior, ½” plywood and 5/8 inch GWB on exterior and 6-inch glass fiber insulation in the cavity.
Window: ¼” glass – ½” airspace – ¼” Glass, (STC 35)
Door: Solid core door with ½” glass insert

South Façade and Recessed Elements. (Green)

Wall: 6-inch wood stud wall with one layer of 5/8” GWB in the interior, ½” plywood and 5/8 inch GWB on exterior and 6-inch glass fiber insulation in the cavity.
Window: ¼” glass – ½” airspace – 3/16” Glass, (STC 33)
Door: Solid core door with ½” glass insert

Type 1 Construction on Hotel (Orange)

The assemblies of this portion of the project will achieve higher performance with less mass because of the use of metal stud construction. However the spandrel and window portions will reduce the window wall ration in some conditions. Similar assemblies, without the use of laminated glass are achievable. The use of curtain wall assemblies will need to be evaluated on a product-by-product basis.



3. Rooftop Amenity Spaces

Rooftop recreation areas at the project should have sound mitigated on both sides to provide an environment that is lower than a DNL 65. This will require mitigation to this area in the form of wall or window to a height of 6' 6" continuous on both sides from the deck to the total height. If completed using window, a standard thermal pane assembly or a ½" single pane glass assembly is sufficient. If completed using structural materials, walls should be construction to 3-lbs/sf using gypsum board, plywood, or steel construction. Joints and attachments should be completed as air-tight.

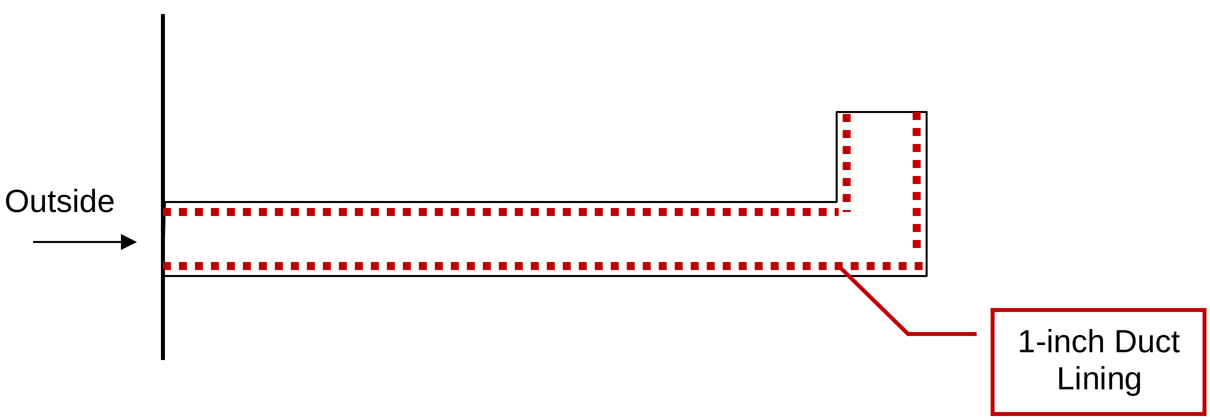
4. Outside Air Vents

To provide outside air to these units without creating a direct sound path, such as a window enclosed trickle vent, a sound controlled outside air path must be integrated into the design.

Install ducted outside air path from rooftop or façade.

Specifications:

- Minimum of 7-feet of ducting with 1-inch thick duct liner
- Minimum of 1 elbow between outside inlet and interior vent.

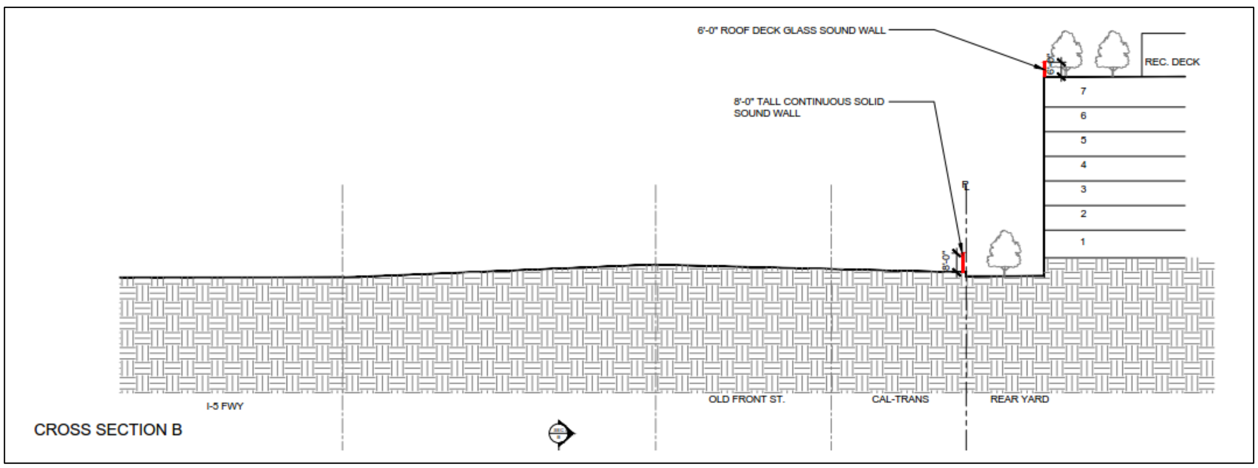


With these mitigation measures the predicted interior sound level is 40 – 43 dB(A), which meets the design goal.

5. Courtyard Amenity Spaces and Apartment Property Walk

The project is designed to provide outdoor recreation areas in the courtyard and in a apartment property walk along the north side of the building. These areas require mitigation to provide an outdoor environment that is acceptable to recreational use.

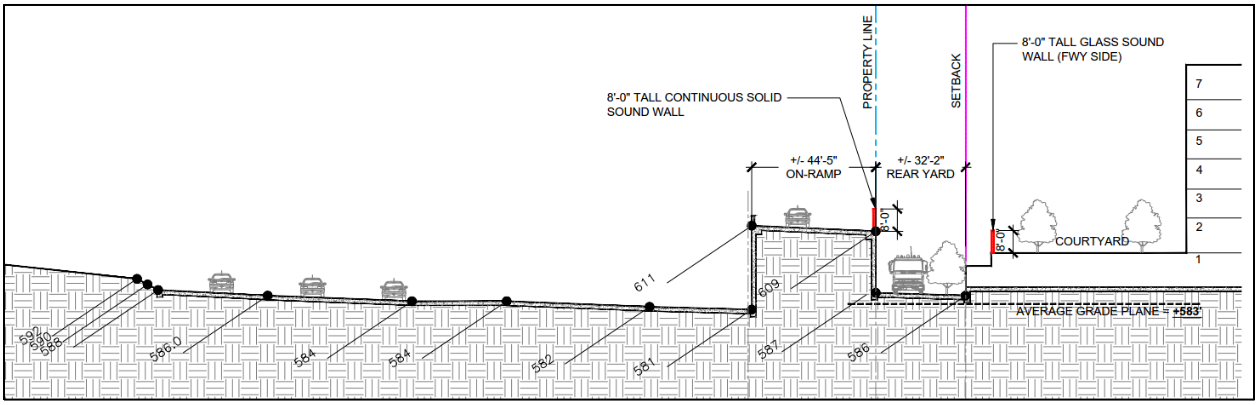
Park Walk and Ground Level Courtyards
The park walk on the north side of the building is exposed to an average of 75.7 dBA. To reduce these levels a barrier is necessary to the parkway.



To achieve noise levels within the apartment property walk a continuous barrier extending from the ground to a height of 8-feet should be constructed. This will provide an environment of 61-63 dBA within the Park. The location of this barrier (yellow) is shown in figure in the attached site plan. The intent of this barrier to control noise levels to courtyard areas and not to mitigation sound to interior portions of the building. The interior levels will be controlled by the design of the building envelope.

Transferring the location of the barrier to the proposed Caltrans road barrier location and increasing the height to 10 feet, as proposed, would further reduce the noise levels at the site in the courtyards and to the public park. We would anticipate an additional 3 dB reduction but would need a detailed plan to further understand the impact.

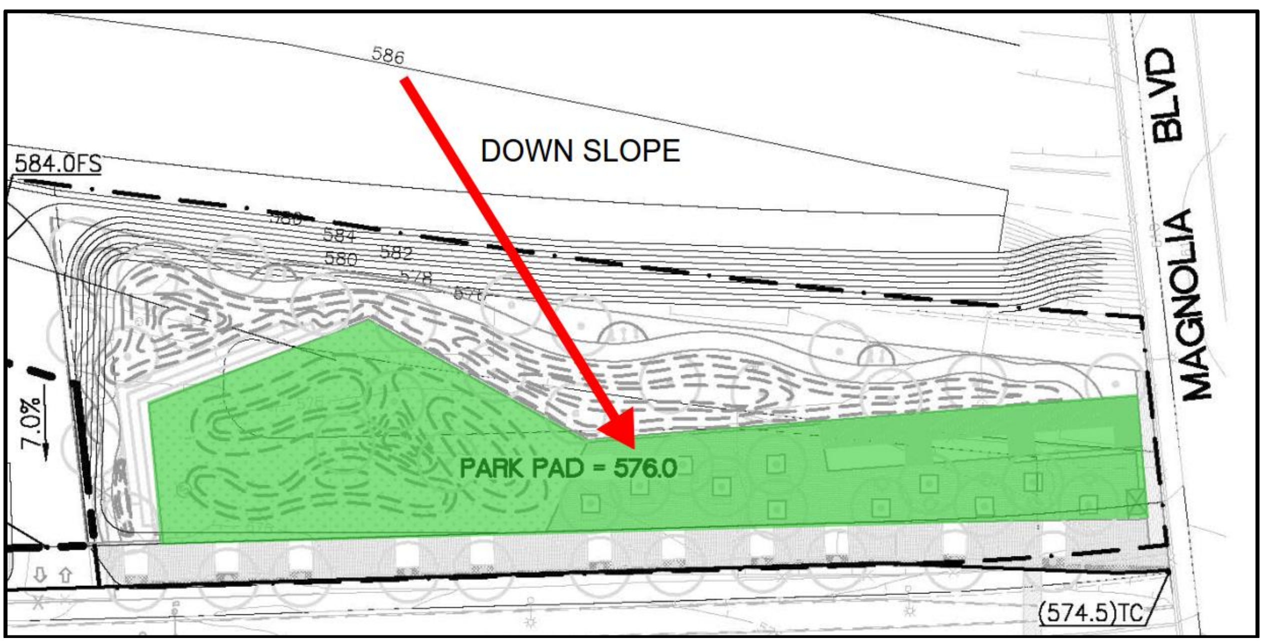
Courtyard recreation areas at the project should have sound mitigated on both sides to provide an environment that is lower than a DNL 65. This will require mitigation to this area in the form of wall or window to a height of 8' above the courtyard level and provides more than 16-feet of elevation above the highway. This will achieve a DNL of 60 or below in the courtyards to the north, and below DNL 58 to the south. If completed using window, a standard thermal pane assembly or a ½" single pane glass assembly is sufficient. If completed using structural materials, walls should be construction to 3-lbs/sf using gypsum board, plywood, or steel construction. Joints and attachments should be completed as air-tight.



Rooftop amenity spaces can achieve levels below DNL 58 using a barrier to traffic exposure by constructing a barrier to a height of 6 feet.

6. Public Park

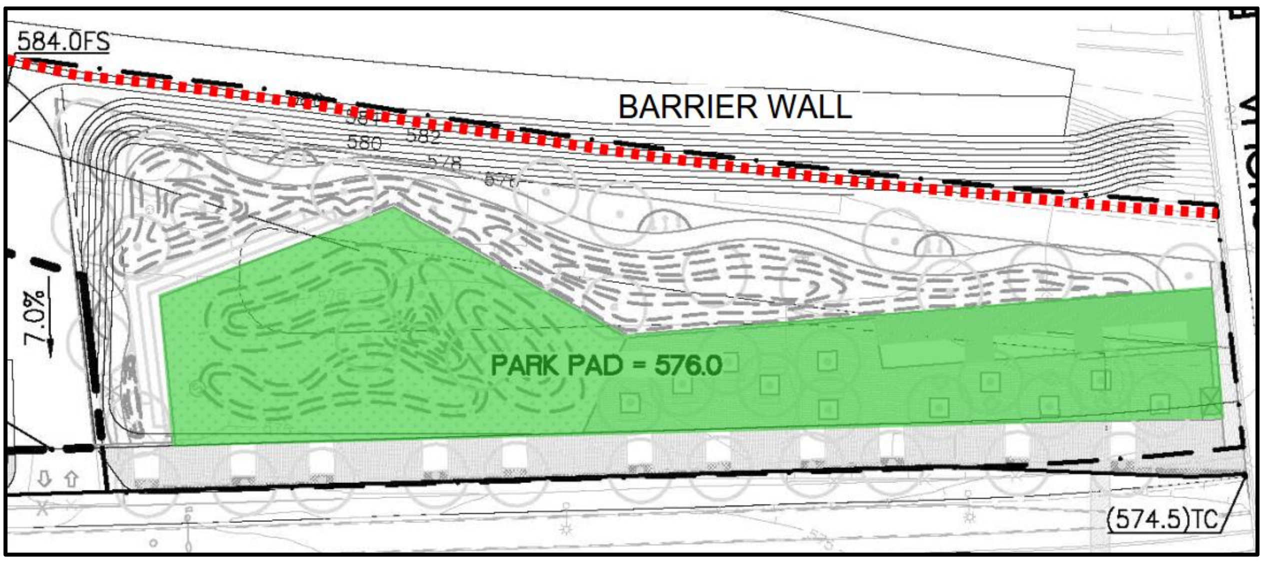
At the east end of the property is a parcel of city land to be used as a public park. This property has a designated park pad area shown in the diagram. Traffic noise exposure to this pad is from an elevation of 586 feet while the pad is at an elevation of 576 feet. This is a down slope exposure to the park, different from other exposures at the site.



To control noise to the park pad a barrier is needed. Barriers are most effective when they are close to the source, or close to the receiver. In conditions where the source is higher than the receiver, providing a barrier close to the source is more practical because the barrier does not have to be as high as the alternative of putting the barrier at the receiver location.

Noise exposure levels from traffic along I-5, during the day, average 76 dBA. To reduce this level of traffic noise to below 65 dBA, a barrier that extends to a height of 10 feet above the source needs to be constructed to control noise to the park pad. With this height, noise levels at the site will be reduced to 61 dBA. This is within acceptable limits for a urban park and will provide an acceptable environment to the people using the space for leisure and recreation.

The location of the barrier should be on the highest point of the land within the control of the park as shown in the diagram below. It should be constructed with a minimum mass of 4-lbs/sf, however, with the proximity to the highway and exposure to the weather, constructing the barrier using concrete would be a practical solution.



The barrier wall, to be effective, needs to maintain a height of 10 feet above the elevation of the highway. As the contour of the land falls away from the highway, moving east, the barrier height will need to be increased to maintain the relationship to the elevation of the highway.

Summary

The evaluation and recommendations provided by this report are a beginning to the selection and pricing of windows and curtain wall assemblies for the project. As the project moves forward this evaluation can be revised based on specific assemblies and products.

Please contact me if you have any questions.

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