APPENDIX 3.14-A **KNE NOISE AND VIBRATION TECHNICAL REPORT**

Los Angeles County
Metropolitan Transportation Authority

NOISE AND VIBRATION TECHNICAL REPORT

K LINE NORTHERN EXTENSION

Metro

JULY 2024

K LINE NORTHERN EXTENSION TRANSIT CORRIDOR PROJECT

Noise and Vibration Technical Report

Prepared for:

Los Angeles County
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ABBREVIATIONS/ACRONYMS

ACRONYM	DEFINITION
CAT	Computerized axial tomography
CNEL	community noise equivalent level
dB	decibels
dBA	A-weighted decibels
Division 16	Division 16 Southwestern Maintenance Yard
EIR	Environmental Impact Report
FDL	force density level
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FTA Guidance Manual	Federal Transit Administration 2018 *Transit Noise and Vibration Impact Assessment Manual*
GBN	ground-borne noise
GBV	ground-borne vibration
HVAC	heating, ventilation, and cooling
KNE	K Line Northern Extension
L_A	A-weighted ground-borne noise
LAX	Los Angeles International Airport
L_{dn}	day-night noise level
L_{eq}	equivalent noise level
$L_{eq}(h)$	hourly equivalent noise level
L_{max}	maximum noise level
LRT	light rail transit
LSTM	line source transfer mobility
L_V	level of velocity
Metro	Los Angeles County Metropolitan Transportation Authority
MFR	Multi-family residence
mph	miles per hour
MRI	magnetic resonance imaging
MSF	Maintenance and Storage Facility
N/A	not applicable
OCS	Overhead Contact System

ACRONYM	DEFINITION
PPV	peak particle velocity
Project	K Line Northern Extension Project
PSTM	point source transfer mobility
RCNM	Roadway Construction Noise Model
RMS	root mean square
ROW	right-of-way
RSA	Resource Study Area
SCAG	Southern California Association of Governments
SEL	sound exposure level
SEM	Sequential Excavation Method
SFR	single-family residence
TBM	tunnel boring machine
TPSS	traction power substation
VdB	vibration decibels
WPLE	Westside Project Line Extension

CHAPTER 1 INTRODUCTION

1.1 PROJECT OVERVIEW

The Los Angeles County Metropolitan Transportation Authority (Metro) is preparing a Draft Environmental Impact Report (EIR) for the K Line Northern Extension Transit Corridor Project (KNE, the Project). The Project would provide a northern extension of the Metro light rail transit (LRT) K Line from the Metro E Line (Expo) to the Metro D Line (Purple) and B Line (Red) heavy rail transit lines. The Project would serve as a critical regional connection, linking the South Bay, the Los Angeles International Airport (LAX) area, South Los Angeles, Inglewood, and Crenshaw corridor to Mid-City, Central Los Angeles, West Hollywood, and Hollywood, allowing for further connections to points north in the San Fernando Valley via the Metro B Line. The Project would also connect major activity centers and areas of high population and employment density.

1.2 TECHNICAL REPORT SUMMARY

This technical report evaluates the Project's environmental impacts as they relate to noise and vibration. It describes existing conditions, the current applicable regulatory setting, potential impacts from construction and operation of the alignment alternatives, stations, design option, and maintenance and storage facility (MSF), as well as mitigation measures where applicable. This technical report was conducted in compliance with the California Environmental Quality Act (CEQA) (Sections 21000 et seq.) and the CEQA Guidelines (Section 15000 et seq.), which require state and local agencies to identify the significant environmental impacts of their actions, including significant impacts associated with noise and vibration, and to avoid or mitigate those impacts, when feasible.

The technical report is organized into eight chapters:

- Chapter 1 – Introduction, provides an overview of the Project and a summary of the technical report's contents.
- Chapter 2 – Project Description, provides a description of the Project's alignment alternatives, stations, design option, and MSF. This section also describes the construction approach for the Project.
- Chapter 3 – Regulatory Framework, discusses applicable federal, state, and local regulatory requirements, including plans and policies relevant to Project jurisdictions.
- Chapter 4 – Methodology and Significance Thresholds, describes the analysis methodologies applied for this Project and provides a summary of CEQA significance thresholds adopted by state and local jurisdictions.
- Chapter 5 – Existing Setting, describes the existing conditions as relevant to the Project's alignment alternatives, stations, design option, and MSF.
- Chapter 6 – Impacts and Mitigation Measures, discusses the impact analyses conducted for the Project's alignment alternatives, stations, design option, and MSF, and discusses applicable mitigation measures. It also discusses any project measures that would be implemented as part of design and construction of the Project.

- Chapter 7 – Cumulative Impacts, discusses the cumulative impacts for the Project's alignment alternatives, stations, design option, and MSF.
- Chapter 8 – References, lists the references used to prepare this technical report.

CHAPTER 2 PROJECT DESCRIPTION

This section provides information pertinent to the components of the Project as evaluated in the technical report. The Project components for evaluation in this technical report include three light rail alignment alternatives with stations, one design option, and one MSF.

2.1 ALIGNMENT ALTERNATIVES

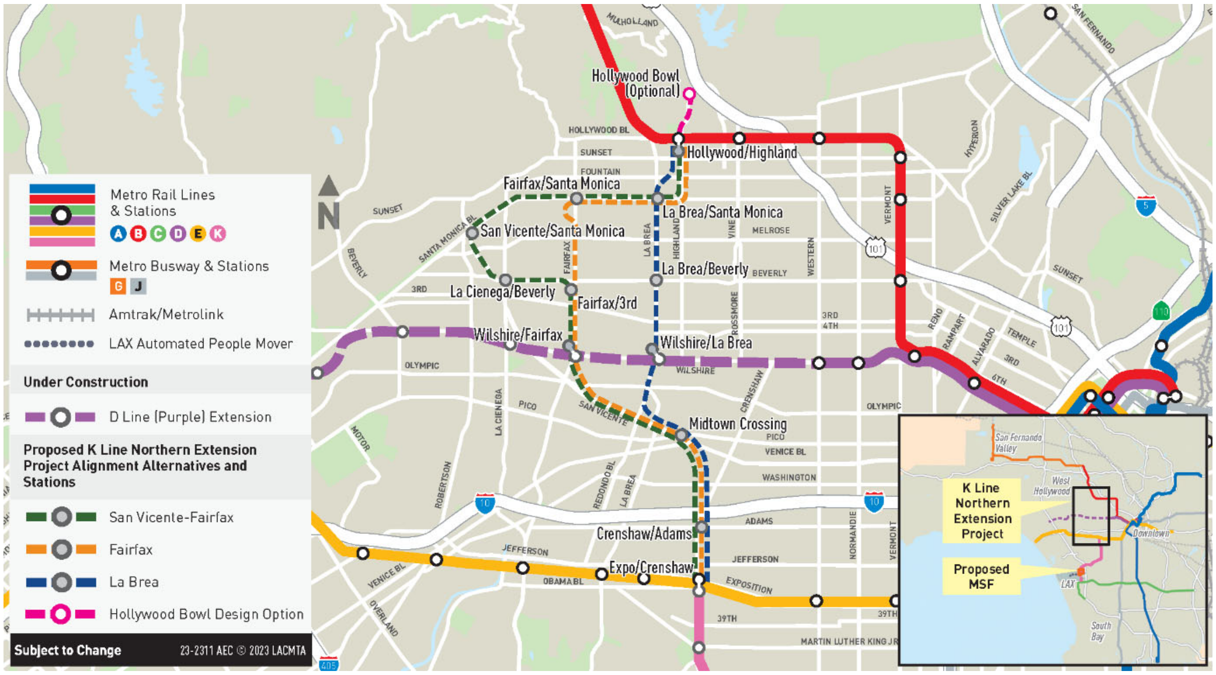
As shown in Figure 2-1, each of the three alignment alternatives would provide a northern extension of the Metro K Line from its current terminus at the Expo/Crenshaw Station to the Metro B Line Hollywood/Highland Station. All three alignment alternatives would operate entirely underground in parallel twin-bore tunnels with some station elements at the surface, including the station entrance and ventilation structures. Due to the project length and pending funding availability, the alignment alternatives would be constructed sequentially in sections.

The alignment alternatives are as follows:

- Alignment Alternative 1: San Vicente–Fairfax. This alignment alternative would travel north from the existing Metro K Line Expo/Crenshaw Station before heading northwest under San Vicente Boulevard, with a connection to the future Metro D Line Wilshire/Fairfax Station. It would continue north under Fairfax Avenue before turning west under Beverly Boulevard to rejoin San Vicente Boulevard. The alignment would then turn east under Santa Monica Boulevard, and then turn north just east of La Brea Avenue to follow Highland Avenue north to connect to the Metro B Line at the Hollywood/Highland Station.
- Alignment Alternative 2: Fairfax. This alignment alternative would travel north from the existing Metro K Line Expo/Crenshaw Station before heading northwest under San Vicente Boulevard and north under Fairfax Avenue, where it would connect with the future Metro D Line Wilshire/Fairfax Station. It would continue north under Fairfax Avenue and turn east under Santa Monica Boulevard. The alignment would then turn north just east of La Brea Avenue to follow Highland Avenue north to connect to the Metro B Line at the Hollywood/Highland Station.
- Alignment Alternative 3: La Brea. This alignment alternative would travel north from the existing Metro K Line Expo/Crenshaw Station before heading northwest under San Vicente Boulevard and north under La Brea Avenue, where it would connect with the future Metro D Line Wilshire/La Brea Station. From there, it would continue north under La Brea Avenue and turn northeast north of Fountain Avenue to follow Highland Avenue to connect with the Metro B Line at the Hollywood/Highland Station.

Table 2-1 provides a summary of the characteristics of each of the alignment alternatives and Table 2-2 identifies which stations would be constructed under each alignment alternative. In total, 12 station areas are identified, including the option to extend to the Hollywood Bowl.

FIGURE 2-1. K LINE NORTHERN EXTENSION ALIGNMENT ALTERNATIVES



Source: Connect Los Angeles Partners 2023

TABLE 2-1. CHARACTERISTICS OF THE ALIGNMENT ALTERNATIVES AND DESIGN OPTION

PROJECT COMPONENTS	ALIGNMENT ALTERNATIVES			DESIGN OPTION
	1. SAN VICENTE–FAIRFAX	2. FAIRFAX	3. LA BREA	HOLLYWOOD BOWL EXTENSION
Alignment Length	9.7 miles underground	7.9 miles underground	6.2 miles underground	+ 0.8 mile underground
Stations	9 underground	7 underground	6 underground	+1 underground
Travel time from Expo/Crenshaw to Hollywood/Highland Stations	19 minutes	15 minutes	12 minutes	+2 minutes (from Hollywood/Highland)

Source: Connect Los Angeles Partners 2023

TABLE 2-2. STATIONS BY ALIGNMENT ALTERNATIVE

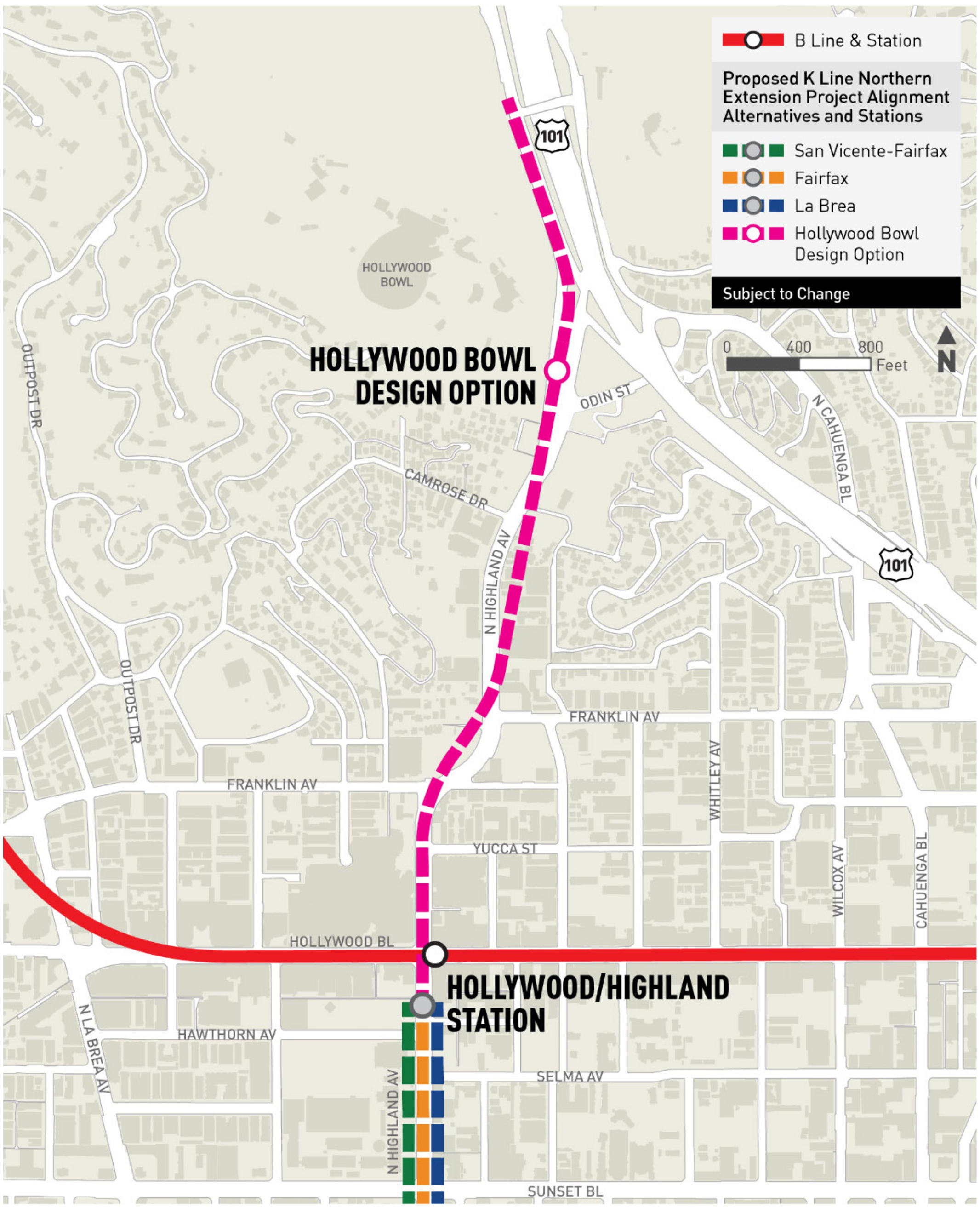
STATION	SAN VICENTE–FAIRFAX	FAIRFAX	LA BREA
Crenshaw/Adams (City of Los Angeles)	●	●	●
Midtown Crossing (City of Los Angeles)	●	●	●
Wilshire/Fairfax (City of Los Angeles)	●	●	
Fairfax/3rd (City of Los Angeles)	●	●	
La Cienega/Beverly (City of Los Angeles)	●		
San Vicente/Santa Monica (City of West Hollywood)	●		
Fairfax/Santa Monica (City of West Hollywood)	●	●	
La Brea/Santa Monica (City of West Hollywood)	●	●	●
Hollywood/Highland (City of Los Angeles)	●	●	●
Wilshire/La Brea (City of Los Angeles)			●
La Brea/Beverly (City of Los Angeles)			●
Hollywood Bowl (City of Los Angeles)	●	●	●

Source: Connect Los Angeles Partners 2023

2.2 HOLLYWOOD BOWL DESIGN OPTION

For every alignment alternative, there is one design option under consideration. The Hollywood Bowl Design Option includes an alternate terminus station at the Hollywood Bowl, north of the proposed Hollywood/Highland Station, as shown in Figure 2-2.

FIGURE 2-2. HOLLYWOOD BOWL DESIGN OPTION



Source: Connect Los Angeles Partners 2023

2.3 MAINTENANCE AND STORAGE FACILITY

An MSF would be constructed that would expand the Division 16 Maintenance Yard (Division 16), the existing MSF for the Metro K Line near LAX, as shown in Figure 2-3. The MSF would provide equipment and facilities to accommodate daily servicing and cleaning, inspection and repairs, and storage of light rail vehicles that are not in service. The MSF would be the primary physical employment center for rail operation employees, including train operators, maintenance workers, supervisors, administrators, security personnel, and other roles. If the Project is opened in sections, operation of the extended K Line from the Expo/Crenshaw Station to the Metro D Line could be accommodated within the existing Division 16 site with four new storage tracks.

FIGURE 2-3. MAINTENANCE AND STORAGE FACILITY

Source: Connect Los Angeles Partners 2023

2.4 CONSTRUCTION APPROACH

The Project would be constructed in sections that would be built sequentially, depending on available funding. The development of the Project would employ conventional construction methods, techniques, and equipment, similar to other Metro projects that require underground tunneling. Detailed information on construction techniques can be found in the KNE Construction Approach Report. Major construction activities for the Project include surveys and preconstruction, which consist of local business surveys, building and utility assessments, and site preparations; right-of-way acquisition; tunnel construction, including tunnel boring machine (TBM) excavation and segmental lining and installation; utility relocation and installation work; station, crossover, and connection box construction; MSF construction, including site grading, maintenance building construction, and storage and access track construction; street restorations, including paving and sidewalks; ventilation and emergency egress construction; systems installation and facilities, including trackbed, rail, overhead contact system, conduit, electrical substation, and communications and signaling construction; and construction of other ancillary facilities.

The tunnels would be bored with TBMs, and the stations and track crossover boxes would be constructed via cut-and-cover methods, which entail excavating down from the ground surface and stabilizing the ground with an excavation support, then placing temporary decking surfaces above the excavation and conducting all excavation inside the supported area. The tunnel and station associated with the Hollywood Bowl Design Option would be constructed by sequential excavation method (SEM), which entails conventional mining techniques and equipment for hard rock excavation, which would reduce surface impacts.

Construction staging areas have been identified at each of the station locations, which are described and illustrated in Appendix A of the KNE Construction Approach Report. In order to construct a station, a minimum of one to two acres of construction staging sites would be needed for the duration of the station construction period. A larger construction staging site of three to four acres would be required if the site is also used to launch the TBMs and support tunneling activities. The TBM launch sites have been identified at the Midtown Crossing, San Vicente/Santa Monica, and La Brea/Santa Monica Stations. Temporary street, lane, sidewalk and bike lane closures as well as street reconfigurations will be part of construction activities. Construction and operational impacts on noise and vibration are identified and discussed in this technical report.

CHAPTER 3 REGULATORY FRAMEWORK

3.1 FEDERAL REGULATIONS

3.1.1 TRANSIT NOISE AND CONSTRUCTION NOISE

Federal Transit Administration (FTA) standards and criteria for assessing noise impacts related to transit projects are used for this analysis since CEQA does not address modeling methodology for transit noise and vibration impacts. The FTA methodology is the proven method to address the effects of noise and vibration on the environment from transit construction and operations, and it is based on community reactions to noise. The noise impact criteria reflect changes in noise exposure using a sliding scale where the higher the level of existing noise, the smaller the increase in total noise exposure that is allowed. Some land use activities are more sensitive to noise than others, such as parks, churches, and residences, as compared to industrial and commercial uses. FTA noise impact criteria group sensitive land uses into three categories, as described in Table 3-1. Most commercial or industrial uses are not considered noise-sensitive because activities within these types of buildings are generally compatible with higher noise levels. Businesses can be considered noise-sensitive if low noise levels are an important part of operations; such business include sound and motion picture recording studios. Most parks used primarily for active recreation, such as sports complexes and bike or running paths, are not considered noise-sensitive. However, some parks (even some in dense urban areas) are primarily used for passive recreation, such as reading, conversation, or meditation. These places, which may be valued as havens from the noise and rapid pace of everyday city life, are treated as noise-sensitive, and are included in Land Use Category 3. Non-sensitive uses do not require noise impact assessment.

TABLE 3-1. LAND USE CATEGORIES AND METRICS FOR TRANSIT NOISE IMPACT CRITERIA

LAND USE CATEGORY	LAND USE TYPE	NOISE METRIC (dBA)	DESCRIPTION OF LAND USE CATEGORY
1	High Sensitivity	Outdoor L_{eq} (1hr)[1]	Land where quiet is an essential element of its intended purpose. Example land uses include preserved land for serenity and quiet, outdoor amphitheaters and concert pavilions, and national historic landmarks with considerable outdoor use. Recording studios and concert halls are also included in this category.
2	Residential	Outdoor L_{dn}	This category is applicable to all residential land use and to buildings where people normally sleep, such as hotels and hospitals.
3	Institutional	Outdoor L_{eq} (1hr)[1]	This category is applicable to institutional land uses with primarily daytime and evening use. Example land uses include schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds, and recreational facilities are also included in this category.

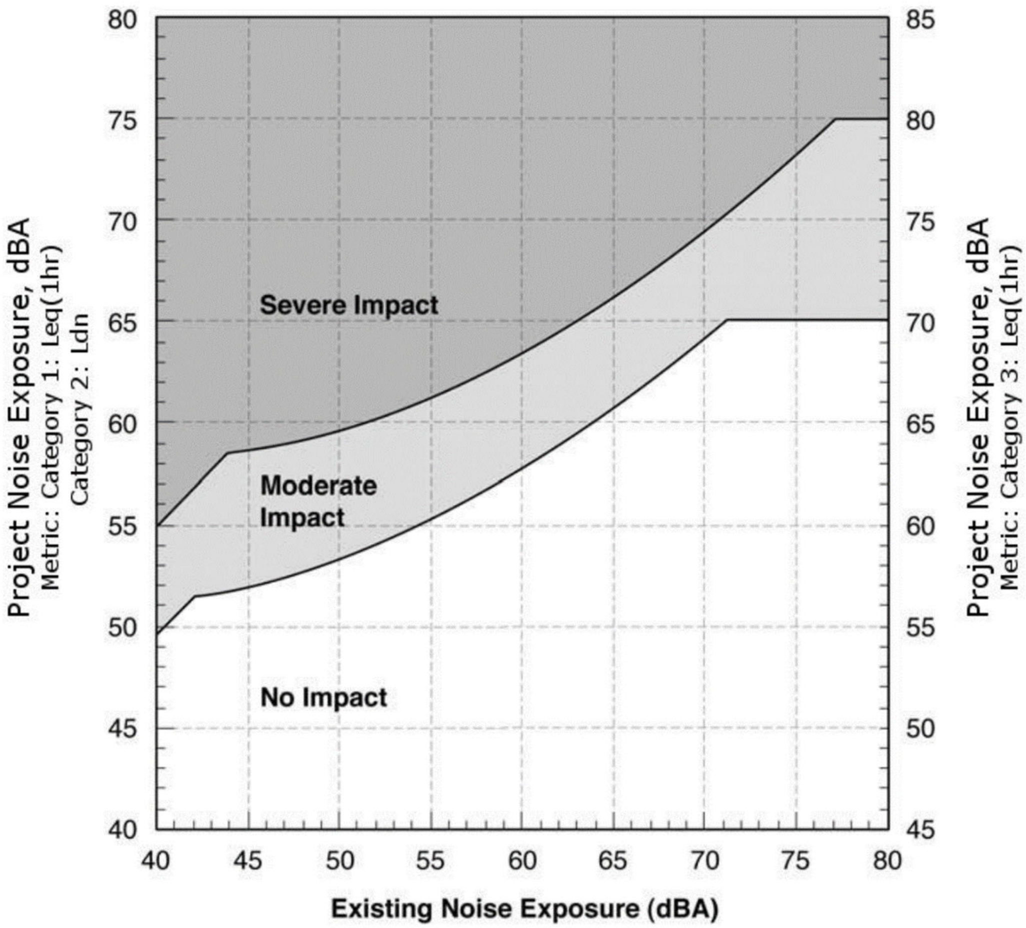
Source: FTA 2018

[1] L_{eq} (1hr) for the loudest hour of project related activity during hours of noise sensitivity.

dBA = A-weighted decibels; L_{dn} = day-night noise level ; L_{eq} = equivalent noise level

The FTA has defined three levels of impacts for sensitive uses affected by transit projects: no impact, moderate impact, and severe impact. Each impact level is illustrated in Figure 3-1 and described in Table 3-2. For CEQA, a severe impact under FTA guidelines is considered a significant increase in noise levels. Mitigation measures will be identified for severe impacts.

FIGURE 3-1. NOISE IMPACT CRITERIA FOR TRANSIT PROJECTS



Source: FTA 2018

TABLE 3-2. LEVELS OF IMPACT

LEVEL OF IMPACT	DESCRIPTION
No Impact	Project-generated noise is not likely to cause community annoyance. Noise projections in this range are considered acceptable by FTA and mitigation is not required.
Moderate Impact	Project-generated noise in this range is considered to cause impact at the threshold of measurable annoyance. Moderate impacts serve as an alert to project planners for potential adverse impacts and complaints from the community. Mitigation should be considered at this level of impact based on project specifics and details concerning the affected properties.
Severe Impact	Project-generated noise in this range is likely to cause a high level of community annoyance. The project sponsor should first evaluate alternative locations/alignments to determine whether it is feasible to avoid severe impacts altogether. In densely populated urban areas, evaluation of alternative locations may reveal a trade-off of affected groups, particularly for surface rail alignments. Projects that are characterized as point sources rather than line sources often present greater opportunity for selecting alternative sites. This guidance manual and FTA's environmental impact regulations both encourage project sites which are compatible with surrounding development when possible. If it is not practical to avoid severe impacts by changing the location of the project, mitigation measures must be considered.

Source: FTA 2018

The FTA has identified special cases for severe and moderate impact categories:

- Severe impact: Noise mitigation will be specified for severe impact areas unless there is no practical method of mitigating the noise.
- Moderate impact: In this range, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These other factors may include the predicted increase over existing noise levels, the type and number of noise-sensitive land uses affected, existing outdoor-indoor sound insulation, and the cost-effectiveness of mitigating noise to more acceptable levels.

The noise impact criteria for transit operations are summarized in Table 3-3. The first column of the table shows existing noise exposure, and the remaining columns show the additional noise exposure caused by a transit project that would need to result in each of the three impact levels (no impact, moderate, or severe). As the existing noise exposure increases, the amount of allowable increase in noise exposure from the Project alignment alternatives decreases.

For the purposes of this analysis, sensitive land uses were clustered depending on the similarity of existing noise conditions and other parameters. The FTA noise impact criteria were applied for each cluster based upon existing noise exposure using equations found within Table C-1 of the FTA Transit Noise and Vibration Impact Assessment Manual (FTA Guidance Manual; FTA 2018). The future noise exposure would be the combination of the existing noise exposure and the additional noise exposure caused by a transit project.

TABLE 3-3. NOISE IMPACT CRITERIA FOR TRANSIT OPERATIONS

EXISTING NOISE EXPOSURE L_{EQ} OR L_{DN} (dBA)	PROJECT NOISE IMPACT EXPOSURE, L_{EQ} (H) OR L_{DN} (dBA)					
	CATEGORY 1 OR 2 SITES			CATEGORY 3 SITES		
	NO IMPACT	MODERATE IMPACT	SEVERE IMPACT	NO IMPACT	MODERATE IMPACT	SEVERE IMPACT
<43	< Ambient + 10	Ambient + 10 to 15	>Ambient + 15	< Ambient + 15	Ambient + 15 to 20	>Ambient + 20
43	<52	52-58	>58	<57	57-63	63
44	<52	52-58	>58	<57	57-63	63
45	<52	52-58	>58	<57	57-63	63
46	<53	53-59	>59	<58	58-64	64
47	<53	53-59	>59	<58	58-64	64
48	<53	53-59	>59	<58	58-64	64
49	<54	54-59	>59	<59	59-64	64
50	<54	54-59	>59	<59	59-64	64
51	<54	55-60	>60	<59	59-65	65
52	<55	55-60	>60	<60	60-65	6
53	<55	55-60	>60	<60	60-65	65
54	<55	55-61	>61	<60	60-66	66
55	<56	55-61	>61	<61	61-66	66
56	<56	56-62	>62	<61	61-67	67
57	<57	57-62	>62	<62	62-67	67
58	<57	57-62	>62	<62	62-67	67
59	<58	58-63	>63	<63	63-68	68
60	<58	58-63	>63	<63	63-68	68
61	<59	59-64	>64	<64	64-69	69
62	<59	59-64	>64	<64	64-69	69
63	<60	60-65	>65	<65	65-70	70
64	<61	61-65	>65	<66	66-70	70
65	<61	61-66	>66	<66	66-71	71
66	<62	62-67	>67	<67	67-72	72
67	<63	63-67	>67	<68	68-72	72
68	<63	63-68	>68	<68	68-73	73
69	<64	64-69	>69	<69	69-74	74
70	<65	65-69	>69	<70	70-74	74
71	<66	66-70	>70	<71	71-75	75
72	<66	66-71	>71	<71	71-76	76
73	<66	66-71	>71	<71	71-76	76

EXISTING NOISE EXPOSURE L_{EQ} OR L_{DN} (dBA)	PROJECT NOISE IMPACT EXPOSURE, L_{EQ} (H) OR L_{DN} (dBA)					
	CATEGORY 1 OR 2 SITES			CATEGORY 3 SITES		
	NO IMPACT	MODERATE IMPACT	SEVERE IMPACT	NO IMPACT	MODERATE IMPACT	SEVERE IMPACT
74	<66	66-72	>72	<71	71-77	77
75	<66	66-73	>73	<71	71-78	78
76	<66	66-74	>74	<71	71-79	79
77	<66	66-74	>74	<71	71-79	79
>77	<66	66-75	>75	<71	71-80	80

Source: FTA 2018
dBA = A-weighted decibels; L_{dn} = day-night noise level; Leq(h) = hourly equivalent noise level

FTA guidelines defer assessing construction noise impacts to local noise ordinances, where local noise ordinances exist. Where local noise ordinances do not exist, the FTA provides guidelines that can be considered reasonable criteria for impact assessment. If these criteria are exceeded, there may be adverse community reaction. Table 3-4 shows these noise criteria by land use.

TABLE 3-4. GENERAL ASSESSMENT OUTDOOR CONSTRUCTION NOISE CRITERIA

LAND USE	$L_{EQ.EQUIP(1HR)}$, dBA	
	DAY	NIGHT
Residential	90	80
Commercial	100	100
Industrial	100	100

Source: FTA 2018
dBA = A-weighted decibels; L_{eq} = hourly equivalent noise level

For this project, outdoor construction noise is assessed using guidance provided in local ordinances as discussed in Section 3.3.

3.1.2 TRANSIT VIBRATION AND CONSTRUCTION VIBRATION

FTA has developed impact criteria for acceptable levels of ground-borne vibration (GBV) and ground-borne noise (GBN). GBV is the movement of the ground caused by an energy source, such as train movement or construction; GBN is the noise that can occur inside a building, caused by the GBV effect on the structure of the building. Chapter 4 provides more detail on how GBV and GBN are calculated. These GBV and GBN criteria are summarized in Table 3-5 and are presented in terms of acceptable indoor GBV and GBN levels. Impacts would occur if these levels are exceeded. Criteria for GBV are expressed in terms of root mean square (RMS) velocity levels in vibration decibels (VdB), and criteria for GBN are expressed in terms of A-weighted sound pressure levels as A-weighted decibels (dBA).

TABLE 3-5. GBV AND GBN IMPACT CRITERIA FOR GENERAL ASSESSMENT

LAND USE CATEGORY	GBV IMPACT LEVELS (VdB, 1 MICRO-INCH / SEC)			GBN IMPACT LEVELS (dBA, 20 MICRO PASCALS)		
	FREQUENT EVENTS[1]	OCCASIONAL EVENTS[2]	INFREQUENT EVENTS[3]	FREQUENT EVENTS[1]	OCCASIONAL EVENTS[2]	INFREQUENT EVENTS[3]
Category 1: Buildings where vibration would interfere with interior operations[4]	65	65	65	N/A	N/A	N/A
Category 2: Residences and buildings where people normally sleep	72	75	80	35	38	43
Category 3: Institutional land uses with primarily daytime use	75	78	83	40	43	48

Source: FTA 2018
[1] "Frequent Events" is defined as more than 70 vibration events of the same source per day. The Project would fall into this category.
[2] "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines fall into this category.
[3] "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes commuter rail branch lines.
[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes.
Note: dBA = A-weighted decibels; N/A = not applicable; VdB = vibration decibels

Since the Project would have more than 70 train pass-bys per day, the FTA criteria for frequent events is used to assess potential impacts.

The criteria for special buildings such as concert halls, television and recording studios, auditoriums, and theaters, which are also sensitive to vibration but do not fit into the three FTA sensitive land use categories previously described, are presented in Table 3-6. For this Project, the Hollywood Bowl, Lee Strasberg Theatre, and others are included in this special building category. The Academy Museum is classified as a Category 3 Institutional land use due to its usage as a movie theater. Medical buildings such as Cedars-Sinai Medical Center may have equipment sensitive to vibration, which would need to be evaluated if there is a possible vibration impact at the building.

Table 3-6 includes the consideration of frequency of vibration events. If the combined frequency of existing and project vibration events would change the GBV and GBN impact level, for example from occasional to frequent, the impact criteria for the higher-frequency of events is applicable. GBN is the potential impact from underground transit operations where there is no wayside noise.

To evaluate potential annoyance or interference with vibration-sensitive activities caused by construction vibration, the criteria for general assessment shown in Table 3-5 can be applied. In most cases, the primary concern regarding construction vibration relates to potential damage effects. Vibration damage criteria are provided in Table 3-7 for various structural categories.

TABLE 3-6. GBV AND GBN IMPACT CRITERIA FOR SPECIAL BUILDINGS

TYPE OF BUILDING OR ROOM	GBV IMPACT LEVELS (VdB, 1 MICRO-INCH / SEC)		GBN IMPACT LEVELS (dBA, 20 MICRO PASCALS)	
	FREQUENT EVENTS[1]	OCCASIONAL OR INFREQUENT EVENTS[2,3]	FREQUENT EVENTS[1]	OCCASIONAL OR INFREQUENT EVENTS[2,3]
Concert Halls	65	65	25	25
TV Studios	65	65	25	25
Recording Studios	65	65	25	25
Auditoriums	72	80	30	38
Theaters	72	80	35	43

Source: FTA 2018
[1] "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
[2] "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines fall into this category.
[3] "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes commuter rail branch lines.
dBA = A-weighted decibels; VdB= vibration decibels

TABLE 3-7. CONSTRUCTION VIBRATION DAMAGE RISK CRITERIA

BUILDING CATEGORY	PPV (INCH / SECOND)
I. Reinforced concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Historic buildings that have average sensitivity to vibration damage, and non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

Source: FTA 2018
PPV = peak particle velocity

The limit of 0.12 inch/second (PPV) for fragile historic structures is among the most restrictive limits used for vibration damage risk to buildings. A damage risk criterion of 0.2 inch/second (PPV) is protective of all but the most fragile buildings.

3.2 STATE REGULATIONS

3.2.1 NOISE

There are no state noise regulations relevant to the Project.

3.2.2 VIBRATION

There are no state vibration regulations relevant to the Project.

3.3 LOCAL REGULATIONS

The regulations of local jurisdictions do not apply to transit operational noise, which is most appropriately assessed using guidance provided by the FTA. However, the regulations of local jurisdictions are relevant to Project construction.

3.3.1 CITY OF LOS ANGELES

The City of Los Angeles has established policies and regulations concerning the generation and control of noise that could adversely affect its citizens and noise-sensitive land uses. The City of Los Angeles Municipal Code and the City of Los Angeles General Plan Noise Element (1999) are the two documents designed to regulate noise within the city. The L.A. CEQA Threshold Guide (City of Los Angeles 2006) provides impact thresholds for construction within the city. Codes, goals, objectives, and policies designed to regulate noise are shown in Table 3-8.

TABLE 3-8. CITY OF LOS ANGELES RELEVANT NOISE AND VIBRATION CODES, GOALS, OBJECTIVES, AND POLICIES

CODE/GOAL/OBJECTIVE/ POLICY	DESCRIPTION
CITY OF LOS ANGELES MUNICIPAL CODE	
Section 41.40	Engaging in construction, repair, or excavation work with any construction-type device or job-site delivering of construction materials without a Police Commission approved variance would constitute a violation: • Between the hours of 9:00 p.m. and 7:00 a.m. of the following day. • In any residential zone, or within 500 feet of land so occupied, before 8:00 a.m. or after 6:00 p.m. on any Saturday, or at any time on any Sunday. In a manner as to disturb the peace and quiet of neighboring residents or any reasonable person of normal sensitiveness residing in the area.
Section 41.40(j)	States that the noise standards do not apply to major public works construction by the City of Los Angeles and its proprietary departments, including all structures and operations necessary to regulate or direct traffic due to construction activities. It also states that the Board of Police Commissioners will grant a variance for this work and construction activities will be subject to all conditions of the variance as granted. Concurrent with the request for a variance, the City department that will conduct the construction work will notify each affected Council district office and established Neighborhood Council of projects where proposed Sunday and/or holiday work will occur.
Section 91.1207.14.2	Interior noise levels attributable to exterior sources shall not exceed 45 dB. in any habitable room. The noise metric shall be either the L_{dn} or the community noise equivalent level (CNEL), the weighted average noise level in a community over a certain period of time, consistent with the noise element of the local general plan.
Section 112.05	Specifies the maximum noise level of powered equipment or powered hand tools. Any powered equipment or hand tool that produces a maximum noise level exceeding 75 dBA at a distance of 50 feet when operated within 500 feet of a residential zone is prohibited. However, this noise limitation does not apply where compliance is technically infeasible. "Technically infeasible" means the above noise limitation cannot be met despite the use of mufflers, shields, sound barriers, and/or any other noise-reduction device or techniques during the operation of equipment.

CODE/GOAL/OBJECTIVE/ POLICY	DESCRIPTION
CITY OF LOS ANGELES GENERAL PLAN NOISE ELEMENT	
P11	For a proposed development project that is deemed to have a potentially significant noise impact on noise-sensitive uses, as defined by this chapter, require mitigation measures, as appropriate, in accordance with CEQA and city procedures.
P12	When issuing discretionary permits for a proposed noise-sensitive use (as defined by this chapter) or a subdivision of four or more detached single-family units and which use is determined to be potentially significantly impacted by existing or proposed noise sources, require mitigation measures, as appropriate, in accordance with procedures set forth in the CEQA so as to achieve an interior noise level of a CNEL of 45 dB, or less, in any habitable room, as required by Los Angeles Municipal Code Section 91.
CITY OF LOS ANGELES CEQA THRESHOLD GUIDELINES	
I.2	A project would normally have a significant impact on noise levels from construction if: • Construction activities lasting more than one day would exceed existing ambient exterior noise levels by 10 dBA or more at a noise-sensitive use; • Construction activities lasting more than 10 days in a three-month period would exceed existing ambient exterior noise levels by 5 dBA or more at a noise-sensitive use; or • Construction activities would exceed the ambient noise level by 5 dBA at a noise-sensitive use between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 6:00 p.m. on Saturday, or at any time on Sunday. • Quantification of ambient noise levels (existing and projected at time of construction) measured in CNEL.

Source: City of Los Angeles Municipal Code; City of Los Angeles 1999, 2006
CEQA = California Environmental Quality Act; CNEL = community noise equivalent level; dB = decibels; dBA = A-weighted decibels; Ldn = day-night noise level

3.3.2 CITY OF WEST HOLLYWOOD

The City of West Hollywood's Municipal Code section 9.08 has established policies and regulations concerning the generation and control of noise that could adversely affect its citizens and noise-sensitive land uses. Codes, goals, objectives, and policies designed to regulate noise are shown in Table 3-9.

TABLE 3-9. CITY OF WEST HOLLYWOOD RELEVANT NOISE AND VIBRATION CODES, GOALS, OBJECTIVES, AND POLICIES

CODE/GOAL/OBJECTIVE/ POLICY	DESCRIPTION
Section 9.08.050(d 1)	States construction between the hours of 7:00 p.m. and 8:00 a.m. on weekdays; or at any time on Saturday (except, between the hours of 8:00 a.m. and 7:00 p.m., interior construction is permissible); or at any time on Sunday, New Year's Day, Martin Luther King Day, President's Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, the day after Thanksgiving, Christmas Day and observed holidays; all except as provided in subsection (d) of Section 9.08.060. If New Year's Day, Independence Day or Veterans Day falls on a weekend, then the following Monday or preceding Friday is a holiday.
Section 9.08.050(d 2)	To minimize the disturbance to surrounding community, the motors and engines for construction related vehicles and equipment shall not be left idling and shall be turned off when not in use.
Section 9.08.0560(d)	*Construction and Commercial Tree Removal or Trimming Services – Special Circumstances.* The provisions of Section 9.08.050 do not apply to any person who performs construction, repair, earthmoving work, excavation, or commercial tree trimming and removal services if and to the extent that the City Manager has given express prior written permission to perform such work at times prohibited in Section9.08.050. In order to be given such permission, the person must submit to the City Manager an application in writing, stating the reasons for the request and the facts upon which such reasons are based. The City Manager may grant or conditionally grant such permission if the City Manager, City Engineer, Code Enforcement Officer, or Building Official has found that: 1. The work proposed to be done is necessary to protect or promote public safety or welfare or is otherwise in the public interest; or 2. Hardship, including, but not limited to, unreasonable delay due to weather, acts of God or labor strikes, would result from the interruption thereof during the hours and days specified in Section 9.08.060; or 3. The building or structure involved is devoted or intended to be devoted to a use immediately incidental to public defense. Any applicant dissatisfied with the decision of the City Manager may appeal to the City Council by filing a notice of appeal with the City Clerk within 10 days after notice of the City Manager's decision. The City Council shall, within 30 days of filing the appeal, affirm, reverse or modify the decision of the City Manager. The provisions of Section 9.08.050 do not apply to the construction, repair, excavation, or commercial tree trimming and removal during prohibited hours as may be necessary for the preservation of life or property, when such necessity arises during such hours as the offices of the City are closed, or where such necessity requires immediate action prior to the time at which it would be possible to obtain a permit pursuant to this section. The person doing such construction, repair, excavation, or commercial tree trimming and removal shall obtain a permit therefor within one business day of such construction, repair, excavation, or commercial tree trimming and removal.

Source: City of West Hollywood Municipal Code 2023

CHAPTER 4 METHODOLOGY AND SIGNIFICANCE THRESHOLDS

4.1 METHODOLOGY

The purpose of this assessment is to evaluate the Project against thresholds of significance as the basis for determining the level of impacts related to noise and vibration. The analysis utilizes the FTA Guidance Manual for assessing operational noise and vibration associated with construction and operation of transit projects. Impacts are analyzed in accordance with CEQA guidelines, using the FTA noise and vibration impact criteria to identify significant increases in noise and vibration levels.

FTA standards and criteria for assessing noise impacts (see Section 3.1) related to transit projects are based on community reactions to noise. The criteria reflect changes in noise exposure using a sliding scale where the higher the level of existing noise, the smaller the increase in total noise exposure that is allowed. Findings of a severe impact according to FTA criteria is considered a significant impact for the purposes of this CEQA analysis.

FTA has also developed impact criteria for acceptable levels of GBN and GBV. These criteria, as summarized in Table 3-5, are presented in terms of acceptable indoor GBN and GBV levels. Impacts will occur if these levels are exceeded. Criteria for GBV are expressed in terms of RMS velocity levels in VdB, and criteria for GBN are expressed in terms of A-weighted sound pressure levels in dBA. The criteria for special buildings such as concert halls, television and recording studios, auditoriums, and theaters, which are also sensitive to vibration but do not fit into the three FTA sensitive land use categories described in Table 3-5, are presented in Table 3-6. With the exception of the MSF site, GBN from Project operations will be modeled because the alignment will be below grade. Findings of a severe impact according to FTA criteria is considered a significant impact for the purposes of this CEQA analysis.

4.1.1 OPERATIONAL NOISE AND VIBRATION

4.1.1.1 ABOVEGROUND NOISE SOURCES

An analysis of operational noise levels at sensitive land uses was completed using the FTA Detailed Noise Analysis procedure as found in Section 4.5 of the FTA Guidance Manual and outlined as follows:

- Receivers of Interest: Cluster sensitive land uses and select receivers of interest.
- Project Noise: Identify the project noise sources that are in the vicinity of receivers of interest. For these sources, determine the source reference noise in terms of sound exposure level (SEL). Convert each source SEL to noise exposure (L_{dn} or L_{eq} (h)) at 50 feet, for the appropriate project operating parameters.
- Propagation and Summation of Project Noise at Receivers of Interest: Draw a noise exposure vs. distance curve for each relevant source. This curve will show source noise as a function of distance, accounting for shielding along the path, as well as any propagation-path mitigation

that will be included in the project. From these curves, determine the total project noise exposure at all receivers of interest by combining the levels from all relevant sources.

- Existing Noise Levels in the Vicinity of the Project Are Considered When Using the FTA Detailed Assessment: Take at least one noise measurement at each receiver that is typical of noise exposure in the area. If a measurement cannot be taken, estimate the existing noise exposure at each receiver of interest.
- Noise Impact Assessment: Assess noise impact at each receiver of interest using the impact levels and criteria defined in Table 3-2 and Table 3.3. If the project has a severe noise impact under the FTA Detailed Assessment, it would be a significant increase under CEQA.
- Mitigation of Noise Impact: Where the assessment shows a Severe Impact, evaluate mitigation measures. Then loop back to modify the Project-noise computations, thereby accounting for the adopted mitigation, and reassess the remaining noise impact.

The Project would be primarily underground, with the exception of the MSF and the entrances and exits to the stations. The following sections provide methodological considerations about various aboveground Project components.

SPECIAL TRACKWORK

Where two sets of rail track cross, the special piece of track used is referred to as a “frog.” Standard frogs have gaps where the two rails cross and the wheels must “jump” across the gap. The wheels striking the ends of the gap increases noise levels near special trackwork by approximately five dBA. A five-dBA adjustment has been applied for receivers within 300 feet of a crossover.

ANCILLARY FACILITIES NOISE MODEL

The traction power substation (TPSS) units would be located underground (with the exception of the TPSS unit at the MSF); therefore, the TPSS units would not contribute to future noise levels. Emergency, standby, and critical operations power system generators, located along the alignment, at the MSF, and at a rail operations control center would be another potential source of noise. Reduction of noise from these sources would be provided by barriers, enclosures, sound absorptive materials, and engine silencers as applicable to the individual facility or unit design. Operation of the generators would not be a part of regular operation. They would only be used during emergency situations and during weekly testing for approximately 20 minutes; therefore, generator operation has not been included as part of the operational analysis.

STATION NOISE MODEL

While underground operational activities at the stations were not included in the noise analysis, aboveground activities at the stations were. These aboveground activities include entrance and egress from the stations (through stairways, escalators, and elevators), as well as an increase in the number of people around the station. The openings for the escalators and for the ventilation shafts can act as noise sources for the subway. Emergency egress locations would be closed during normal operations and would not be a source of noise.

MAINTENANCE AND STORAGE FACILITY NOISE MODEL

The proposed MSF would have a various aboveground noise sources within the facility, which are described in the sections below.

TRAIN MOVEMENT ON TRACKS

Train movements at the MSF would generate noise from steel wheels rolling on steel rails. Trains would travel at low speeds within the MSF site. As described in Section 7 of the Metro Rail Rule Book (Metro 2013) for the Metro A and E Lines, the trains are anticipated to move with an average speed of 10 miles per hour (mph) within the yard and five mph along curves. Train movement noise within the yard was calculated using the same procedure for the calculation of light rail noise, as shown in Section 4.1.1.1.

CROSSOVERS

Turnouts and crossovers require that two rails cross; the special fixture used where two rails cross is referred to as a "frog." The wheels striking the ends of the gap increases noise and vibration levels near special trackwork by approximately five dBA.

WHEEL SQUEAL

The MSF would include tight curves that may generate wheel squeal. The analysis assumes that LRT activity on tight curves within the yard would add 10 dBA due to noise from wheel squeal to the light rail noise.

MAINTENANCE SHOPS

The maintenance shop would accommodate daily servicing and cleaning, inspection and repairs, and storage of light rail vehicles. A reference noise level for the maintenance shops was obtained from the Metro E Line Phase 2 Final EIR (Metro 2022) and from noise measurements at the Metro C Line Maintenance Yard. The reference noise level was 62 dBA L_{eq} at 30 feet for a period of 30 minutes. The noise level from the maintenance shops is assumed to be continuous. The L_{dn} was calculated using FTA methodology for determining L_{dn} from a one-hour L_{eq} measurement:

L_{eq}: 62 dBA at 30 feet

L_{dn}: 70 dBA at 30 feet (L_{eq} + 8)

L_{dn} or L_{eq} = (L_{dn} or L_{eq}) at 50 feet - 20 x Log (50/30)

CAR WASH

The car wash would include one vehicle wash bay and servicing area for daily cleaning. The mechanical system would operate 50 percent of the time both day and night. The FTA Guidance Manual provides a reference SEL for car washes of 111 dBA at 50 feet (75 dBA maximum noise level [L_{max}] at 50 feet). However, FTA would prefer measurements for this noise source. For this Project, the SEL is based on measurements taken for other recent Metro studies, such as the Metro E Line Phase 2 Project (Metro 2022). A reference SEL of 85 dBA (64 dBA L_{max}) at 20 feet was used:

SEL: 85 dBA at 20 feet

Based upon wash cycle information from the Metro A Line, a three-car train would typically take five minutes with a maximum of 22 three-car trains able to be washed per day. This would lead to a total operation time of 110 minutes per day of the car wash. The car wash was assumed to operate for two hours during the day and two hours during the night.

VEHICULAR TRAFFIC

Parking noise was modeled at the proposed MSF parking area. Sensitive receivers were screened using the distances provided in the FTA Guidance Manual and then clustered. Each cluster was categorized as FTA Land Use Category 1, 2, or 3 and assigned a representative receiver for modeling noise impacts.

Employee parking would be located onsite at the MSF. To increase the traffic noise levels along a roadway by three dBA, the amount of traffic would need to double. Employee trips to and from the MSF would constitute a small portion of the overall traffic along the roadway network and would not double traffic volumes along any roadway. Therefore, employee trips would not result in a substantial permanent increase in noise levels near the MSF. As such, employee trips have not been further assessed in this analysis.

COMBINED NOISE LEVEL

Noise levels from MSF noise sources was combined and used to assess impacts at receivers. The combined L_{dn} was calculated using the following FTA methodology:

$$L_{dn}\text{ (total)} = 10 \times \text{LOG } (\Sigma\text{All sources } 10^{(Ldn/10)})$$

Where Σ = Sum

L_{dn} (total) = Total L_{dn} from all sources combined

ANCILLARY FACILITIES NOISE MODEL

The TPSS unit (which, unlike the TPSS for the alignment alternatives, would not be underground), emergency, standby, and critical operations power system generators at the MSF would be potential sources of noise. Reduction of noise from these sources would be provided by barriers, enclosures, sound absorptive materials, and engine silencers as applicable. Operation of the generators would not be a part of regular operation and would only be used during emergency situations and during weekly testing for approximately 20 minutes. Thus, generator operation has not been included as part of the operational analysis.

Sources of TPSS noise include heating, ventilation, and cooling systems (HVAC) and transformer hum. The HVAC system is the primary source of sound emitted from a TPSS. TPSS noise levels were measured at seven feet (ATS Consulting 2010) from the cooling fan of the TPSS unit located at Farmdale Avenue and Exposition Boulevard. The resulting noise level was 66.5 dBA L_{eq} at seven feet. The equivalent noise level is approximately 49.4 dBA L_{eq} at 50 feet. The measured noise level is consistent with the specifications used for the purchase of the TPSS units for the Metro L Line Phase 1 and the Eastside Phase 2 extension of the L Line (now the Metro E Line).

The specifications limit TPSS noise to a maximum of 50 dBA at 50 feet from any side of the TPSS:

Reference noise level ($TPSS_{ref}$): 50.0 dBA

Reference Distance (D_{ref}): 50 feet

$$Ldn_{TPSS} = 10 \times Log\ (15 \times 10^{(SPL/10)} + 9 \times 10^{([SPL+10]/10)} - 13.8 - 20 \times Log\ (D/Dref)$$

Where Ldn_{TPSS} = Project TPSS Day-Night noise level at the receiver

SPL = TPSS reference sound pressure level of 50 dBA

D_{ref} = Reference distance for reference TPSS sound pressure noise level

D = Distance of receiver from TPSS unit

4.1.1.2 BELOW-GROUND NOISE SOURCES (GBN)

Operating conditions are used as inputs to predict GBN from underground train operations. Reference force density noise levels were obtained from previous studies of Metro LRT cars, including measurements of the Metro L (Gold) Line vehicles, as included in Metro's Exposition Corridor Transit Project Phase 2 Final EIR (Metro 2009).

Sensitive land uses were then clustered depending on the similarity of existing noise conditions, distance to the alignment, LRT system operating parameters, trackwork, and LRT speed along the alignment. Each cluster (i.e., group of sensitive land uses with similar existing conditions, distance to the alignment and other similar conditions) was categorized as FTA Land Use Categories 1, 2, or 3 and assigned a representative receiver for modeling GBN impacts for the cluster.

An analysis of operational GBN levels at sensitive land uses was completed using the FTA Detailed Vibration Analysis (FTA 2018) procedure, outlined as follows:

- Receivers of Interest: Identify cluster of sensitive receivers and select closest receiver to underground project alignment and at-grade maintenance and ancillary facilities.
- Vibration Impact Assessment: Assess the GBV impact at each receiver of interest using the impact criteria defined in Table 3-5 and Table 3-6. Convert the GBV levels into GBN noise levels. This is done by subtracting 37 from the GBV levels (GBN = GBV – 37).
- Mitigation of Vibration Impact: Where the assessment shows an exceedance of the FTA vibration impact thresholds, evaluate mitigation measures and/or design modifications to the track design. Then loop back to modify the project-vibration computations, thereby accounting for the adopted mitigation, and reassess the remaining vibration impact.

GBN is based on a three-car train operating at various speeds, using maximum design speeds and deceleration/acceleration coming into/leaving stations. Wheel/rail noise increases with speed. At speeds greater than 20 to 30 mph, the wheel/rail noise usually dominates noise from the vehicle auxiliary equipment.

4.1.1.3 OPERATIONAL VIBRATION

An analysis of operational GBV levels at sensitive receivers was completed using the FTA Detailed Vibration Analysis procedure, as outlined below:

- Receivers of Interest: Identify cluster of sensitive receivers and select closest receiver to underground Project alignment and at-grade maintenance and ancillary facilities.
- Vibration Impact Assessment: Assess the GBV impact at each receiver of interest using the impact criteria defined in Table 3-5 and Table 3-6.
- Mitigation of Vibration Impact: Where the assessment shows an exceedance of the FTA vibration impact thresholds, evaluate mitigation measures and/or design modifications to the track design. Then loop back to modify the project vibration computations, thereby accounting for the adopted mitigation, and reassess the remaining vibration impact.

Since the alignment alternatives and the design option are primarily underground, the potential impacts from train operations would be related to GBV and GBN. The modeling of GBV and GBN was conducted in accordance with the FTA Detailed Vibration Analysis procedure. Modeling assumptions included:

- Three-car train.
- Train operating speed of 55 mph.
- Direct fixation track.
- Metro's low impact special track design was not included in the modeling.
- The radiation factor, K_{rad}, is an adjustment to convert from GBV to sound pressure level. A -5 dB adjustment was used for this analysis.
- As a safety factor, building coupling loss was not included in the modeling and assumed to be 0.0 dB at each of the receivers.
- The force density level (FDL) measurements of the Gold Line train operating on ballast and tie at 53 mph was assumed.

LIGHT RAIL VEHICLE OPERATIONAL VIBRATION MODEL

GBV impacts from transit operations are generated by motions/actions at the wheel/rail interface. The smoothness of these motions/actions is influenced by wheel and rail roughness, transit vehicle suspension, train speed, track type (including types of fixation), the location of switches and crossovers, and the geologic strata (layers of rock and soil) underlying the track. Vibration from a passing train has a relatively small potential to move through the geologic strata and results in building vibration from energy transferred through a building's foundation. Vibration levels that would be high enough to cause any building damage, even minor cosmetic damage, are extremely unlikely.

GBV is analyzed because of its potential to create an annoyance, or to cause issues for sensitive equipment, such as a magnetic resonance imaging (MRI) scanners, as well as its potential to damage buildings:

- Human Annoyance from Vibration: Potential human annoyance from vibration is assessed using RMS vibration velocity. GBV from transit vehicles is characterized using RMS vibration velocity amplitude expressed as VdB. The vibration perception threshold for most humans is approximately an RMS vibration level of 65 to 70 VdB. Levels from 70 to 75 VdB are typically noticeable but acceptable to most persons. Levels higher than 80 VdB are often considered unacceptable.
- Sensitive Equipment Issues with Vibration: Potential issues with sensitive equipment from vibration is assessed using RMS vibration velocity. GBV from transit vehicles is characterized using RMS vibration velocity amplitude expressed as VdB. This sensitive equipment can range from medical imaging devices, MRIs, X-ray and computerized axial tomography (CAT) scanners, computerized milling and drill machines, and high-powered telescopes. The vibration perception threshold for buildings where vibration would interfere with interior operations and potentially with equipment is an RMS vibration level of 65 VdB for screening level or the specific criteria of the equipment manufacturer.

Following guidance established in the FTA Guidance Manual, the significance of vibration impacts is based on the vibration level, the type of land use, and whether the vibration events occur frequently, occasionally, or infrequently. Vibration events are considered frequent when there are more than 70 VdB due to the same source per day. Most transit subway projects, including the Project, fall into that category.

In contrast, GBN is a low-frequency rumble related to GBV that excites a building's floors and walls. However, a deep subway produces no appreciable airborne noise above the ground surface. The GBN is considered to be related to operational vibration, and the GBN may be slightly audible within a building that otherwise has low internal background noise. Because GBN is directly related to GBV, the level of GBN is a function of the distance from the tracks to the building.

To calculate the GBN, the GBV is first calculated, and then the potential for exciting GBN is determined. Both the FTA GBV and GBN impact criteria are shown in Table 3-5. The GBN and GBV analysis uses vibration impact thresholds defined in the FTA Guidance Manual. Residences are considered FTA Category 2 receivers in the FTA guidance. The thresholds for Category 2 receivers are 72 VdB for GBV and 35 dBA for GBN.

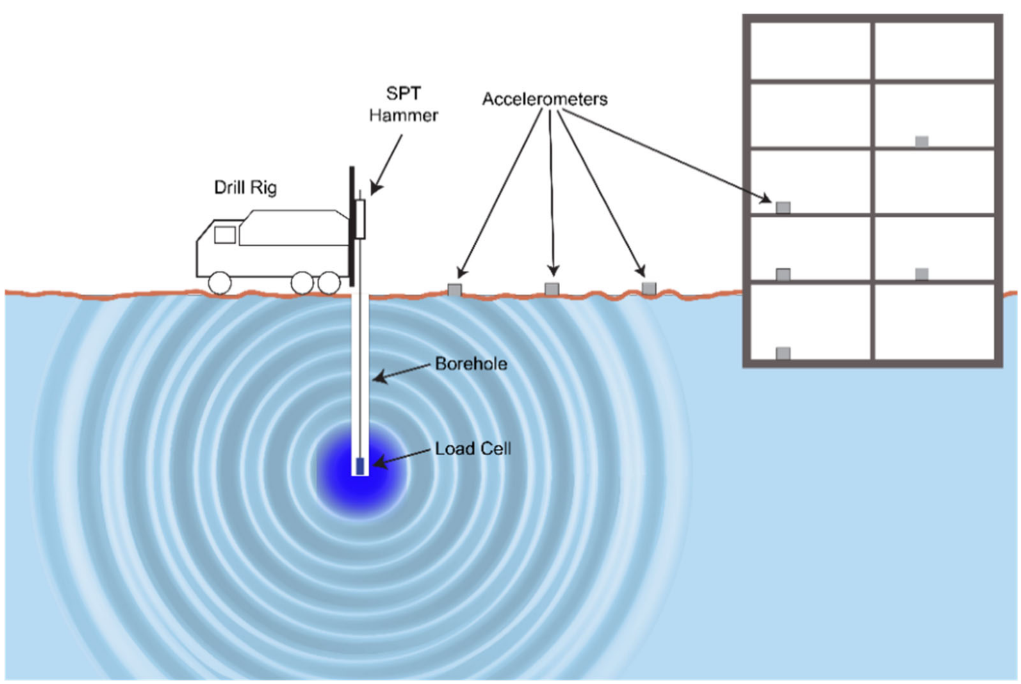
4.1.1.4 VIBRATION PROPAGATION TESTS

Since the FDL levels of Metro's existing trains were used in the vibration analysis, the FTA Detailed Vibration Assessment process had to be used for this study. The detailed assessment requires testing to determine the line source transfer mobility (LSTM). No borehole tests were conducted for this Project to determine the LSTM values between the underground tracks and the at-grade receivers. In lieu of actual measured borehole data, Metro's Westside Project Line Extension (WPLE) project (Metro 2012) borehole vibration propagation tests were used to predict the GBV and GBN for this Project. The results of these tests could be used to calculate the effects of vibration from any source on receivers at any distance. In particular, the vibration propagation test conducted at Warner Avenue and Thayer Avenue in West Los Angeles, as shown in Appendix A, was used to represent the line source response for the alignment alternatives and the design option.

The WPLE vibration propagation tests followed the FTA Detailed Assessment approach recommended in the FTA Guidance Manual. The test characterizes how vibration travels through the soil by imparting vibration into the ground and measuring the input force and corresponding ground vibration response at several distances. The captured digital signals are then processed to determine the relationship between the exciting force and the resulting vibration level, which is referred to as the transfer mobility. Transfer mobility indicates how easily vibration travels through the soil—a high transfer mobility indicates there is low attenuation as vibration travels through the soil, while a low transfer mobility indicates there is large attenuation as vibration travels through the soil. Soils with a high transfer mobility have higher vibration levels over a large area, while low transfer mobility reduces the distance the vibration can travel.

The alignment alternatives would be located in a below-grade tunnel throughout the measurement area; therefore, the results of the WPLE tests were used. The borehole vibration tests involved generating subsurface vibration via hammer impacts while measuring the surface response at several locations, as illustrated in Figure 4-1. Surface vibration at each site was measured using six seismic accelerometers, deployed on a single radial line away from the hole, at verified surface distances. These surface acceleration measurements were all made with the accelerometers oriented in the vertical direction.

FIGURE 4-1. BOREHOLE TEST CONFIGURATION



Source: FTA 2018

The driving force for the measurements was supplied by the drill rig's standard 140-pound drop hammer. A downhole load cell was used to measure the resulting impact force applied to the soil. All test signals (force and acceleration) were digitally recorded and saved for subsequent analysis. It is not feasible to drill many borehole points over the length of the trains, so measurements are collected at several depths in the same borehole. The data at these multiple depths and surface accelerometer locations are then extrapolated to account for the length of the train.

Ideally, the target test depths are set at top-of-rail and top-of-rail ±10 feet. The actual depths were usually adjusted to accommodate other testing requirements, such as soil sampling or pressure tests. Once on the site, the field crew would identify the measurement locations to be used, attach the accelerometers to the ground using base plates or ground stakes as appropriate, connect all transducers to the data recorders and check each data channel, making sure that the transducers were working, the channel assignments were correct, and that there were no electrical noise problems present.

Once the drilling crew reached each target test depth, the drill string would be withdrawn from the borehole, the load cell attached, and then re-inserted into the borehole. At each depth, the test procedure consisted of the following steps:

1. The load cell and data recorders were powered on, and the load cell supply voltage checked.
2. One or more sets of trial impacts (typically five) were made to settle the load cell at the bottom of the borehole and provide a check of recording levels for the load cell and each of the accelerometer channels.
3. Once satisfied that the signal levels were correct, the data recorders were started and the drill rig operator asked to run off the desired number of hammer impacts. Typically, 50 hits were requested.
4. Once the desired number of impacts had been collected, the data recorders were stopped and the drill crew directed to bring up the load cell.

4.1.1.5 TEST SITE

Borehole vibration tests were performed for the WPLE at the site presented in Appendix A, which provides details of the borehole testing site, including site diagrams and images.

4.1.1.6 DATA PROCESSING PROCEDURES

The data analysis was conducted in two principal phases, as described in the following subsections. In the first phase, quality control and signal processing steps are performed, culminating in a set of point source transfer mobility (PSTM) estimates for each test site. The second phase of the analysis takes these individual PSTM estimates and derives LSTM values for each site.

There were four key steps involved in processing the recorded field data into the required PSTM estimates:

1. Quality Control: Parse the raw time history files into individual impacts, referred to in this context as hammer strikes on the drill rig chain of the borehole testing equipment. Examine these individual samples for noise or other problems. Because of the large number of strikes (typically 50) and the high ambient vibration levels in many locations, an automatic accept/reject function was employed to reject samples with excessive interference from ambient vibration. The test site was on Warner Avenue, between Thayer Avenue and Rochester Avenue; the primary source of ambient vibration was vehicular traffic on Century Park West, S Beverly Glen Boulevard, and Santa Monica Boulevard. While these sites are not in the direct vicinity of the Project, they were used to analyze how a similar type of ground affects the transmission of vibration. The test results were applied to the vibration levels from an LRT train for this Project.
2. PSTM Estimation: Process the selected impact data to obtain the narrowband transfer functions between the exciting force and the response at each accelerometer position. These transfer functions are often termed accelerance functions (ratio of acceleration to the applied force). Mobility (velocity/force) is derived here from accelerance by applying a 1/frequency correction factor. The resulting transfer function relationship between the force and the vibration velocity response is referred to in this report as the PSTM and is the inverse of the system impedance.
3. One-Third Octave Levels: Filter the narrowband transfer mobility spectral values into 1/3 octave bands.
4. Curve Fitting: Pool the PSTM results at different depths and distances and calculate a best-fit curve of transfer mobility as a function of diagonal distance from the impact location. These best-fit curves are developed for each 1/3 octave band.

DEVELOPING LINE SOURCE TRANSFER MOBILITY CURVES

While the PSTM represents the response at the surface from a vibration source at a single subsurface point, the LSTM represents the response from forces distributed along a line such as a train. This more accurately represents the energy from trains that may be many feet long. To do this, the equivalent LSTM as a function of distance was derived from the measured point source transfer mobilities at the six accelerometer positions. A linear regression was first calculated for each frequency band as previously described and used to predict the PSTM as a function of distance. Line integration of these regression functions was then used to calculate the equivalent LSTMs. The resulting LSTM functions can then be combined with separately developed force density functions to predict future GBV levels along the alignment alternatives and design option.

MEASUREMENT RESULTS

The results of the vibration propagation test are the LSTM and signal coherence. As stated, the LSTM quantifies how efficiently the vibration travels through the ground. An area with a higher LSTM would have higher train vibrations levels further from the tracks than an area with low LSTM. Coherence is a measure of confidence in the results of the LSTM. Coherence values close to 1 indicate strong confidence in the results, and coherence levels less than 0.2 indicate the results should be used with caution because the input force characteristics may not be closely related with the measured vibration.

The individual measured PSTM and coherence values are presented, in detail, in Appendix B. The measured PSTMs in Appendix B were used to develop level-versus-*log* (distance) curves for each 1/3 octave band at all the measurement sites. These curves were used to estimate the LSTM at distances of 100 feet, 125 feet, 150 feet, and 200 feet, and are plotted in Figure A-4 in Appendix A. The best-fit coefficients used in the linear fit for the LSTMs are shown in Appendix A for the measurement location. Predicted levels are then calculated using the formula A+B**log* (distance to receiver in feet), where A and B are the best-fit coefficients. The study found that LSTMs in the Los Angeles metro area are higher than the nature average in the FTA calculations, meaning that train vibrations levels could be higher farther from the tracks.

4.1.1.7 PREDICTION MODELS

VIBRATION MODEL

The predictions of GBV for this study follow the Detailed Vibration Assessment procedure of the FTA Guidance Manual. This is an empirical method based on testing of the vibration propagation characteristics of the soil in the Project corridor and measurements of the vibration characteristics of similar light rail vehicles. The vibration propagation test is used to determine the LSTM. The vibration characteristics of the light-rail vehicles are quantified by the FDL. The basic relationship used for the vibration predictions is:

$$L_v = FDL + LSTM + SF + C_{build}.$$

Where L_v = Predicted vibration level inside the space

LSTM = Measured line surface transfer mobility

FDL = Force density level

SF = Safety factor to account for uncertainties

C_{build} = Adjustment to account for attenuation or amplification as vibration travels from the soil into the building structure

The FDL characterizes the vibration forces generated by the train and track structure. It is ideal to measure the FDL at a site with existing train operations that has the same vehicle and track structure as the Project. This measurement would be required to be at least 100 feet tangent distance to the track. If this is not possible, a reasonable assumption for the FDL can be made using the same Metro transit vehicle proposed for this Project at different operating speeds.

4.1.1.8 BUILDING ADJUSTMENT

The propagation of vibration from the soil into the building foundation and through the building structure is complex and dependent on the specific design and construction of the building. The FTA Guidance Manual provides some generic adjustments to account for building response and floor resonance; however, the FTA Guidance Manual also recommends that measured values be used in place of the generic adjustments when available. Since measurements of the outdoor-to-indoor transfer functions were not possible for this report, the following rationale was used to estimate a building adjustment factor. The building adjustment factor includes coupling loss as the vibration travels from the soil into the building foundation, transmission loss as the vibration travels though the building, and any amplification effects due to floor resonances.

For single-family residences (SFR) composed of lightweight wood-frame structures, the FTA Guidance Manual suggests a +6 dB adjustment for floor amplification and -1 to -2 dB per floor for floor-to-floor attenuation, as well as a -5 dB adjustment for coupling loss, which is defined as the vibration energy that is not transmitted from the soil into a building due to how the building is placed on the soil. Combining these values leads to a -1 to 0 dB building adjustment factor inside a typical SFR structure. A 0 dB building adjustment was applied to this single-family structure for each 1/3 octave band.

4.1.1.9 SAFETY FACTOR

A safety factor of +5 dB is also added to each 1/3 octave band. The purpose of the safety factor is to account for measurement uncertainties and other error sources in the predictions. This is a conservative approach, ensuring that in the majority of cases the predicted levels are higher than what would occur during regular operations.

4.1.1.10 GROUND-BORNE NOISE MODEL

GBN is directly related to GBV inside the building. GBN is predicted using the following formula:

$$L_A = L_v + K_{rad} + K_{awt}$$

Where L_A = Predicted A-weighted GBN inside the space

L_V = Predicted vibration level inside the space

K_{rad} = Radiation adjustment of -5 VdB is used.

K_{awt} = A-weighting adjustment at the 1/3 octave band center frequency

The following modeling assumptions were used:

- Horizontal distance from the centerline of the tunnel to the building foundation of the receiver
- Depth of building foundation to top of rail at closest point
- The size of the train (i.e., number of transit cars) at the operational and/or design speed
- Location of special trackwork (crossovers and/or turnouts)

- Safety factor of +5 VdB. This accounts for uncertainty in the building amplification, future rail corrugations, and wheel roughness that may result in higher than predicted GBV and GBN levels.
- Recommended FTA coupling loss to building foundation of 0 dB
- Floor-to-floor attenuation of -2 dB for the second floor above grade
- K_{rad} adjustment of -5 VdB to convert GBV to sound pressure level

Once a preferred alignment is selected, an FTA Detailed Vibration Assessment would be conducted during the final design phase. The FTA analysis and methodology would require borehole propagation tests at locations within the vicinity of the Project. The vibration assessment would provide a more detailed analysis of potential vibration impacts on land uses and sensitive receptors near the Project. Refer to Project Measure PM NOI-2 in Chapter 6 for additional information on future vibration assessments.

MAINTENANCE AND STORAGE FACILITY VIBRATION MODEL

Train movements within the MSF would generate vibration from steel wheels rolling on steel rails. Trains would travel at low speeds within the MSF. As described in Section 7 of the Metro Rail Rule Book for the A/E Line, the trains are anticipated to move with an average speed of 10 mph within the yard and five mph along curves (Metro 2013). Train movement vibration within the yard was calculated using the same formulas for the calculation of light rail vibration.

4.1.2 CONSTRUCTION NOISE AND VIBRATION

Since the level of detail for the actual construction is general at this time and the contractor would provide final input on how construction would be done, a qualitative assessment of the estimated construction noise and vibration was done for this report. At this stage, the assessment identifies possible noise and vibration impacts under CEQA, but final decisions on noise and vibration control measures will be provided when there is more detail on the construction plans, during the final engineering phase.

4.1.2.1 CONSTRUCTION NOISE

Construction noise was modeled using noise levels from the FTA Guidance Manual and the Federal Highway Administration (FHWA) Roadway Construction Noise Model version 1.1. The FTA Guidance Manual includes noise levels for common pieces of construction equipment. For equipment not listed in the FTA Guidance Manual, noise levels from the FHWA Roadway Construction Noise Model were used. Construction noise levels were assessed as they would typically occur on the alignment. The two loudest pieces of construction equipment were combined, and this noise level was used to assess construction noise against the FTA construction 1-hour L_{eq} noise criteria.

FTA provides guidance for assessing construction noise associated with transit projects. The criteria are based upon a 1-hour L_{eq}. For residential uses, the threshold is 90 dBA for daytime construction and 80 dBA for nighttime construction. Commercial and industrial uses are held to a 100-dBA daytime and nighttime noise construction threshold. For the purposes of this analysis, the FTA general assessment construction noise limit criteria 1-hour L_{eq} have been applied. While the FTA criteria were used for this general assessment, the 80-dBA nighttime threshold will likely not be used, as Metro would defer to the noise ordinances of local jurisdictions. Typical construction equipment used during each phase of construction and their 1-hour L_{eq} are listed in Table 4-1.

TABLE 4-1. CONSTRUCTION NOISE BY PHASE

EQUIPMENT	1-HOUR LEQ (dBA)
AT-GRADE CONSTRUCTION	
Backhoe	80.0
Compressor (air)	80.0
Crane	83.0
Dump Truck	76.5
Flat Bed Truck	74.3
Generator	82.0
Grader	85.0
Rail Saw	90.0
Paver	85.0
Pneumatic Tools	85.0
Welder/Torch	74.0
Combined At-Grade Construction 1-hour L_{eq}[1]	**91.2**
TUNNEL CONSTRUCTION	
Backhoe	80.0
Crane	83.0
Dump Truck	76.5
Generator	82.0
Pneumatic Tools	85.0
Ventilation Fan	85.0
Combined Tunnel Construction 1-hour L_{eq}[1]	**88.0**
CUT-AND-COVER	
Backhoe	80.0
Compressor (air)	80.0
Concrete Saw	89.6
Crane	83.0
Drill Rig	79.0
Dump Truck	76.5
Excavator	80.7
Flat Bed Truck	74.3
Generator	82.0
Pneumatic Tools	85.0
Welder/Torch	74.0
Combined Cut-and-Cover Construction 1-hour L_{eq}[1]	**90.9**

Source: FHWA 2006; FTA 2018
[1] Logarithmic sum of two loudest pieces of equipment.
dBA = A-weighted decibel; L_{eq} = equivalent noise level; TBM = tunnel boring machine

The three phases of construction that would occur are at-grade construction, tunnel construction, and cut-and-cover construction. Construction of the aboveground elements of the LRT guideways and MSF would use equipment such as heavy-earth moving equipment, generators, cranes, and pneumatic tools. Construction activity at station areas would be cut-and-cover. Construction noise levels at the staging areas would be less than the noise levels generated by at-grade construction and would primarily involve the movement of equipment to and from the Project site.

4.1.2.2 CONSTRUCTION VIBRATION

Construction vibration was modeled using vibration levels from the FTA Guidance Manual, which includes vibration levels for common pieces of construction equipment. Using the PPV values in Table 4-2, a general assessment of the distance of the damage risk for different types of buildings can be calculated, using the following equation:

$$PPV_{equip} = PPV_{ref} X (25/D)^{1.5}$$

Where PPV_{equip} = the peak particle velocity of the equipment adjusted for distance

PPV_{res} = the source reference vibration level at 25 feet

D = distance from the equipment to the receiver, in feet

TABLE 4-2. CONSTRUCTION VIBRATION

EQUIPMENT	PPV AT 25 FEET (INCH / SECOND)	APPROXIMATE L_V AT 25 FEET
Clam shovel drop (slurry wall)	0.202	94
Hydromill (slurry wall) in soil	0.0008	66
Hydromill (slurry wall) in rock	0.017	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drilling	0.089	87
Load trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

Source: FTA 2018
PPV = peak particle velocity; L_v = velocity level

4.2 CEQA SIGNIFICANCE THRESHOLDS

In accordance with Appendix G of the 2022 CEQA Guidelines, the Project would have a significant impact related to noise and vibration if it would:

- Impact NOI-1: Result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinances, or applicable standards of other agencies.
- Impact NOI-2: Result in generation of excessive GBV or GBN levels.
- Impact NOI-3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

CHAPTER 5 EXISTING SETTING

5.1 NOISE

5.1.1 REGIONAL SETTING

The Project is located in the Cities of Los Angeles and West Hollywood, in Los Angeles County. The existing noise environment is primarily an urban area that typically has noise levels between 65 to 71 L_{dn} dBA. The Project is a below-ground transit alignment that would operate in underground tunnels to be constructed as part of the Project. The GBN from Project construction and operations would transmit as GBV through the ground to the buildings above and adjacent to the tunnel alignment. At-grade facilities such as station entrances and ventilation structures are a potential source of noise.

The exterior noise environment within an urban area is generally dominated by traffic noise and occasional aircraft flyovers that are contributors to the existing noise environment. Land uses found around the station locations include public facilities, public and commercial office buildings, various types of commercial uses, institutional uses, multifamily residential uses (including adaptive reuse of older non-residential buildings), industrial uses, surface parking facilities, and parking structures.

Noise-sensitive land uses were identified using Geographic Information Systems (GIS), assessor's parcel maps, aerial photos, and were verified through field work. Field noise measurements were conducted at the proposed station locations, between May 9 and May 12, 2023, to document the existing ambient noise levels for use in the impact analysis. Monitoring locations were selected to represent conditions that could be applied to multiple receiver locations. Existing noise levels were taken for 24 hours at nine sites, and three 15-minute measurements were taken at sites where there were additional areas of noise-sensitive uses near a station. The 15-minute measurements sites were compared to the nearest 24-hour measurement site to estimate the existing L_{dn} noise levels. Representative measurement sites can be used to estimate noise levels at other sites when both sites share proximity to the same major transportation noise sources and similar type of land use density and housing.

5.1.2 RESOURCE STUDY AREA

The resource study area (RSA) for noise impacts is defined as a radius of 200 feet from all alignment alternatives, the design option, and the MSF. A radius of 200 feet was chosen because it is the FTA limit for noise screening for this type of project, within an urban environment. Due to buildings in the area, the noise sources would not have an influence over 200 feet away. The ground within the RSA would not transmit vibration levels more than 100 feet from the source. Existing noise levels would not be measured for the underground segments of the alignment as there would not be audible noise sources at the surface level. Noise levels were monitored at noise-sensitive receivers near locations where surface level activities would occur, at station entrances, and at the MSF site.

5.1.3 ALIGNMENTS AND STATIONS

Land uses were evaluated within a screening distance of 200 feet from each station for all three alignment alternatives. Table 5-1 to Table 5-3 show the stations for each alignment alternative with noise-sensitive land uses within the RSA. For the San Vicente-Fairfax Alignment Alternative there are eight noise-sensitive parcels; for the Fairfax Alignment Alternative there are five noise-sensitive parcels; and for the La Brea Alignment Alternative there are 15 noise-sensitive parcels within each RSA. Figure 5-1 and Figure 5-2 show the locations of the noise measurement locations and noise-sensitive land uses identified in the RSA.

FIGURE 5-1. NOISE MEASUREMENT AND NOISE SENSITIVE LAND USES FOR ALIGNMENT ALTERNATIVES

Source: Connect Los Angeles Partners 2023

5.1.3.1 ALIGNMENT ALTERNATIVE 1: SAN VICENTE-FAIRFAX

There are 10 noise-sensitive parcels within the RSAs of the stations along the San Vicente-Fairfax Alignment Alternative. There are no noise-sensitive parcels within the RSA of the Expo/Crenshaw Station, where construction would occur to connect to the existing K Line station. The Crenshaw/Adams Station has two SFRs within its RSA. There is one apartment complex, with 20 units in the Midtown Crossing Station RSA. There is one MFR, one mixed residential and commercial use building, and the Academy Museum of Motion Pictures in the RSA of the Wilshire/Fairfax Station. There are 24 residential units in the Wilshire/Fairfax Station RSA. There is no noise-sensitive parcel in the Fairfax/3rd Station RSA. There is one duplex located in the RSA of the La Cienega/Beverly Station, representing two residential units. There are two apartment complexes within the San Vicente/Santa Monica Station RSA; the two complexes have 42 residential units. There are no noise-sensitive parcels within Fairfax/Santa Monica Station RSA. The Dylan Apartments are in the RSA for the La Brea/Santa Monica Station, with 70 residential units. There are no noise-sensitive parcels within the RSA of the Hollywood/Highland Station.

Table 5-1 summarizes these noise-sensitive land uses.

TABLE 5-1. NOISE-SENSITIVE LAND USES IN THE SAN VICENTE-FAIRFAX ALIGNMENT ALTERNATIVE RSA

STATION (NOISE MEASUREMENT LOCATION)	NOISE-SENSITIVE LAND USE	# OF PARCELS	# OF RESIDENTIAL UNITS	EXISTING L_{DN} dBA LEVELS AT NOISE-SENSITIVE LAND USES
Expo/Crenshaw	None	None	0	N/A
Crenshaw/Adams (LT1, ST1)	Residential – SFR	2 – SFR	2	67 dBA – 2614 S Victoria Ave
Midtown Crossing (LT2)	Residential – MFR (Apartment Building)	1 – MFR	20	62 dBA – 4729 San Vicente Blvd
Wilshire/Fairfax (LT6)	Residential – MFR (Apartment Building) Academy Museum of Motion Pictures	1 – MFR 1 – Mixed Use Building 1 – Museum	24	61 dBA – 6122 Orange St
Fairfax/3rd	None	None	0	N/A
La Cienega/Beverly (LT7)	Residential – MFR (Apartment Building)	1 – Duplex	2	63 dBA – 321 N Alfred St
San Vicente/Santa Monica (LT8)	Residential – MFR (Apartment Building)	2 – Apartment Complexes	42	63 dBA – 840 Larrabee St
Fairfax/Santa Monica	None	None	0	N/A
La Brea/Santa Monica (LT5)	Residential – Apartments	1 – Apartment Complex	70	74 dBA – 7100 Santa Monica Blvd
Hollywood/Highland	None	None	0	N/A
Hollywood Bowl Design Option	None	None	0	N/A

Source: Connect Los Angeles Partners 2023
dBA = A-weighted decibels; L_{dn} = day-night noise level; N/A = not applicable; SFR = single-family residence; MFR = multi-family residence

5.1.3.2 ALIGNMENT ALTERNATIVE 2: FAIRFAX

There are seven noise-sensitive parcels within the RSA of the stations along the Fairfax Alignment Alternative. There are no noise-sensitive parcels within the RSA of the Expo/Crenshaw Station. The Crenshaw/Adams station has two SFRs within the RSA. There is one apartment complex, with 20 units, in the Midtown Crossing Station RSA. There is one MFR, one mixed use residential and commercial building, and the Academy Museum of Motion Pictures in the RSA of the Wilshire/Fairfax Station. There are 24 residential units in the Wilshire/Fairfax Station RSA. There are no noise-sensitive parcels in the Fairfax/3rd Station RSA. The Dylan Apartments are in the RSA for the La Brea/Santa Monica station, with 70 residential units. There are no noise-sensitive parcels within the RSA of the Hollywood/Highland Station.

Table 5-2 summarizes these noise-sensitive land uses.

TABLE 5-2. NOISE-SENSITIVE LAND USES IN THE FAIRFAX ALIGNMENT ALTERNATIVE RSA

STATION (NOISE MEASUREMENT LOCATION)	NOISE-SENSITIVE LAND USE	# OF PARCELS	# OF RESIDENTIAL UNITS	EXISTING L_{DN} dBA LEVELS AT NOISE-SENSITIVE LAND USES
Expo/Crenshaw	None	None	0	N/A
Crenshaw/Adams (LT1, ST1)	Residential – SFR	2 – SFR	2	67 dB – 2614 S Victoria Ave
Midtown Crossing (LT2)	Residential – MFR (Apartment Building)	1 – MFR	20	62 dBA – 4729 San Vicente Blvd
Wilshire/Fairfax (LT6)	Residential – MFR Academy Museum of Motion Pictures	1 – MFR 1 – Mixed Use Building 1 – Museum	24	61 dBA – 6122 Orange St
Fairfax/3rd	None	None	0	N/A
Fairfax/Santa Monica	None	None	0	N/A
La Brea/Santa Monica (LT5)	Residential – MFR (Apartment Building)	1 – MFR	70	74 dBA – 7100 Santa Monica Blvd
Hollywood/Highland	None	None	0	N/A
Hollywood Bowl Design Option	None	None	0	N/A

Source: Connect Los Angeles Partners 2023
dBA = A-weighted decibels; L_{dn} = day-night noise level; N/A = not applicable; SFR = single-family residence; MFR = multi-family residence

5.1.3.3 ALIGNMENT ALTERNATIVE 3: LA BREA

There are 15 noise-sensitive parcels within the RSA of the stations along the La Brea Alignment Alternative. There are no noise-sensitive parcels within the RSA of the Expo/Crenshaw Station. The Crenshaw/Adams station has two SFRs within the RSA. There is one apartment complex, with 20 units, in the Midtown Crossing Station RSA. There are six residential parcels within the RSA of the Wilshire/La Brea Station, with a total of 64 residential units. There are four noise-sensitive parcels within the RSA of La Brea/Beverly Station, with a total six residential units. The Dylan Apartments are in the RSA for the La Bera/Santa Monica station, with a total of 70 residential units. There are no noise-sensitive parcels within the RSA of the Hollywood/Highland Station.

Table 5-3 summarizes these noise-sensitive land uses.

TABLE 5-3. NOISE-SENSITIVE LAND USES IN THE LA BREA ALIGNMENT ALTERNATIVE RSA

STATION (NOISE MEASUREMENT LOCATION)	NOISE-SENSITIVE LAND USE	# OF PARCELS	# OF RESIDENTIAL UNITS	EXISTING L_{DN} DBA LEVELS AT NOISE-SENSITIVE LAND USES
Expo/Crenshaw	None	None	0	N/A
Crenshaw/Adams (LT1, ST1)	Residential – SFR	2 – SFR	2	67 dBA – 2614 S Victoria Ave
Midtown Crossing (LT2)	Residential – Apartments	1 – Apartment Complex	20	62 dBA – 4729 San Vicente Blvd
Wilshire/La Brea (LT3, ST2)	Residential – SFR and Apartments	3 – SFR 3 – Apartment Complexes	64	71 dBA – 618 S Detroit St
La Brea/Beverly (LT4, ST3)	Residential – SFR and Apartments	4 – SFR 1 – Apartment Complexes	6	68 dBA – 317 N Detroit St
La Brea/Santa Monica (LT5)	Residential – Apartments	1 – Apartment Complexes	70	74 dBA – 7100 Santa Monica Blvd
Hollywood/Highland	None	None	0	N/A
Hollywood Bowl Design Option	None	None	0	N/A

Source: Connect Los Angeles Partners 2023
dBA = A-weighted decibels; L_{dn} = day-night noise level; N/A = not applicable; SFR = single-family residence

5.1.4 HOLLYWOOD BOWL DESIGN OPTION

The Hollywood Bowl Design Option would be located primarily underground, with the aboveground station entrance at Hollywood Bowl. This station would be located under an existing parking lot, and there are no noise-sensitive land uses identified within the RSA. The performance area for the Hollywood Bowl is located more than 200 feet from any station activity and is shielded by buildings and natural terrain.

5.1.5 MAINTENANCE AND STORAGE FACILITY

There are no noise-sensitive land uses within the RSA of the MSF. According to the Final LAX Part 150 Noise Exposure Map Update Report, the MSF would be located inside the airport's 65 to 70 community noise equivalent level (CNEL) contour, the time-weighted 24 hour average noise level for a location (LAWA 2015). The MSF would be located in an area within an acceptable range of noise exposure given the existing industrial land uses. Aircraft are the only source of noise from LAX in the MSF RSA, but noise from roadways and industrial land use adds to the overall noise levels. The MSF would not be located under any flight paths.

5.2 VIBRATION

5.2.1 REGIONAL SETTING

The Project is located in the Cities of Los Angeles and West Hollywood, in Los Angeles County. The existing urban environment in this region is dominated by auto-oriented corridors, which are used frequently by automobiles, buses, and trucks. Although no vibration measurements were conducted to assess existing ambient vibration levels, vibration propagation test results from Metro's WPLE project were used to determine how vibration would propagate from the tracks to GBV- and GBN-sensitive receivers. Appendix A presents the location and other details of the borehole testing site and includes site diagrams and images.

The FTA vibration impact criteria (Table 3-5) do not directly account for existing vibration. In most cases, the existing environment does not include a substantial number of perceptible GBV events.

5.2.2 RESOURCE STUDY AREA

The RSA for vibration impacts is defined as a radius of 100 feet from each alignment alternative, the design option, and the MSF. Vibration-sensitive land uses were identified using GIS, assessor's parcel maps, and aerial photos, and were verified through field work. Vibration from construction and operation of an underground light rail tunnel system does not travel more than 100 feet in the type of ground/soils that make up the RSA. The propagation of vibration is affected by the overall distance from the source to the receiver. Thus, a screening distance of 100 feet horizontal from the center line of the alignment alternative at the surface was used to further identify land uses that could have issues with vibration. These land uses were then screened to only include areas where the depth to the rail tunnel is 110 feet or less. This value takes into consideration a buffer of ± 10 feet to account for any uncertainty in potential vibration transmission through the ground. Figure 5-2 shows areas of the alignment alternatives where tunnel depths are 110 feet (including the ± 10 feet buffer) or less. Figure 5-3 shows the vibration-sensitive land uses across all the alignment alternatives and the design option.

FIGURE 5-2. TUNNEL DEPTHS OF 110 FEET OR LESS

Source: Connect Los Angeles Partners 2023

FIGURE 5-3. VIBRATION-SENSITIVE LAND USES

Source: Connect Los Angeles Partners 2023

5.2.3 ALIGNMENTS AND STATIONS

5.2.3.1 ALIGNMENT ALTERNATIVE 1: SAN VICENTE-FAIRFAX

As shown in Figure 5-2, the San Vicente-Fairfax Alignment Alternative has multiple areas with a tunnel depth of 110 feet or less, located between the following cross streets:

- Crenshaw Boulevard between Exposition Boulevard and I-10
- San Vicente Boulevard between Venice Boulevard and Orange Drive
- Where the tunnel passes under private properties near Olympic Boulevard and S Spaulding Avenue; S Genesee Avenue between Olympic Boulevard and 8th Street; S Ogden Drive between Olympic Boulevard and 8th Street; and S Orange Grove Avenue between 8th Street and Wilshire Boulevard
- S Fairfax Avenue between Wilshire Boulevard and 1st Street
- Beverly Boulevard between N Hayworth Avenue and N San Vicente Boulevard
- N Sherbourne Drive between N San Vicente Boulevard and Ashcroft Avenue
- N San Vicente Boulevard between Ashcroft Avenue and Santa Monica Boulevard
- Santa Monica Boulevard between N San Vicente Boulevard and N Orange Drive
- Where the tunnel passes under private properties near N Orange Drive and Santa Monica Boulevard; N Mansfield Avenue between Santa Monica Boulevard and Lexington Avenue; N Citrus Avenue between Santa Monica Boulevard and Lexington Avenue; and between Lexington Avenue and Highland Avenue
- Highland Avenue between Lexington Avenue and Hollywood Boulevard

Within these areas of the RSA, there are 154 vibration-sensitive land uses, as summarized in Table 5-4 and Figure 5-3. Table 6-6 to Table 6-8 in Chapter 6 show the address of each parcel where vibration levels were modeled, along with the data used in the modeling, and the station location on the alignment.

TABLE 5-4. VIBRATION-SENSITIVE LAND USES IN THE SAN VICENTE-FAIRFAX ALIGNMENT ALTERNATIVE RSA

LAND USE	# OF PARCELS	PARCEL USE/ADDRESS
Education	16	• 5611 San Vicente Blvd • 408 and 567 S Fairfax Ave • 7951 Beverly Blvd • 3000, 3004, and 3045 Crenshaw Blvd • 1248, 1521, and 1622 N Highland Ave • 1105 N Laurel Ave • 7070, 7362, 7070, 7924, and 7963 Santa Monica Blvd
Residential	124	• 41 – SFR • 10 – Multi Unit • 73 – Apartment Buildings
Art Gallery	0	• N/A
Worship Center	2	• West Angeles Church of God – 2 locations at 3602 and 3045 Crenshaw Blvd
Medical	6	• Complete Eye Care Center – 2825 Crenshaw Blvd • Olympia Hospital – 5901 W Olympic Blvd • Cedars Sinai – 8700 Beverly Blvd • Modern Animal Hospital – 8126 Beverly Blvd • Hollywood Cat and Dog Hospital –1150 N La Brea Ave
School	1	• Hollywood High School – 1521 N Highland Ave
Museum	2	• Academy Museum of Motion Pictures – 6067 Wilshire Blvd • Peterson Automotive Museum – 6060 Wilshire Blvd
Theatre	2	• West Angeles Performing Arts – 3020 Crenshaw Blvd • Lee Strasberg Theatre – 7936 Santa Monica Blvd
Hotel	1	• Ramada Plaza – 8585 Santa Monica Blvd

Source: Connect Los Angeles Partners 2023
N/A = not applicable; SFR = single-family residence

5.2.3.2 ALIGNMENT ALTERNATIVE 2: FAIRFAX

As shown in Figure 5-2, the Fairfax Alignment Alternative has four areas with a tunnel depth of 110 feet or less, located between the following cross streets:

- Crenshaw Boulevard between Exposition Boulevard and I-10
- San Vicente Boulevard between Venice Boulevard and Orange Drive
- Where the tunnel passes under private properties near Olympic Boulevard and S Spaulding Avenue; S Genesee Avenue between Olympic Boulevard and 8th Street; S Ogden Drive between Olympic Boulevard and 8th Street; and S Orange Grove Avenue between 8th Street and Wilshire Boulevard
- S Fairfax Avenue between Wilshire Boulevard and 1st Street; N Fairfax Avenue between 1st Street and Melrose Avenue

- Where the tunnel passes under private properties near Waring Avenue and Fairfax Avenue; N Hayworth Avenue between Willoughby Avenue and Waring Avenue; Romaine Street between N Laurel Avenue and N Edinburgh Avenue; N Edinburgh Avenue between Romaine Street and Santa Monica Boulevard and between N Hayworth Avenue and Santa Monica Boulevard
- Where the tunnel passes under private properties near N Orange Drive and Santa Monica Boulevard; N Mansfield Avenue between Santa Monica Boulevard and Lexington Avenue; N Citrus Avenue between Santa Monica Boulevard and Lexington Avenue and between Lexington Avenue and Highland Avenue
- Highland Avenue between Lexington Avenue and Hollywood Boulevard

Within these four areas of the RSA, there are 188 vibration-sensitive land uses, as summarized in Table 5-5 and Figure 5-3. Table 6-9 to Table 6-11 in Chapter 6 show the address of each parcel where vibration levels were modeled, along with the data used in the modeling, and the station location on the alignment.

TABLE 5-5. VIBRATION-SENSITIVE LAND USES IN THE FAIRFAX ALIGNMENT ALTERNATIVE RSA

LAND USE	# OF PARCELS	PARCEL USE/ADDRESS
Education	16	• 5611 San Vicente Blvd • 408 and 567 S Fairfax Ave • 925 N Hayworth Ave • 3000, 3004, and 3045 Crenshaw Blvd • 1248, 1521, and 1622 N Highland Ave • 1900 Hillcrest Rd • 1105 N Laurel Ave • 7070, 7362, 7070, 7924, and 7963 Santa Monica Blvd
Residential	160	• 60 – SFR • 10 – Multi Unit • 90 – Apartment Buildings
Art Gallery	0	• N/A
Worship Center	2	• West Angeles Church of God – 2 locations at 3602 and 3045 Crenshaw Blvd
Medical	3	• Complete Eye Care Center – 2825 Crenshaw Blvd • Olympia Hospital – 5901 W Olympic Blvd • Hollywood Cat and Dog Hospital –1150 N La Brea Ave
School	3	• Laurel Span School – 925 N Hayworth Ave • Fairfax High School – 7850 Melrose Ave • Hollywood High School – 1521 N Highland Ave
Museum	2	• Academy Museum of Motion Pictures – 6067 Wilshire Blvd • Peterson Automotive Museum – 6060 Wilshire Blvd
Theatre	2	• West Angeles Performing Arts – 3020 Crenshaw Blvd • Lee Strasberg Theatre – 7936 Santa Monica Blvd
Hotel	0	• N/A

Source: Connect Los Angeles Partners 2023
N/A = not applicable; SFR = single-family residence

5.2.3.3 ALIGNMENT ALTERNATIVE 3: LA BREA

As shown in Figure 5-2, the La Brea Alignment Alternative has three areas with a tunnel depth of 110 feet or less, located between the following cross streets:

- Crenshaw Boulevard between Exposition Boulevard and I-10
- San Vicente Boulevard between Venice Boulevard and S Orange Drive
- S La Brea Avenue between 2nd Street and 1st Street; N La Brea Avenue between 1st Street and Lexington Avenue
- Where the tunnel passes under private properties near Lexington Avenue and N La Brea Avenue; Fountain Avenue and N Sycamore Avenue; N Orange Drive between Fountain Avenue and De Longpre Avenue; N Mansfield Avenue between Fountain Avenue and De Longpre Avenue; N Citrus Avenue between Fountain Avenue and De Longpre Avenue; De Longpre Avenue between N Mansfield Avenue and Highland Avenue; and between Leland Way and Highland Avenue
- Highland Avenue between Leland Way to Hollywood Boulevard

Within these three areas of the RSA, there are 86 vibration-sensitive land uses, as summarized in Table 5-6 and Figure 5-3. Table 6-12 to Table 6-14 in Chapter 6 show the address of each parcel where vibration levels were modeled, along with the data used in the modeling, and the station location on the alignment.

TABLE 5-6. VIBRATION-SENSITIVE LAND USES IN THE LA BREA ALIGNMENT ALTERNATIVE RSA

LAND USE	# OF PARCELS	PARCEL USE/ADDRESS
Education	16	• 3000, 3004 and 3045 Crenshaw Blvd • 116, 132, 330, 514, 516, 520, 524, 528, 534, and 540 N La Brea Ave • 734 S La Brea Ave • 1521 and 1622 N Highland Ave • 1105 N Laurel Ave • 7070 Santa Monica Blvd
Residential	59	• 1 – SFR • 20 – Multi Unit • 38 – Apartment Buildings
Art Gallery	1	• The Hole – 844 N La Brea Ave
Worship Center	3	• West Angeles Church of God – 2 locations at 3602 and 3045 Crenshaw Blvd • Congregation Levi Yitzhok – 356 N La Brea Ave
Medical	4	• Complete Eye Care Center – 2825 Crenshaw Blvd • The Rehabilitation Center – 501 N La Brea Ave • UCLA Health MPTF – 335 N La Brea Ave • Hollywood Cat and Dog Hospital –1150 N La Brea Ave
School	2	• Yeshiva Rav Isacsohn – 540 and 55 N Brea Ave • Hollywood High School – 1521 N Highland Ave
Museum	0	• N/A
Theatre	1	• West Angeles Performing Arts – 3020 Crenshaw Blvd
Hotel	0	• N/A

Source: Connect Los Angeles Partners 2023
N/A = not applicable; SFR = single-family residence

5.2.4 HOLLYWOOD BOWL DESIGN OPTION

As shown in Figure 5-2, the Hollywood Bowl Design Option has one area with a tunnel depth of 110 feet or less, located between the cross street of:

- Highland Avenue between Franklin Road and Milner Road

Within this area of the RSA, there are four vibration-sensitive land uses: three hotels and one apartment complex.

5.2.5 MAINTENANCE AND STORAGE FACILITY

There are no vibration-sensitive land uses within the RSA for the MSF.

CHAPTER 6 IMPACTS AND MITIGATION MEASURES

6.1 IMPACT ANALYSIS

This section presents the evaluation of impacts related to noise and vibration, as well as the corresponding mitigation measures, where applicable. Both construction and operational impacts are evaluated. Table 6-16 in Section 6.2.2 provides a summary of the impact conclusions.

The impact analysis described in Chapter 6 utilizes the FTA Guidance Manual for the general assessment construction noise criteria with transit projects, as described in more detail in Section 4.1. The criteria are based upon 1-hour L_{eq}. Adverse community reaction may occur if the following 1-hour L_{eq} are exceeded:

- Residential: 90 dBA during the day and 80 dBA at night
- Commercial: 100 dBA during the day and 100 dBA at night
- Industrial: 100 dBA during the day and 100 dBA at night

The City of Los Angeles and the County of Los Angeles have established quantitative standards for construction noise, as shown in Table 6-1. The City of West Hollywood has set construction hours between 8 a.m. and 7 p.m., during these times, construction is exempt from local noise standards. For the purposes of this analysis, the FTA general assessment construction noise limit criteria 1-hour L_{eq} have been applied.

TABLE 6-1. CONSTRUCTION STANDARDS BY JURISDICTION

JURISDICTION	PERMISSIBLE CONSTRUCTION TIME	QUANTITATIVE CONSTRUCTION NOISE STANDARD
City and County of Los Angeles	7:00 a.m. to 9:00 p.m. Monday through Friday 8:00 a.m. to 6:00 p.m. Saturdays	75 dBA at 50 feet within 500 feet of a residential zone
City of West Hollywood	8:00 a.m. to 7:00 p.m. Monday through Saturday	None Stated

Sources: City of Los Angeles *Municipal Code*; City of Los Angeles 1999; City of West Hollywood Municipal Code 2023

Operational noise would not cause a noise impact; once the system is operational, the trains would not create airborne noise impacts outside the tunnel and stations because they are below ground with no direct pathway to noise-sensitive receivers. Various ancillary facilities at the stations, such as fans and other ventilation structures, aboveground entrance portals, and escalators, could result in operational noise impacts. Noise impacts could also occur at nearby noise-sensitive land uses within the noise RSA. None of the current station designs call for development of additional parking or bus stations, so there would be no noise impacts in the station RSAs from additional vehicle traffic during operations.

Project measures are design elements, best management practices, or other commitments that Metro implements as part of all alignment alternatives and stations, the design option, and the MSF to reduce or avoid environmental effects associated with the Project. Project measures are not the same as mitigation measures, which are used to reduce an environmental impact's significance level. Where applicable, project measures are identified here as part of the evaluation of environmental impacts in this chapter.

6.1.1 PROJECT MEASURE PM NOI-1: GUIDELINES TO PROTECT CATEGORY 1 AND CATEGORY 3 LAND USES, HISTORIC BUILDINGS AND HISTORIC NON-BUILDING STRUCTURES DURING CONSTRUCTION

The general guidelines to protect Category 1 and Category 3 land uses, historic buildings and historic non-building structures from damage during construction of the project alignments comprise project measure PM NOI-1 and are discussed below. These guidelines should be customized for listed or eligible historic properties. The detailed steps that may be required to protect historic and fragile buildings from damage during construction are:

- Pre-Construction Survey: Metro or the contractor should perform a pre-construction survey of the structural elements of historic buildings near major construction projects. Pre-construction surveys typically include inspecting building foundations, exterior, and interior elements and documenting any pre-existing defects such as cracks, settlement, subsidence, corrosion, or water damage. Defects that need to be monitored during construction should be noted and, where appropriate, crack monitors installed prior to the start of construction. For historic structures, the pre-construction survey also should include an inspection of the historically significant features of the buildings, such as stained-glass windows, ornaments and sheet metal cornices signboards in front of buildings, and engravings on the facade of buildings. The historical survey should be performed by historic architects and the structural survey should be performed by qualified professional engineers prior to the start of construction. The survey report will assist in the resolution of any damage claims that are made as a result of the construction. For Category 1 and Category 3 buildings, the survey will document the type of use, location of use and the existing vibration levels.
- Vibration Control Plan: Preliminary source vibration levels are presented in Table 4-2. These source levels are preliminary in nature and it is up to the contractor to verify and update information prior to and/or during construction. The contractor shall provide the results of the calculated vibration levels, with the locations for the calculations indicated on the site sketch in a Vibration Control Plan to be submitted to Metro for approval. If the results of the vibration calculations or representative field data indicate that the predicted construction vibration levels exceed the damage risk criteria, the plan will identify proposed vibration abatement measures and their anticipated vibration effects, include a schedule for their implementation, provide calculations demonstrating the effectiveness of the proposed abatement measures, and, if applicable, provide applicable drawings and sketches to indicate where such abatement measures will be placed.

- Vibration Monitoring: The primary goal of monitoring is to verify that the vibration limits are not exceeded. When construction activities that create high vibration levels will be performed near vibration-sensitive buildings, the contractor should be required to monitor vibration to verify that the construction activities do not exceed the vibration limits. In addition, the contractor should be required to perform testing to verify that the vibration levels will be below the applicable limits before starting the actual construction. For example, if vibratory compaction is needed near a historic building, a short test using the compactor should be monitored prior to starting the compaction to ensure that the vibration levels will be below the allowable limits. If vibration from the test approaches or exceeds the limits, the contractor should immediately cease operations and conduct an inspection of the nearest historic property to determine if any damage occurred. The contractor should be required to reduce the intensity of the vibratory compactor until the vibration amplitudes at all sensitive buildings are below the applicable limit before construction could resume. Only then should the actual vibratory compaction commence, with continued monitoring. The key guidelines for vibration monitoring are:
  - Minimize the use of impact devices, such as jackhammers, pavement breakers, and hoe rams that cause the highest vibration. Where possible, use concrete crushers or pavement saws rather than hoe rams for tasks such as concrete deck removal and retaining wall demolition.
  - Continuous vibration monitoring shall be performed whenever construction activities that generate high vibration levels are active within 100 feet of vibration-sensitive structures.
  - If the vibration levels exceed the allowable amplitudes, construction activities should be halted immediately and the engineer should be notified. Construction should not be allowed to commence until the engineer approves the contractor’s approach for reducing the vibration levels. The engineer should be responsible for notifying property owners that the vibration limits were exceeded.
  - For historic buildings, ground motion generated by construction activities should not exceed a PPV limit of 0.20 inches per second at any location within 10 feet of any part of the building. For the non-historic building structures, ground motion generated by construction activities should not exceed a PPV limit of 0.50 inches per second at any location within 10 feet of any part of the structure.
- Visual Inspection During Construction: Follow-up visual inspection of particularly sensitive building features should be performed during and after high-vibration construction activities near sensitive buildings.
- Remove or Secure Fragile Elements: Before construction begins, some of the fragile elements in a building, such as chandeliers or wall decorations, would be removed for the duration of the construction, or would be more safely secured to the wall to ensure that they are not damaged or displaced due to high vibration activities.
- Secure or Repair Loose Elements: Any elements identified on a building as loose or in danger of damage due to a pre-existing condition would be repaired prior to construction to ensure that high vibration activities will not exacerbate the problem. If it is not feasible to repair the

element (which would be the building owner's responsibility), temporary means of securing the element should be used.

- Alternative Construction Procedures: For some construction processes, it may not be feasible to meet the vibration limits. In these cases, alternative construction processes may be required. Examples include the use of vibratory compaction near churches and theaters, and operating large tracked vehicles such as bulldozers, next to sensitive buildings. Alternative procedures include use of non-vibratory compaction in limited areas and using a bobcat in place of large bulldozers within 25 feet of buildings.

6.1.2 PROJECT MEASURE PM NOI-2: FTA DETAILED VIBRATION ASSESSMENT

The vibration assessment conducted for this project is based on the conceptual design plans as known in October 2023. Due to refinements that can occur in the design of the project, such as changes in depth or location of the tunnel, the predicted vibration impacts may be further analyzed once a preferred alignment is chosen. In the final design stage, Metro would prepare an FTA Detailed Vibration Assessment for a more comprehensive analysis of the actual vibration impacts within the vicinity of the project.

This future vibration assessment would require borehole propagation tests at various locations within the vicinity of the project. The borehole tests would provide detailed data about which frequencies are transmitted through the ground.

The project is classified as a Frequent Event by the FTA vibration event criteria, defined in Section 3.1.2. Metro would commit to constructing and operating the project within the FTA Category 3 land use GBV impact threshold of 75 VbB for Frequent Events. The FTA methodology includes a safety buffer of +5 VdB for all FTA thresholds to account for uncertainty in building amplification, future rail corrugations, and wheel roughness. Preparation of an FTA Detailed Vibration Assessment would ensure construction and operation of the project would not exceed this GBV impact threshold.

6.1.3 IMPACT NOI-1: AMBIENT NOISE

Impact NOI-1: Would the Project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

The sections below provide analysis of the aboveground noise impacts during construction and operation for the alignment alternatives and stations, the design option, and the MSF.

6.1.3.1 ALIGNMENT ALTERNATIVE 1: SAN VICENTE-FAIRFAX

CONSTRUCTION IMPACTS

Significant Impact. Construction of the San Vicente-Fairfax Alignment Alternative would be required to comply with the local general plan or local noise ordinance, as summarized in Section 3.3. The actual construction approach and equipment will not be known until a contractor is identified.

At-grade construction at each station location would be the loudest phase, with a 1-hour L_{eq} of 91.2 dBA at 50 feet. This would exceed the LA City CEQA thresholds and the 1-hour L_{eq} FTA standards of 90 dBA during the day and 80 dBA at night for residential uses during cut-and-cover construction. The removal of soil and equipment during tunnel construction would exceed the nighttime 1-hour L_{eq} FTA standard and could potentially exceed the daytime standards.

Table 6-2 provides a summary of the impacts on noise-sensitive residential properties in the station RSAs for the San Vicente-Fairfax Alignment Alternative during construction.

TABLE 6-2. CONSTRUCTION IMPACTS AT NOISE-SENSITIVE PROPERTIES IN THE SAN VICENTE-FAIRFAX ALIGNMENT ALTERNATIVE RSA

STATION	ADDRESS OF NEAREST NOISE-SENSITIVE RECEIVER	DISTANCE TO NEAREST NOISE-SENSITIVE RECEIVER (FEET)	CONSTRUCTION PHASE	PREDICTED NOISE LEVEL (dBA)	# OF IMPACTS
Crenshaw/Adams*	2614 S Victoria Ave	25	At-Grade	94	6
			Cut and Cover	93	6
			Tunnel	91	6
Midtown Crossing	4729 San Vicente Blvd	110	At-Grade	81	20
			Cut and Cover	81	20
			Tunnel	79	20
Wilshire/Fairfax*	The Academy of Museum of Motion Pictures	20	At-Grade	94	3
			Cut and Cover	93	3
			Tunnel	91	3
Fairfax/3rd*	146 S Hayworth Ave	150	At-Grade	79	4
			Cut and Cover	78	4
			Tunnel	76	4
La Cienega/Beverly *	321 N Alfred Street	70	At-Grade	85	3
			Cut and Cover	84	3
			Tunnel	81	3
San Vicente/Santa Monica *	830 Palm Ave	40	At-Grade	90	3
			Cut and Cover	89	3
			Tunnel	87	3
Fairfax/Santa Monica*	1050 N Orange Grove	150	At-Grade	74	3
			Cut and Cover	73	3
			Tunnel	73	3
La Brea/Santa Monica*	7100 Santa Monica Blvd	30	At-Grade	96	70
			Cut and Cover	95	70
			Tunnel	96	70

STATION	ADDRESS OF NEAREST NOISE-SENSITIVE RECEIVER	DISTANCE TO NEAREST NOISE-SENSITIVE RECEIVER (FEET)	CONSTRUCTION PHASE	PREDICTED NOISE LEVEL (dBA)	# OF IMPACTS
Hollywood/Highland and Hollywood/Highland Terminus*	1724 Highland Ave	30	At-Grade	92	3
			Cut and Cover	93	3
			Tunnel	92	3

Source: Connect Los Angeles Partners 2023
* Significant Impact
dBA = A-weighted decibels

The following paragraphs provide construction noise analysis for each of the San Vicente-Fairfax Alignment Alternative stations.

Crenshaw/Adams Station – The nearest residential dwelling unit to the proposed construction area is 25 feet away, as shown in Table 6-2. Construction noise levels at that distance would be an hourly L_{eq} of more than 94 dBA during the at-grade construction phase, more than 93 dBA during the cut-and-cover phase, and more than 91 dBA during the tunnel phase, which would exceed local and FTA residential daytime and nighttime 1-hour L_{eq} limits. This would be considered a substantial temporary increase in ambient noise levels above the 5 dBA allowed in the LA City CEQA thresholds and above the FTA general assessment construction noise limit standard at six dwelling units. Therefore, the impact during construction of the Crenshaw/Adams Station would be significant and mitigation is required (see Section 6.2).

Midtown Crossing Station – The nearest residential dwelling unit to the proposed construction area is 110 feet away, as shown in Table 6-2. Construction noise levels at that distance would be an hourly L_{eq} of more than 81 dBA during the at-grade phase, more than 81 dBA during the cut-and-cover phase, and more than 79 dBA during the tunnel phase. This would not be considered a substantial temporary increase in ambient noise levels above the 5 dBA allowed in the LA City CEQA thresholds nor of the FTA general assessment construction noise limit standard. Therefore, the impact during construction of the Midtown Crossing Station would be less than significant.

Wilshire/Fairfax Station – The nearest residential dwelling unit to the proposed construction area is 20 feet away, as shown in Table 6-2. Construction noise levels at that distance would be an hourly L_{eq} of more than 94 dBA during the at-grade phase, 93 dBA during the cut-and-cover phase, and more than 91 dBA during the tunnel phase. Construction would be located on Fairfax Avenue, within 20 feet of The Academy Museum of Motion Pictures. This would be considered a substantial temporary increase in ambient noise levels above the 5 dBA allowed in the LA City CEQA thresholds and above the FTA general assessment construction noise limit standard. Therefore, the impact during construction of the Wilshire/Fairfax Station would be significant and mitigation is required (see Section 6.2).

Fairfax/3rd Station – The nearest residential dwelling unit to the proposed construction area is 150 feet away, as shown in Table 6-2. Construction noise levels at that distance would be an hourly L_{eq} less than 79 dBA during the at-grade phase, less than 78 dBA during the cut-and-cover phase, and less than 76 dBA during the tunnel phase, which are below FTA's residential daytime and nighttime 1-hour L_{eq} limits but may be above the 5 dBA allowed in the LA City CEQA thresholds at four dwelling units. The noise levels at the office and commercial land use along Fairfax Avenue would be 99 dBA during the at-grade phase, 98 dBA during the cut-and-cover and 96 dBA, which are below FTA's commercial daytime and nighttime 1-hour L_{eq} limits; however, the noise levels may be in excess of the 5-dBA increase allowed in the LA City CEQA thresholds. Therefore, the impact during construction of the Fairfax/3rd Station would be significant and mitigation is required (see Section 6.2).

La Cienega/Beverly Station – The nearest residential dwelling unit to the proposed construction is 70 feet away (Table 6-2). Construction noise levels at that distance would be an hourly L_{eq} less than 85 dBA during the at-grade phase, 84 dBA during the cut-and-cover phase, and 81 dBA during the tunnel phase. The noise levels at the office and commercial land use along Fairfax would be 96 dBA during the at-grade phase, 95 dBA during the cut-and-cover phase, and 93 dBA during the tunnel phase. While these levels are below the FTA daytime and nighttime 1-hour L_{eq} limits, the noise levels may increase above the 5 dBA allowed in the LA City CEQA thresholds at three dwelling units. Therefore, the impact during construction of the La Cienega/Beverly Station would be significant and mitigation is required (see Section 6.2).

San Vicente/Santa Monica Station – The nearest residential dwelling unit to the construction is 40 feet away (Table 6-2). Construction noise levels at that distance would be an hourly L_{eq} over 90 dBA during the at-grade phase, 89 dBA during the cut-and-cover phase, and 87 dBA during the tunnel phase. The noise levels may increase above the 5 dBA allowed in the LA City CEQA thresholds. This would be considered a substantial temporary increase in ambient noise levels at three dwelling units. Therefore, the impact during construction of the San Vicente/Santa Monica Station would be significant and mitigation is required (see Section 6.2).

Fairfax/Santa Monica Station – The nearest residential dwelling unit to the construction is 150 feet away (Table 6-2). Construction noise levels at that distance would be an hourly L_{eq} under 74 dBA during the at-grade phase, 73 dBA during the cut-and-cover phase, and 73 dBA during the tunnel phase. The noise levels at the office and commercial land use along Fairfax would be 96 dBA during the at-grade phase, 95 dBA during the cut-and-cover, and 93 dBA during the tunnel phase. The noise levels may increase above the 5 dBA allowed in the LA City CEQA thresholds. This would be considered a substantial temporary increase in ambient noise levels at three dwelling units. Therefore, the impact during construction of the Fairfax/Santa Monica Station would be significant and mitigation is required (see Section 6.2).

La Brea/Santa Monica Station – The nearest residential dwelling unit to the construction is 20 feet away, as shown in Table 6-2. Construction noise levels at that distance would be an hourly L_{eq} more than 96 dBA during the at-grade phase, more than 95 dBA during the cut-and-cover phase, and more than 96 dBA during the tunnel phase. The noise levels may increase above the 5 dBA allowed in the LA City CEQA thresholds. This would be considered a substantial temporary increase in ambient noise levels at 70 dwelling units. Therefore, the impact during construction of the La Brea/Santa Monica Station would be significant and mitigation is required (see Section 6.2)

Hollywood/Highland Station or Terminus – The nearest residential dwelling unit to the construction is 30 feet away. Construction noise levels at that distance would be an hourly L_{eq} over 92 dBA during the at-grade phase, more than 93 dBA during the cut-and-cover phase, and more than 92 dBA during the tunnel phase. This would be considered a substantial temporary increase in ambient noise levels at three dwelling units. Therefore, the impact during construction of the Hollywood/Highland Station or Terminus would be significant and mitigation is required (see Section 6.2).

As described above, construction of eight of the San Vicente-Fairfax Alignment Alternative stations (all except the Midtown Crossing Station) would generate substantial temporary increases in ambient noise levels in excess of standards established in the LA CEQA thresholds and/or the applicable FTA noise-level criteria. Therefore, the impact during construction of the San Vicente-Fairfax Alignment Alternative would be significant, and mitigation is required (see Section 6.2).

OPERATIONAL IMPACTS

No Impact. Of the nine stations along the San Vicente-Fairfax Alignment, six have noise-sensitive land uses within their RSAs. These stations are Crenshaw/Adams, Midtown Crossing, Wilshire/Fairfax, La Cienega/Beverly, San Vicente/Santa Monica, and La Brea/Santa Monica. (Table 5-1 lists the land uses within the RSA of each station.) However, no additional parking or buses are planned for any of these stations, so noise from operations would be limited to people at the stations and the escalators and elevators used to enter and exit the stations. The noise-sensitive land uses within the RSA are all 100 feet or more from the proposed station entrances, and there would be no direct line of sight between the light rail vehicles at the stations and aboveground sensitive receivers. As a result, noise levels associated with operation of stations would be far below the applicable FTA noise-level criteria.

Outside the station areas, operation of the San Vicente-Fairfax Alignment Alternative would occur underground, so there would be no increase in airborne noise level to any of the noise-sensitive land uses in the RSA, including The West Angeles Church of God, Olympia Medical Center, Cedars-Sinai Medical Center, West Gate Jewish Community Center, Fairfax High School, Hollywood High School, and the Lee Strasberg Theatre, the Peterson Auto Museum, The Academy Museum of Motion Pictures, and residential properties (see Table 5-4).

Operation of the San Vicente-Fairfax Alignment Alternative would be primarily underground, and station activities that occur aboveground would not involve any noise-generating equipment. For this reason, and the reasons described above, operation of the San Vicente-Fairfax Alignment Alternative would not result in an increase in the ambient noise levels. Therefore, there would be no impact related to ambient noise during operation of the San Vicente-Fairfax Alignment Alternative.

6.1.3.2 ALIGNMENT ALTERNATIVE 2: FAIRFAX

CONSTRUCTION IMPACTS

Significant Impact. Construction of the Fairfax Alignment Alternative would be required to comply with the local general plan or local noise ordinance, as summarized in Section 3.3. The actual construction phasing and equipment will not be known until a contractor is identified. To address the increase in noise levels during construction, once the contractor is identified and before any construction can start, the contractor would develop a noise and vibration monitoring and control plan, which would require approval by Metro. This plan would include the proposed construction staging, equipment usage, noise and vibration monitoring locations, and noise and vibration mitigation measures that would be used, and it would require a report schedule to address any noise impacts and complaints. The noise and vibration control plan would address how the construction can be done in compliance with local noise ordinances and in areas where variances to codes are required. Haul routes can add substantial noise if place on roads in residential areas and with little existing traffic; the contractor should use only major roadways for haul routes and should time the trips to avoid high numbers of trucks in short periods of time.

At-grade construction at each station location would be the loudest phase, with a 1-hour L_{eq} of 91.2 dBA at 50 feet. This would exceed the LA City CEQA thresholds and the 1-hour L_{eq} FTA standards of 90 dBA during the day and 80 dBA at night for residential uses during cut-and-cover construction. The removal of soil and equipment during tunnel construction would exceed the nighttime 1-hour L_{eq} FTA standard but could also potentially exceed the daytime standards.

Table 6-3 provides a summary of the impacts on noise-sensitive residential properties in the station RSAs for the Fairfax Alignment Alternative.

The following paragraphs provide construction noise analysis for each of the Fairfax Alignment Alternative stations.

Crenshaw/Adams Station – The nearest residential dwelling unit to the proposed construction area is 25 feet away, as shown in Table 6-3. Construction noise levels at would be an hourly L_{eq} of more than 94 dBA during the at-grade construction phase, more than 93 dBA during the cut-and-cover phase, and more than 91 dBA during the tunnel phase, which exceeds local and FTA's residential daytime and nighttime 1-hour L_{eq} limits. This would be considered a substantial temporary increase in ambient noise levels above the 5 dBA allowed in the LA City CEQA thresholds and exceed the FTA general assessment construction noise limit standard on six dwelling units. Therefore, the impact during construction of the Crenshaw/Adams Station would be significant and mitigation is required (see Section 6.2).

Midtown Crossing Station – The nearest residential dwelling unit to the proposed construction area is 110 feet away, as shown in Table 6-3. Construction noise levels at that distance would be an hourly L_{eq} of more than 81 dBA during the at-grade phase, more than 81 dBA during the cut-and-cover phase, and more than 79 dBA during the tunnel phase. This would not be considered a substantial temporary increase in ambient noise levels in excess of the 5-dBA increase allowed in the LA City CEQA thresholds nor of the FTA general assessment construction noise limit standard. Therefore, the impact during construction of the Midtown Crossing Station would be less than significant.

TABLE 6-3. CONSTRUCTION IMPACTS AT NOISE-SENSITIVE PROPERTIES IN THE FAIRFAX ALIGNMENT ALTERNATIVE RSA

STATION	ADDRESS OF NEAREST NOISE-SENSITIVE RECEIVER	DISTANCE TO NEAREST NOISE-SENSITIVE RECEIVERS (FEET)	CONSTRUCTION PHASE	PREDICTED NOISE LEVEL (dBA)	# OF IMPACTS
Crenshaw/Adams*	2614 S Victoria Ave	25	At-Grade	94	6
			Cut and Cover	93	6
			Tunnel	91	6
Midtown Crossing	4729 San Vicente Blvd	110	At-Grade	81	20
			Cut and Cover	81	20
			Tunnel	79	20
Wilshire/Fairfax*	The Academy of Museum of Motion Pictures	20	At-Grade	94	3
			Cut and Cover	93	3
			Tunnel	91	3
Fairfax/3rd*	146 S Hayworth Ave	150	At-Grade	79	4
			Cut and Cover	78	4
			Tunnel	76	4
Fairfax/Santa Monica*	1050 N Orange Grove	150	At-Grade	74	3
			Cut and Cover	73	3
			Tunnel	73	3
La Brea/Santa Monica*	7100 Santa Monica Blvd	30	At-Grade	96	70
			Cut and Cover	95	70
			Tunnel	96	70
Hollywood/Highland and Hollywood/Highland Terminus*	1724 Highland Ave	30	At-Grade	92	3
			Cut and Cover	93	3
			Tunnel	92	3

Source: Connect Los Angeles Partners 2023
dBA = A-weighted decibels
* Significant Impact

Wilshire/Fairfax Station – The nearest residential dwelling unit to the proposed construction area is less than 20 feet away, as shown in Table 6-3. Construction noise levels at that distance would be an hourly L_{eq} of more than 94 dBA during the at-grade phase, more than 93 dBA during the cut-and-cover phase, and more than 91 dBA during the tunnel phase. Construction would be located on Fairfax Avenue, within 20 feet of The Academy Museum of Motion Pictures. This would be considered a substantial temporary increase in ambient noise levels above the 5 dBA allowed in the LA City CEQA thresholds and above the FTA general assessment construction noise limit standard. Therefore, the impact during construction of the Wilshire/Fairfax Station would be significant, and mitigation is required (see Section 6.2).

Fairfax/3rd Station – The nearest residential dwelling unit to the proposed construction area is 150 feet away, as shown in Table 6-3. Construction noise levels at that distance would be an hourly L_{eq} less than 79 dBA during the at-grade phase, less than 78 dBA during the cut-and-cover phase, and less than 76 dBA during the tunnel phase, which are below FTA's residential daytime and nighttime 1-hour L_{eq} limits but may be above the 5 dBA allowed in the LA City CEQA thresholds at four dwelling units. The noise levels at the office and commercial land use along Fairfax Avenue would be 99 dBA during the at-grade phase, 98 dBA during the cut-and-cover and 96 dBA, which are below FTA's commercial daytime and nighttime 1-hour L_{eq} limits; however, the noise levels may be above the 5 dBA allowed in the LA City CEQA thresholds. Therefore, the impact during construction of the Fairfax/3rd Station would be significant and mitigation is required (see Section 6.2).

Fairfax/Santa Monica Station – The nearest residential dwelling unit to the construction is 150 feet away, as shown in Table 6-3. Construction noise levels at that distance would be an hourly L_{eq} under 74 dBA during the at-grade phase, less than 73 dBA during the cut-and-cover phase, and less than and 73 dBA during the tunnel phase. The noise levels at the office and commercial land use along Fairfax would be 96 dBA during the at-grade phase, 95 dBA during the cut-and-cover, and 93 dBA during the tunnel phase. The noise levels may increase above the 5 dBA allowed in the LA City CEQA thresholds. This would be considered a substantial temporary increase in ambient noise levels at three dwelling units. Therefore, the impact during construction of the Fairfax/Santa Monica Station would be significant and mitigation is required (see Section 6.2).

La Brea/Santa Monica Station – The nearest residential dwelling unit to the construction is 30 feet away, as shown in Table 6-3. Construction noise levels at that distance would be an hourly $L_{eq\ of}$ more than 96 dBA during the at-grade phase, more than 95 dBA during the cut-and-cover phase, and more than 96 dBA during the tunnel phase. The noise levels may increase above the 5 dBA allowed in the LA City CEQA thresholds. This would be considered a substantial temporary increase in ambient noise levels at 70 dwelling units. Therefore, impact during construction of the La Brea/Santa Monica Station would be significant and mitigation is required (see Section 6.2).

Hollywood/Highland Station or Terminus – The nearest residential dwelling unit to the construction is 30 feet away, as shown in Table 6-3. Construction noise levels at that distance would be an hourly L_{eq} over 92 dBA during the at grade phase, more than 93 dBA during the cut and cover phase, and more than 92 dBA during the tunnel phase. This would be considered a substantial temporary increase in ambient noise levels at three dwelling units. Therefore, the impact during construction of the Hollywood/Highland Station or Terminus would be significant and mitigation is required (see Section 6.2).

As described above, construction of six of Fairfax Alignment Alternative stations (all except the Midtown Crossing Station) would generate substantial temporary increases in ambient noise levels in excess of standards established in the LA CEQA thresholds and/or the applicable FTA noise-level criteria. Therefore, the impact during construction of the Fairfax Alignment Alternative would be significant, and mitigation is required (see Section 6.2).

OPERATIONAL IMPACTS

No Impact. Of the seven stations along the Fairfax Alignment, four have noise-sensitive land uses within their RSAs. These stations are Crenshaw/Adams, Midtown Crossing, Wilshire/Fairfax, and La Brea/Santa Monica. (Table 5-2 lists the land uses within the RSA of each station.) However, no additional parking or buses are planned for any of these stations, so noise from operations would be limited to people at the stations and the escalators and elevators used to enter and exit the stations. The noise-sensitive land uses within the RSA are all 100 feet or more from the proposed station entrances, and there would be no direct line of sight between the light rail vehicles at the stations and aboveground sensitive receivers. As a result, noise levels associated with operation of stations would be far below the applicable FTA noise-level criteria.

Outside the station areas, operation of the Fairfax Alignment Alternative would be underground, so there would be no increase in airborne noise level to any of the noise-sensitive land uses in the RSA, including The West Angeles Church of God, Complete Eye Care Center, Olympia Hospital, Hollywood Cat and Dog Hospital, Academy Museum of Motion Pictures, the Peterson Auto Museum, West Angeles Performing Arts, Lee Strasberg Theatre, and residential properties (see Table 5-5).

Operation of the Fairfax Alignment Alternative would be primarily underground, and station activities that occur aboveground would not involve any noise-generating equipment. For this reason, and the reasons described above, operation of the Fairfax Alignment Alternative would not result in an increase in the ambient noise levels. Therefore, there would be no impact related to ambient noise during operation of the Fairfax Alignment Alternative.

6.1.3.3 ALIGNMENT ALTERNATIVE 3: LA BREA

CONSTRUCTION IMPACTS

Significant Impact. Construction of the La Brea Alignment Alternative construction would be required to comply with the local general plan or noise ordinance, as summarized in Section 3.3. The actual construction phasing and equipment will not be known until a contractor is identified. To address the increase in noise levels during construction, once the contractor is identified and before any construction can start the contractor would develop a noise and vibration monitoring and control plan, which would require approval by Metro. This plan will include the proposed construction staging, equipment usage, noise and vibration monitoring locations, and noise and vibration mitigation measures that would be used, and it would require a report schedule to address noise impacts and complaints. The noise and vibration control plan would address how the construction can be done in compliance with local noise ordinance and in areas where variances to codes are required. Haul routes can add substantial noise if they are on roads in residential area and with little existing traffic; the contractor should use only major roadways for haul routes and should time the trips to avoid high numbers of trucks in short periods of time.

At-grade construction at each station location would be the loudest phase, with a 1-hour L_{eq} of 91.2 dBA at 50 feet. This would exceed the LA City CEQA thresholds and the 1-hour L_{eq} FTA standards of 90 dBA during the day and 80 dBA at night for residential uses during cut-and-cover construction.

The removal of soil and equipment during tunnel construction would exceed the nighttime 1-hour L_{eq} FTA standard but could also potentially exceed the daytime standards.

Table 6-4 provides a summary of the impacts on noise-sensitive receivers in the station RSAs for the La Brea Alignment Alternative.

TABLE 6-4. CONSTRUCTION IMPACTS AT NOISE-SENSITIVE PROPERTIES IN THE LA BREA ALIGNMENT ALTERNATIVE RSA

STATION	ADDRESS OF NEAREST NOISE-SENSITIVE RECEIVER	DISTANCE TO NEAREST NOISE-SENSITIVE RECEIVERS (FEET)	CONSTRUCTION PHASE	PREDICTED NOISE LEVEL (dBA)	# OF IMPACTS
Crenshaw/Adams*	2614 S Victoria Ave	25	At-Grade	94	6
			Cut and Cover	93	6
			Tunnel	91	6
Midtown Crossing	4729 San Vicente Blvd	110	At-Grade	81	20
			Cut and Cover	81	20
			Tunnel	79	20
Wilshire/La Brea*	460 S Detroit St	30	At-Grade	96	54
			Cut and Cover	95	54
			Tunnel	96	54
La Brea/Beverly*	318 N Detroit St	30	At-Grade	96	46
			Cut and Cover	95	46
			Tunnel	96	46
La Brea/Santa Monica*	7100 Santa Monica Blvd	30	At-Grade	96	70
			Cut and Cover	95	70
			Tunnel	96	70
Hollywood/Highland and Hollywood/Highland Terminus*	1724 Highland Ave	30	At-Grade	92	3
			Cut and Cover	93	3
			Tunnel	92	3

Source: Connect Los Angeles Partners 2023
dBA = A-weighted decibels
* Significant Impact

The following paragraphs provide construction noise analysis for each of the La Brea Alignment Alternative stations.

Crenshaw/Adams Station – The nearest residential dwelling unit to the proposed construction area is 25 feet away, as shown in Table 6-4. Construction noise levels at that distance would be an hourly L_{eq} of more than 94 dBA during the at-grade construction phase, more than 93 dBA during the cut-and-cover phase, and more than 91 dBA during the tunnel phase, which exceeds local and FTA's residential daytime and nighttime 1-hour L_{eq} limits. This would be considered a substantial temporary increase in ambient noise levels above the 5 dBA allowed in the LA City CEQA thresholds and above the FTA general assessment construction noise limit standard at six dwelling units. Therefore, the impact during construction of the Crenshaw/Adams Station would be significant and mitigation is required (see Section 6.2).

Midtown Crossing Station – The nearest residential dwelling unit to the proposed construction area is 110 feet away, Table 6-4. Construction noise levels at that distance would be an hourly L_{eq} of more than 81 dBA during the at-grade phase, more than 81 dBA during the cut-and-cover phase, and more than 79 dBA during the tunnel phase. This would not be considered a substantial temporary increase in ambient noise levels above the 5 dBA allowed in the LA City CEQA thresholds nor of the FTA general assessment construction noise limit standard. Therefore, the impact during construction of the Midtown Crossing Station would be less than significant.

Wilshire/La Brea Station – The nearest residential dwelling unit to the proposed construction area is 30 feet away, as shown in Table 6-4. Construction noise levels at would be an hourly L_{eq} of more than 96 dBA during the at-grade construction phase, more than 95 dBA during the cut-and-cover phase, and more than 96 dBA during the tunnel phase, which exceeds local and FTA's residential daytime and nighttime 1-hour L_{eq} limits. This would be considered a substantial temporary increase in ambient noise levels above the 5 dBA allowed in the LA City CEQA thresholds and above the FTA general assessment construction noise limit standard on 54 dwelling units. Therefore, the impact during construction of the Wilshire/La Brea Station would be significant and mitigation is required (see Section 6.2).

La Brea/Beverly Station – The nearest residential dwelling unit to the proposed construction area is 30 feet away, as shown in Table 6-4. Construction noise levels at would be an hourly L_{eq} of more than 96 dBA during the at-grade construction phase, more than 95 dBA during the cut-and-cover phase, and more than 96 dBA during the tunnel phase, which exceeds local and FTA's residential daytime and nighttime 1-hour L_{eq} limits. This would be considered a substantial temporary increase in ambient noise levels above the 5 dBA allowed in the LA City CEQA thresholds and above the FTA general assessment construction noise limit standard on 46 dwelling units. Therefore, the impact during construction of the La Brea/Beverly Station would be significant and mitigation is required (see Section 6.2).

La Brea/Santa Monica Station – The nearest residential dwelling unit to the proposed construction area is 30 feet away, as shown in Table 6-4. Construction noise levels at would be an hourly L_{eq} of more than 96 dBA during the at-grade construction phase, more than 95 dBA during the cut-and-cover phase, and more than 96 dBA during the tunnel phase, which exceeds local and FTA's residential daytime and nighttime 1-hour L_{eq} limits. This would be considered a substantial temporary increase in ambient noise levels above the 5 dBA allowed in the LA City CEQA thresholds and above FTA general assessment construction noise limit standard on 70 dwelling units. Therefore, the impact during construction of the La Brea/Santa Monica Station would be significant and mitigation is required (see Section 6.2).

Hollywood/Highland Station or Terminus – The nearest residential dwelling unit to the construction is 30 feet away, as shown in Table 6-4. Construction noise levels at that distance would be an hourly L_{eq} of more than 92 dBA during the at grade phase, more than 93 dBA during the cut and cover phase, and more than 92 dBA during the tunnel phase. This would be considered a substantial temporary increase in ambient noise levels at three dwelling units. Therefore, the impact during construction of the Hollywood/Highland Station or Terminus would be significant and mitigation is required (see Section 6.2).

As described above, construction of five of La Brea Alignment Alternative stations (all except the Midtown Crossing Station) would generate substantial temporary increases in ambient noise levels in excess of standards established in the LA CEQA thresholds and/or the applicable FTA noise-level criteria. Therefore, the impact during construction of the La Brea Alignment Alternative would be significant, and mitigation is required (see Section 6.2).

OPERATIONAL IMPACTS

No Impact. Of the six stations along the La Brea Alignment Alternative, five have noise-sensitive land uses within their RSAs. These stations are Crenshaw/Adams, Midtown Crossing, Wilshire/La Brea, La Brea/Beverly, and La Brea/Santa Monica (Table 5-3 lists the land uses within the RSA of each station). However, no additional parking or buses are planned for any of these stations, so noise from operations would be limited to the people at the stations and the escalators and elevators used to enter and exit the stations. The noise-sensitive land uses within the RSA are all 100 feet or more from the proposed station entrances, and there would be no direct line of sight between the light rail vehicles at the stations and the aboveground sensitive receivers. As a result, noise levels associated with operation of stations would be far below the applicable FTA noise-level criteria.

Outside the station areas, operation of the Fairfax Alignment Alternative would be underground, so there would be no increase in airborne noise level to any other noise-sensitive land uses in the RSA, including: The West Angeles Church of God, Cathedral Chapel of St. Vibiana, Congregation Livi Yitzchok, Hollywood High School, and residential properties (see Table 5-6).

Operation of the La Brea Alignment Alternative would be primarily underground, and station activities that occur aboveground would not involve any noise-generating equipment. For this reason, and the reasons described above, operation of the La Brea Alignment Alternative would not result in an increase in the ambient noise levels. Therefore, there would be no impact related to ambient noise during operation of the La Brea Alignment Alternative.

6.1.3.4 HOLLYWOOD BOWL DESIGN OPTION

CONSTRUCTION IMPACTS

Significant Impact. The Hollywood Bowl Design Option would be located under Highland Avenue, with construction staging areas proposed within Parking Lots B, C, and D of the Hollywood Bowl. The nearest residential dwelling unit to the proposed construction area is 70 feet away, as shown in Table 6-5. Construction noise levels at the sensitive receivers would be an hourly L_{eq} of less than 85 dBA during the at-grade phase, less than 84 dBA during the cut-and-cover phase, and less than 81 dBA during the tunnel phase. The nearest sensitive noise receiver is more than 200 feet from the entrance to the Hollywood Bowl. Construction activity may be considered a substantial temporary increase in ambient noise levels above the 5 dBA allowed in the LA City CEQA thresholds at 40 dwelling units. Therefore, the impact during construction of the Hollywood Bowl Design Option would be significant and mitigation is required (see Section 6.2).

TABLE 6-5. CONSTRUCTION IMPACTS AT NOISE-SENSITIVE RESIDENTIAL PROPERTIES IN THE HOLLYWOOD BOWL DESIGN OPTION RSA

STATION	ADDRESS OF NEAREST NOISE-SENSITIVE RECEIVER	DISTANCE TO NEAREST NOISE-SENSITIVE RECEIVERS (FEET)	CONSTRUCTION PHASE	PREDICTED NOISE LEVEL (dBA)	# OF IMPACTS
Hollywood Bowl Option*	2614 S Victoria Ave	70	At-Grade	85	40
			Cut and Cover	84	40
			Tunnel	81	40

Source: Connect Los Angeles Partners 2023
dBA = A-weighted decibels
* Significant Impact

OPERATIONAL IMPACTS

No Impact. There are no noise-sensitive land uses within the 200-foot RSA of the station associated with the Hollywood Bowl Design Option. The Hollywood Bowl is located more than 200 feet from the proposed design option. Therefore, operation of the design option would have no impact on ambient noise levels in the vicinity.

6.1.3.5 MAINTENANCE AND STORAGE FACILITY

The MSF site is within 0.5 mile of LAX. While construction and operation of the MSF would expose people working in the area to increased noise levels, existing noise levels in this area are high due to the overflights of planes landing at LAX and from roadways and industrial land use. See Section 5.1.5 for existing noise levels in the MSF RSA.

CONSTRUCTION IMPACTS

No Impact. All construction activities associated with the MSF would be aboveground. However, there are no residential land uses within 200 feet of the proposed construction. Therefore, the construction activity associated with the MSF would result in no impact related to ambient noise levels.

OPERATIONAL IMPACTS

No Impact. There are no noise-sensitive land uses within the MSF RSA. Therefore, operation of the MSF would have no impact related to ambient noise levels.

6.1.4 IMPACT NOI-2: GROUND-BORNE NOISE AND VIBRATION

Impact NOI-2: Would the Project result in generation of excessive GBV or GBN levels?

During construction, GBV and GBN would be of concern primarily in the tunnel phase. As such, the study of potential GBV and GBN construction impacts focuses on the underground alignments. Potential GBV and GBN impacts could also occur in the early stages of the cut-and-cover alignment construction and during aboveground station construction activities, but this would depend on the method of construction that the contractor chooses to use. For all alignment alternatives and stations, the design option, and the MSF, project measure PM NOI-1 would be implemented as part of the Project to protect any Category 1 or 3 land uses, historic buildings and historic non-building structures from damage during construction, as described in Section 6.1.1. Project measure PM NOI-2 would also be implemented to ensure that at a later stage of design, once a preferred alignment is selected, an FTA Detailed Vibration Assessment would be conducted to further analyze vibration impacts, as described in Section 6.1.2.

Operation of the alignment alternatives and the design option would also occur primarily underground, which is the only potential source of GBV and GBN impacts from train operations. Light rail vehicles moving through the stations would be the concern for operational vibration impacts at the station locations. The only operational activities that would not be underground is people entering and exiting the station, which has no risk of GBV or GBN impacts. However, because borehole line source response testing was not conducted as part of this assessment, the theaters and performing arts spaces identified as FTA special buildings would require further study as part of final design.

6.1.4.1 ALIGNMENT ALTERNATIVE 1: SAN VICENTE-FAIRFAX

CONSTRUCTION IMPACTS

Less than Significant Impact. The predicted GBV and GBN at sensitive receivers in the RSA above the underground portions of the San Vicente-Fairfax Alignment Alternative are presented in Table 6-6 for FTA Special Buildings, Table 6-7 for FTA Category 2 residential land uses, and Table 6-8 for FTA Category 3 institutional land uses. For this analysis, the Academy Museum of Motion Pictures is considered a Category 3 land use due to its usage as a movie theater. As shown in the tables, none of the FTA GBV and GBN impact criteria would be exceeded at these land uses.

Construction of the alignment tunnel would be mostly underground. Vibration from the TBM would be at or below the levels predicted for train operations. Implementation of a vibration control plan and vibration monitoring as per PM NOI-1 would ensure station construction at the surface would not result in excessive GBV and GBN levels. Therefore, the levels and impacts shown in Table 6-6, Table 6-7, and Table 6-8 can be used for both construction and operations. The vibration generated by the TBM would be temporary, lasting for a few days as it passes under the different receiver locations.

Therefore, construction of the San Vicente-Fairfax Alignment Alternative would have a less than significant impact related to generation of excessive GBV or GBN levels.

OPERATIONAL IMPACTS

Less than Significant Impact. The predicted GBV and GBN at sensitive receivers in the RSA above the San Vicente-Fairfax Alignment Alternative are presented in Table 6-6 or FTA Special Buildings, Table 6-7 for FTA Category 2 residential Land uses, and Table 6-8 for FTA Category 3 institutional land uses. As shown in the tables, none of the FTA GBV and GBN impact criteria would be exceeded at these land uses during operation of the San Vicente-Fairfax Alignment Alternative. Therefore, the San Vicente-Fairfax Alignment Alternative would have a less than significant operational impact related to generation of excessive GBV or GBN levels.

6.1.4.2 ALIGNMENT ALTERNATIVE 2: FAIRFAX

CONSTRUCTION IMPACTS

Less than Significant Impact. The predicted GBV and GBN at sensitive receivers in the RSA above the underground portions of the Fairfax Alignment Alternative are presented in Table 6-9 for FTA Special Buildings, Table 6-10 for FTA Category 2 residential land uses, and Table 6-11 for FTA Category 3 institutional land uses. For this analysis, the Academy Museum of Motion Pictures is considered a Category 3 land use due to its usage as a movie theater. As shown in the tables, none of the FTA GBV and GBN impact criteria would be exceeded at these land uses.

Construction of the alignment tunnel would be mostly underground. Vibration from the TBM would be at or below the levels predicted for train operations. Implementation of a vibration control plan and vibration monitoring as per PM NOI-1 would ensure station construction at the surface would not result in excessive GBV and GBN levels. Therefore, the levels and impacts shown in Table 6-9, Table 6-10, and Table 6-10 can be used for both construction and operations. The vibration generated by the TBM would be temporary, lasting for a few days as it passes under the different receiver locations.

Therefore, construction of the Fairfax Alignment Alternative would have a less than significant impact related to generation of excessive GBV or GBN levels.

OPERATIONAL IMPACTS

Less than Significant Impact. The predicted GBV and GBN at sensitive receivers in the RSA above the Fairfax Alignment Alternative are presented in Table 6-9 for FTA Special Buildings, Table 6-10 for FTA Category 2 residential land uses, and Table 6-11 for FTA Category 3 institutional land uses. As shown in the tables, none of the FTA GBV and GBN impact criteria would be exceeded at these land uses during operation of the Fairfax Alignment Alternative. Therefore, the San Vicente would have a less than significant operational impact related to generation of excessive GBV or GBN levels.

6.1.4.3 ALIGNMENT ALTERNATIVE 3: LA BREA

CONSTRUCTION IMPACTS

Less than Significant Impact. The predicted GBV and GBN at sensitive receivers in the RSA above the underground portions of the La Brea Alignment Alternative are presented in Table 6-12 for FTA Special Buildings, Table 6-13 for FTA Category 2 residential land uses, and Table 6-14 for FTA Category 3 institutional land uses. As shown in the tables, none of the FTA GBV and GBN impact criteria would be exceeded at these land uses.

Construction of the alignment tunnel would be mostly underground. Vibration from the TBM would be at or below the levels predicted for train operations. Implementation of a vibration control plan and vibration monitoring as per PM NOI-1 would ensure station construction at the surface would not result in excessive GBV and GBN levels. Therefore, the levels and impacts shown in Table 6-12, Table 6-13, and Table 6-14 can be used for both construction and operations. The vibration generated by the TBM would be temporary, lasting for a few days as it passes under the different receiver locations.

Therefore, construction of the La Brea Alignment Alternative would have a less than significant impact related to generation of excessive GBV or GBN levels.

OPERATIONAL IMPACTS

Less than Significant Impact. The predicted GBV and GBN at sensitive receivers in the RSA above the La Brea Alignment Alternative are presented in Table 6-12 for FTA Special Buildings, Table 6-13 for FTA Category 2 residential land uses, and Table 6-14 for FTA Category 3 institutional land uses. As shown in the tables, none of the FTA GBV and GBN impact criteria would be exceeded at these land uses during operation of the La Brea Alignment Alternative. Therefore, the San Vicente would have a less than significant operational impact related to generation of excessive GBV or GBN levels.

6.1.4.4 HOLLYWOOD BOWL DESIGN OPTION

CONSTRUCTION IMPACTS

No Impact. The predicted GBV and GBN at sensitive receivers above the underground portion of the design option alignment is presented in Table 6-15 for FTA Category 2 residential land uses. There are no FTA Special Buildings or FTA Category 3 institutional land uses in the RSA. As shown in the table, none of the FTA GBV and GBN impact criteria would be exceeded at the identified land uses.

Construction of the Hollywood Bowl Design Option tunnel would be mostly underground. Vibration from the TBM would be at or below the levels predicted for train operations. Implementation of a vibration control plan and vibration monitoring as per PM NOI-1 would ensure station construction at the surface would not result in excessive GBV and GBN levels. Therefore, the levels and impacts shown in Table 6-15 can be used for both construction and operations. The vibration generated by the TBM would be temporary, lasting for a few days as it passes under the different receiver locations.

The movement of soil down the tunnel is another potential vibration sources.

Therefore, construction of the Hollywood Bowl Design Option would have no impact related generation of excessive GBV or GBN levels.

OPERATIONAL IMPACTS

No Impact. The predicted GBV and GBN at sensitive receivers in the RSA above the Hollywood Bowl Design Option are presented in Table 6-15. As shown in the table, none of the FTA GBV and GBN impact criteria would be exceeded at these land uses during operation of the design option. There are no FTA Special Buildings or FTA Category 3 institutional land uses in the RSA. Therefore, the Hollywood Bowl Design Option would have no operational impact related to excessive GBV or GBN.

6.1.4.5 MAINTENANCE AND STORAGE FACILITY

CONSTRUCTION IMPACTS

No Impact. The construction of the MSF would require construction equipment and movement of soil. The nearest vibration-sensitive land use to the MSF is more than 200 feet from the MSF. At that distance, vibration levels would not exceed FTA GBV and GBN impact criteria and there would be no impact.

OPERATIONAL IMPACTS

No Impact. Operations of the MSF would involve the movement of light rail vehicles around the MSF. There would also be special trackwork in the yard to allow the trains to be moved between storage tracks. The nearest vibration-sensitive land use to the MSF is more than 200 feet from the MSF. At that distance, vibration levels would not exceed FTA GBV and GBN impact criteria and there would be no impact.

TABLE 6-6. SAN VICENTE-FAIRFAX ALIGNMENT ALTERNATIVE PREDICTED VIBRATION LEVELS AT FTA SPECIAL BUILDINGS

CITY	BUILDING ACTIVITIES AND ADDRESS	TRACK STATIONING	HORIZONTAL DISTANCE TO BUILDING NEAREST TRACK (FEET)	DEPTH TO TRACK	SLANT DISTANCE	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	West Angeles Performing Arts Theatre 3020 Crenshaw Blvd	17+75	30	66	72		53	72	N	30	35	N
West Hollywood	Education/Lee Strasberg Theatre 7936 Santa Monica Blvd	398+00	30	73	79		52	72	N	28	35	N
Los Angeles	Hollywood High School Theater 1521 N Highland Ave	500+00	54	95	109	Yes	60	72	N	33	35	N

Source: Connect Los Angeles Partners 2023
[1] Correction for special trackwork is 10 VdB for 0 to 100 feet and 5 VdB for 100 to 200 feet. No correction beyond 200 feet.
[2] A value of -5 dB can be used for K_{rad} for typical residential rooms.
[3] As a safety factor no building loss was assumed.
dBA = A-weighted decibels; GBN = ground-borne noise; GBV = ground-borne vibration; VdB = vibration decibels

TABLE 6-7. SAN VICENTE-FAIRFAX ALIGNMENT ALTERNATIVE PREDICTED VIBRATION LEVELS AT FTA CATEGORY 2 RESIDENTIAL LAND USES

CITY	RESIDENTIAL ADDRESS	TRACK STATIONING	LATERAL DISTANCE TO NEAREST TRACK (FEET)	DEPTH TO TRACK	SLANT DISTANCE	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	2300 S Victoria Ave	43+00	0	74	74		52	72	N	28	35	N
Los Angeles	2207 S Victoria Ave	50+00	0	106	106		50	72	N	23	35	N
Los Angeles	2026 Wellington Road	55+00	0	127	127		49	72	N	21	35	N
Los Angeles	1945 Wellington Road	60+00	0	133	133		49	72	N	21	35	N
Los Angeles	1864 Virginia Road	65+00	0	144	144		49	72	N	20	35	N
Los Angeles	1823 Virginia Road	70+00	0	134	134		49	72	N	20	35	N
Los Angeles	1734 Buckingham Road	75+00	0	131	131		49	72	N	21	35	N
Los Angeles	1675 Buckingham Road	80+00	0	130	130		49	72	N	21	35	N
Los Angeles	1616 West Blvd	85+00	0	124	124		49	72	N	21	35	N
Los Angeles	W 16th Place	90+00	0	114	114		50	72	N	22	35	N
Los Angeles	4777 San Vicente Blvd	107+00	90	65	111		50	72	N	22	35	N
Los Angeles	4821 San Vicente Blvd	110+00	55	69	88		51	72	N	26	35	N
Los Angeles	1299 S Highland Ave	115+00	62	87	107		50	72	N	23	35	N
Los Angeles	1301 S Highland Ave	115+00	70	87	112		50	72	N	22	35	N
Los Angeles	1300 S Mansfield Ave	120+00	63	73	96		53	72	N	30	35	N
Los Angeles	5111 San Vicente Blvd	125+00	55	113	126		49	72	N	21	35	N
Los Angeles	5104 San Vicente Blvd	125+00	56	113	126		49	72	N	21	35	N
Los Angeles	1248 Redondo Blvd	130+00	60	119	133		49	72	N	21	35	N
Los Angeles	1252 Redondo Blvd	130+00	68	119	137		49	72	N	20	35	N

CITY	RESIDENTIAL ADDRESS	TRACK STATIONING	LATERAL DISTANCE TO NEAREST TRACK (FEET)	DEPTH TO TRACK	SLANT DISTANCE	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	5253 San Vicente Blvd	135+00	60	119	133		49	72	N	21	35	N
Los Angeles	1255 Meadowbrook Ave	135+00	70	119	138		49	72	N	20	35	N
Los Angeles	5315 San Vicente Blvd	140+00	61	119	134		49	72	N	20	35	N
Los Angeles	5322 San Vicente Blvd	140+00	61	119	134		49	72	N	21	35	N
Los Angeles	5404 San Vicente Blvd	145+00	50	118	128		49	72	N	21	35	N
Los Angeles	5415 San Vicente Blvd	146+00	60	120	134		49	72	N	21	35	N
Los Angeles	5455 San Vicente Blvd	150+00	40	123	129		49	72	N	21	35	N
Los Angeles	5470 San Vicente Blvd	150+00	70	123	142		49	72	N	21	35	N
Los Angeles	1128 Masselin Ave	158+00	0	120	120		50	72	N	22	35	N
Los Angeles	1109 Masselin Ave	160+00	0	120	120		50	72	N	22	35	N
Los Angeles	1040 S Curson Ave	165+00	0	127	127		49	72	N	21	35	N
Los Angeles	1007 S Stanley Ave	170+00	0	123	123		49	72	N	21	35	N
Los Angeles	915 S Spaulding Ave	176+00	0	105	105		50	72	N	23	35	N
Los Angeles	847 S Genesee Ave	180+00	0	99	99		51	72	N	25	35	N
Los Angeles	754 S Orange Grove Ave	186+00	0	105	105		50	72	N	23	35	N
Los Angeles	530 S Fairfax Ave	203+00	20	112	114	Yes	60	72	N	32	35	N
Los Angeles	119 N Fairfax Ave	237+00	30	76	82		51	72	N	26	35	N
Los Angeles	140 N Hayworth Ave	239+00	0	80	80		52	72	N	28	35	N
West Hollywood	8700 Bonner Drive	298+00	20	66	69		53	72	N	30	35	N
West Hollywood	354 N Sherbourne Drive	300+00	10	65	66		54	72	N	32	35	N
West Hollywood	404 N Sherbourne Drive	301+85	20	64	67		54	72	N	32	35	N
West Hollywood	8703 Ashcroft Avenue	305+00	11	63	64		54	72	N	32	35	N
West Hollywood	528 N San Vicente Blvd	310+00	30	61	68		54	72	N	32	35	N
West Hollywood	530 N San Vicente Blvd	311+00	83	61	103		50	72	N	23	35	N
West Hollywood	8755 Santa Monica Blvd	336+00	64	63	90	Yes	61	72	N	33	35	N

Source: Connect Los Angeles Partners 2023
[1] Correction for special trackwork is 10 VdB for 0 to 100 feet and 5 VdB for 100 to 200 feet. No correction beyond 200 feet.
[2] A value of -5 dB can be used for K_{rad} for typical residential rooms.
[3] As a safety factor, no building loss was assumed.
dBA = A-weighted decibels; GBN = ground-borne noise; GBV = ground-borne vibration; VdB = vibration decibels

TABLE 6-8. SAN VICENTE/FAIRFAX ALIGNMENT ALTERNATIVE PREDICTED VIBRATION LEVELS AT FTA CATEGORY 3 INSTITUTIONAL LAND USES

CITY	BUILDING ADDRESS	TRACK STATIONING	LATERAL DISTANCE TO NEAREST TRACK (FEET)	DEPTH TO TOP OF RAIL (FEET)	SLANT DISTANCE (FEET)	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	West Angeles Church of God 3602 Crenshaw Blvd	4+00	120	61	135		49	75	N	20	40	N
Los Angeles	West Angeles Church of God 3045 Crenshaw Blvd	15+00	45	67	81		52	75	N	28	40	N
Los Angeles	West Angeles Christian Academy 3000 Crenshaw Blvd	19+00	27	65	70		53	75	N	30	40	N
Los Angeles	Complete Eye Care Center 2825 Crenshaw Blvd	30+00	40	66	77	Yes	57	75	N	33	40	N
Los Angeles	Neighborhood Office Commercial 5601 San Vicente Blvd	155+00	0	120	120		50	75	N	22	40	N
Los Angeles	Peterson Automotive Museum 6060 Wilshire Blvd	191+00	0	107	107		50	75	N	23	40	N
Los Angeles	Academy Museum of Motion Pictures 6067 Wilshire Blvd	196+00	65	105	123		49	75	N	21	40	N
Los Angeles	Hancock Park Elementary School 408 S Fairfax Avenue	216+00	33	82	88		51	75	N	26	40	N
Los Angeles	Short Story Hotel 15 S Fairfax Avenue	232+00	40	70	81	Yes	57	75	N	33	40	N
Los Angeles	Modern Animal Hospital 8126 Beverly Blvd	252+50	25	86	90		51	75	N	26	40	N
Los Angeles	Sofitel Los Angeles at Beverly Hills 8555 Beverly Blvd	288+00	20	63	66		54	75	N	32	40	N
Los Angeles	Cedars-Sinai Medical Center 8700 Beverly Blvd	292+00	100	61	117		50	75	N	22	40	N
West Hollywood	West Hollywood Library 625 N San Vicente Blvd	316+00	45	52	69		53	75	N	30	40	N
West Hollywood	Ramada Plaza 8585 Santa Monica Blvd	347+00	25	80	84		51	75	N	26	40	N
West Hollywood	Avalon West Hollywood – Mixed Use/Multifamily 7136 Santa Monica Blvd	438+00	35	67	76		52	75	N	28	40	N
West Hollywood	Domain – Mixed Use/Multifamily 7141 Santa Monica Blvd	449+00	20	65	68		53	75	N	30	40	N
West Hollywood	The Dylan – Mixed Use/Multifamily 7111 Santa Monica Blvd	453+00	25	67	72		53	75	N	30	40	N
Los Angeles	The Highland 1411 N Highland Ave	486+50	35	73	81		52	75	N	28	40	N
Los Angeles	Modera Hollywood – Mixed Use/Multifamily 6775 Selma Ave	500+00	25	95	98	Yes	61	75	N	35	40	N
Los Angeles	1724 Highland Avenue – Mixed Use/Multifamily	509+00	30	118	122	Yes	59	75	N	31	40	N

Source: Connect Los Angeles Partners 2023
[1] Correction for special trackwork is 10 VdB for 0 to 100 feet and 5 VdB for 100 to 200 feet. No correction beyond 200 feet.
[2] A value of -5 dB can be used for K_{rad} for typical residential rooms.
[3] As a safety factor, no building loss was assumed and a +5 dB Safety Factor used.
dBA = A-weighted decibels; GBN = ground-borne noise; GBV = ground-borne vibration; VdB = vibration decibels

TABLE 6-9. FAIRFAX ALIGNMENT ALTERNATIVE PREDICTED VIBRATION LEVELS AT FTA SPECIAL BUILDINGS

CITY	BUILDING ADDRESS	TRACK STATIONING	LATERAL DISTANCE TO NEAREST TRACK (FEET)	DEPTH TO TOP OF RAIL (FEET)	SLANT DISTANCE (FEET)	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	West Angeles Performing Arts 3020 Crenshaw Blvd	17+75	30	66	72		53	72	N	30	35	N
West Hollywood	Education/Lee Strasberg Theatre 7936 Santa Monica Blvd	299+00	0	70	70		53	75	N	30	40	N
Los Angeles	Hollywood High School Theater 1521 N Highland Ave	310+00	54	95	109	Yes	60	72	N	33	35	N

Source: Connect Los Angeles Partners 2023
[1] Correction for special trackwork is 10 VdB for 0 to 100 feet and 5 VdB for 100 to 200 feet. No correction beyond 200 feet.
[2] A value of -5 dB can be used for K_{rad} for typical residential rooms.
[3] As a safety factor, no building loss was assumed.
dBA = A-weighted decibels; GBN = ground-borne noise; GBV = ground-borne vibration; VdB = vibration decibels

TABLE 6-10. FAIRFAX ALIGNMENT ALTERNATIVE PREDICTED VIBRATION LEVELS AT FTA CATEGORY 2 RESIDENTIAL LAND USES

CITY	BUILDING ADDRESS	TRACK STATIONING	LATERAL DISTANCE TO NEAREST TRACK (FEET)	DEPTH TO TOP OF RAIL (FEET)	SLANT DISTANCE (FEET)	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	2300 S Victoria Ave	43+00	0	74	74		52	72	N	28	35	N
Los Angeles	2207 S Victoria Ave	50+00	0	106	106		50	72	N	23	35	N
Los Angeles	2026 Wellington Road	55+00	0	127	127		49	72	N	21	35	N
Los Angeles	1945 Wellington Road	60+00	0	133	133		49	72	N	21	35	N
Los Angeles	1864 Virginia Road	65+00	0	144	144		49	72	N	20	35	N
Los Angeles	1823 Virginia Road	70+00	0	134	134		49	72	N	20	35	N
Los Angeles	1734 Buckingham Road	75+00	0	131	131		49	72	N	21	35	N
Los Angeles	1675 Buckingham Road	80+00	0	130	130		49	72	N	21	35	N
Los Angeles	1616 West Blvd	85+00	0	124	124		49	72	N	21	35	N
Los Angeles	W 16th Place	90+00	0	114	114	Yes	50	72	N	22	35	N
Los Angeles	4777 San Vicente Blvd	107+00	90	65	111	Yes	50	72	N	22	35	N
Los Angeles	4821 San Vicente Blvd	110+00	55	69	88		51	72	N	26	35	N
Los Angeles	1299 S Highland Ave	115+00	62	87	107		50	72	N	23	35	N
Los Angeles	1301 S Highland Ave	115+00	70	87	112		50	72	N	22	35	N
Los Angeles	1300 S Mansfield Ave	120+00	63	73	96		51	72	N	25	35	N
Los Angeles	5111 San Vicente Blvd	125+00	56	113	126		49	72	N	21	35	N
Los Angeles	5104 San Vicente Blvd	125+00	56	113	126		49	72	N	21	35	N
Los Angeles	1248 Redondo Blvd	130+00	60	119	133		49	72	N	21	35	N
Los Angeles	1252 Redondo Blvd	130+00	68	119	137		49	72	N	20	35	N
Los Angeles	5253 San Vicente Blvd	135+00	60	119	133		49	72	N	21	35	N
Los Angeles	1255 Meadowbrook Ave	135+00	70	119	138		49	72	N	20	35	N
Los Angeles	5315 San Vicente Blvd	140+00	61	119	134		49	72	N	21	35	N

CITY	BUILDING ADDRESS	TRACK STATIONING	LATERAL DISTANCE TO NEAREST TRACK (FEET)	DEPTH TO TOP OF RAIL (FEET)	SLANT DISTANCE (FEET)	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	5322 San Vicente Blvd	140+00	61	119	134		49	72	N	21	35	N
Los Angeles	5404 San Vicente Blvd	145+00	50	118	128		49	72	N	21	35	N
Los Angeles	5415 San Vicente Blvd	146+00	60	120	134		49	72	N	21	35	N
Los Angeles	5455 San Vicente Blvd	150+00	40	123	129		49	72	N	21	35	N
Los Angeles	5470 San Vicente Blvd	150+00	70	123	142		49	72	N	20	35	N
Los Angeles	1128 Masselin Ave	155+00	0	120	120		50	72	N	22	35	N
Los Angeles	1109 Masselin Ave	158+00	0	120	120		50	72	N	22	35	N
Los Angeles	1040 S Curson Ave	160+00	0	120	120		50	72	N	22	35	N
Los Angeles	1255 Meadowbrook Ave	165+00	0	127	127		49	72	N	21	35	N
Los Angeles	1007 S Stanley Ave	170+00	0	123	123		49	72	N	21	35	N
Los Angeles	915 S Spaulding Ave	176+00	0	105	105		50	72	N	23	35	N
Los Angeles	847 S Genesee Ave	180+00	0	99	99		51	72	N	25	35	N
Los Angeles	754 S Orange Grove Ave	186+00	0	105	105		50	72	N	23	35	N
Los Angeles	530 S Fairfax Ave	203+00	20	112	114	Yes	60	72	N	32	35	N
Los Angeles	751 N Fairfax Ave	274+00	0	76	76		52	72	N	28	35	N
Los Angeles	812 N Hayworth Ave	277+00	0	73	73		53	72	N	30	35	N
Los Angeles	839 N Hayworth Ave	280+00	0	70	70		53	72	N	30	35	N
Los Angeles	925 N Hayworth Ave	285+00	0	66	66		54	72	N	32	35	N
Los Angeles	801 Romaine St	290+00	0	73	73		53	72	N	30	35	N
West Hollywood	105 N Edinburgh Ave	295+00	0	75	75		52	72	N	28	35	N

Source: Connect Los Angeles Partners 2023
[1] Correction for special trackwork is 10 VdB for 0 to 100 feet and 5 VdB for 100 to 200 feet. No correction beyond 200 feet.
[2] A value of -5 dB can be used for K_{rad} for typical residential rooms.
[3] As a safety factor, no building loss was assumed.
dBA = A-weighted decibels; GBN = ground-borne noise; GBV = ground-borne vibration; VdB = vibration decibels

TABLE 6-11. FAIRFAX ALIGNMENT ALTERNATIVE PREDICTED VIBRATION LEVELS AT FTA CATEGORY 3 INSTITUTIONAL LAND USES

CITY	BUILDING ADDRESS	TRACK STATIONING	HORIZONTAL DISTANCE TO BUILDING NEAREST TRACK (FEET)	DEPTH TO TRACK	SLANT DISTANCE	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	West Angeles Church of God 3602 Crenshaw Blvd	4+00	120	61	135		49	75	N	20	40	N
Los Angeles	West Angeles Church of God 3045 Crenshaw Blvd	15+00	45	67	81		52	75	N	28	40	N
Los Angeles	West Angeles Christian Academy 3000 Crenshaw Blvd	19+00	27	65	70		53	75	N	30	40	N
Los Angeles	Complete Eye Care Center 2825 Crenshaw Blvd	30+00	40	66	77	Yes	57	75	N	33	40	N
Los Angeles	Peterson Automotive Museum 6060 Wilshire Blvd	191+00	0	107	107		50	75	N	23	40	N
Los Angeles	Academy Museum of Motion Pictures 6067 Wilshire Blvd	196+00	65	105	123		49	75	N	21	40	N
Los Angeles	Hancock Park Elementary School 408 S Fairfax Avenue	216+00	33	82	88		51	75	N	26	40	N
Los Angeles	Short Story Hotel 115 S Fairfax Avenue	232+00	40	70	81	Yes	57	75	N	33	40	N
Los Angeles	Baba Sale Congregation 404 N Fairfax Ave	249+00	15	72	74		52	75	N	28	40	N
Los Angeles	Greenway Court Theatre/Fairfax High School 7850 Melrose Ave	260+00	35	72	80		52	75	N	28	40	N
Los Angeles	Fairfax High School 7850 Melrose Ave	264+00	140	71	157		48	75	N	19	40	N
Los Angeles	Laurel Span School 925 N Hayworth Ave	283+00	84	67	107		50	75	N	23	40	N
West Hollywood	Avalon West Hollywood – Mixed Use/Multifamily 7136 Santa Monica Blvd	339+00	35	67	76		52	75	N	28	40	N
West Hollywood	Domain – Mixed Use/Multifamily 7141 Santa Monica Blvd	350+00	20	65	68		53	75	N	30	40	N
West Hollywood	The Dylan – Mixed Use/Multifamily 7111 Santa Monica Blvd	353+00	25	67	72		53	75	N	30	40	N
Los Angeles	The Highland – Mixed Use/Multifamily 1411 N Highland Ave	387+00	35	73	81		52	75	N	28	40	N
Los Angeles	Modera Hollywood – Mixed Use/Multifamily 6775 Selma Ave	400+00	25	95	98	Yes	61	75	N	35	40	N
Los Angeles	1724 Highland Avenue – Mixed Use/Multifamily	410+00	30	118	122	Yes	59	75	N	31	40	N

Source: Connect Los Angeles Partners 2023
[1] Correction for special trackwork is 10 VdB for 0 to 100 feet and 5 VdB for 100 to 200 feet. No correction beyond 200 feet.
[2] A value of -5 dB can be used for K_{rad} for typical residential rooms.
[3] As a safety factor, no building loss was assumed.
dBA = A-weighted decibels; GBN = ground-borne noise; GBV = ground-borne vibration; VdB = vibration decibels

TABLE 6-12. LA BREA ALIGNMENT ALTERNATIVE PREDICTED VIBRATION LEVELS AT FTA SPECIAL BUILDINGS

CITY	BUILDING ADDRESS	TRACK STATIONING	LATERAL DISTANCE TO NEAREST TRACK (FEET)	DEPTH TO TOP OF RAIL (FEET)	SLANT DISTANCE (FEET)	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	West Angeles Performing Arts Theatre 3020 Crenshaw Blvd	17+75	30	66	72		53	72	N	30	35	N
Los Angeles	Hollywood High School Theater 1521 N Highland Ave	310+00	54	95	109	Yes	60	72	N	33	35	N

Source: Connect Los Angeles Partners 2023
[1] Correction for special trackwork is 10 VdB for 0 to 100 feet and 5 VdB for 100 to 200 feet. No correction beyond 200 feet.
[2] A value of -5 dB can be used for K_{rad} for typical residential rooms.
[3] As a safety factor, no building loss was assumed.
dBA = A-weighted decibels; GBN = ground-borne noise; GBV = ground-borne vibration; VdB = vibration decibels

TABLE 6-13. LA BREA ALIGNMENT ALTERNATIVE PREDICTED VIBRATION LEVELS AT FTA CATEGORY 2 RESIDENTIAL LAND USES

CITY	BUILDING ADDRESS	TRACK STATIONING	LATERAL DISTANCE TO BUILDING NEAREST TRACK (FEET)	DEPTH TO TOP OF RAIL (FEET)	SLANT DISTANCE (FEET)	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	*2300* S Victoria Ave	43+00	0	74	74		52	72	N	28	35	N
Los Angeles	2207 S Victoria Ave	50+00	0	106	106		50	72	N	23	35	N
Los Angeles	2026 Wellington Road	55+00	0	127	127		49	72	N	21	35	N
Los Angeles	1945 Wellington Road	60+00	0	133	133		49	72	N	20	35	N
Los Angeles	1864 Virginia Road	65+00	0	144	144		49	72	N	20	35	N
Los Angeles	1823 Virginia Road	70+00	0	134	134		49	72	N	20	35	N
Los Angeles	1734 Buckingham Road	75+00	0	131	131		49	72	N	21	35	N
Los Angeles	1675 Buckingham Road	80+00	0	130	130		49	72	N	21	35	N
Los Angeles	1616 West Blvd	85+00	0	124	124		50	72	N	22	35	N
Los Angeles	W 16th Place	90+00	0	114	114		50	72	N	22	35	N
Los Angeles	4777 San Vicente Blvd	107+00	84	64	106		50	72	N	23	35	N
Los Angeles	4821 San Vicente Blvd	110+00	55	65	85		51	72	N	26	35	N
Los Angeles	1299 S Highland Ave	115+00	58	87	105		50	72	N	23	35	N
Los Angeles	1301 S Highland Ave	115+00	70	87	112		50	72	N	22	35	N
Los Angeles	1264 S Orange Drive	125+00	0	110	110		50	72	N	23	35	N
Los Angeles	1249 S Orange Drive	127+00	0	114	114		50	72	N	22	35	N
Los Angeles	1214 S Sycamore Ave	130+00	0	110	110		50	72	N	23	35	N
Los Angeles	1112 S Redondo Blvd	135+00	0	106	106		50	72	N	23	35	N
Los Angeles	1059 Redondo Blvd	140+00	0	110	110		50	72	N	23	35	N
West Hollywood	1234 N La Brea Ave	279+00	0	85	85		52	72	N	28	35	N
West Hollywood	1255 N Sycamore Ave	282+00	0	84	84		51	72	N	26	35	N
Los Angeles	1306 N Sycamore Ave	285+00	0	82	82		51	72	N	26	35	N
Los Angeles	1327 N Mansfield Ave	290+00	0	74	74		52	72	N	28	35	N
Los Angeles	1343 N Citrus Ave	293+00	0	71	71		52	72	N	28	35	N
Los Angeles	1352 N Citrus Ave	295+00	0	69	69		53	72	N	30	35	N

Source: Connect Los Angeles Partners 2023
1 Correction for special trackwork is 10 VdB for 0 to 100 feet and 5 VdB for 100 to 200 feet. No correction beyond 200 feet.
2 A value of -5 dB can be used for K_{rad} for typical residential rooms.
3 As a safety factor, no building loss was assumed.
dBA = A-weighted decibels; GBN = ground-borne noise; GBV = ground-borne vibration; VdB = vibration decibels

TABLE 6-14. LA BREA ALIGNMENT ALTERNATIVE PREDICTED VIBRATION LEVELS AT FTA CATEGORY 3 INSTITUTIONAL LAND USES

CITY	BUILDING ADDRESS	TRACK STATIONING	LATERAL DISTANCE TO NEAREST TRACK (FEET)	DEPTH TO TOP OF RAIL (FEET)	SLANT DISTANCE (FEET)	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	West Angeles Church of God 3602 Crenshaw Blvd	4+00	120	61	135		49	75	N	20	40	N
Los Angeles	West Angeles Church of God 3045 Crenshaw Blvd	15+00	45	67	81		51	75	N	26	40	N
Los Angeles	West Angeles Christian Academy 3000 Crenshaw Blvd	19+00	27	65	70		53	75	N	30	40	N
Los Angeles	Complete Eye Care Center 2825 Crenshaw Blvd	30+00	40	66	77	Yes	57	75	N	33	40	N
Los Angeles	Cathedral Chapel of St Vibiana 923 S La Brea Ave	149+00	53	97	111		50	75	N	22	40	N
Los Angeles	Iglesia Cristiana Leon De Juda 847 S La Bera Ave	153+00	40	98	106		50	75	N	23	40	N
Los Angeles	Wilshire La Brea 5200 Wilshire Blvd	160+00	30	99	103	Yes	60	75	N	33	40	N
Los Angeles	La Brea Compassionate Caregivers 735 S La Brea	161+00	35	101	107	Yes	55	75	N	28	40	N
Los Angeles	La Art 217 S La Brea Ave	195+00	40	99	107		50	75	N	23	40	N
Los Angeles	Education 132 S La Brea Ave	203+00	27	75	80		52	75	N	28	40	N
Los Angeles	Education 116 N La Brea Ave	209+00	27	76	81		52	75	N	28	40	N
Los Angeles	UCLA Health MPTF 335 N La Brea Ave	220+00	36	69	78	Yes	57	75	N	33	40	N
Los Angeles	Education 330 N La Brea Ave	220+00	30	69	75	Yes	52	75	N	28	40	N
Los Angeles	Congregation Levi Yitzchok 356 N La Brea Ave	222+00	30	70	76	Yes	62	75	N	38	40	N
Los Angeles	The Rehabilitation Center 501 N La Brea Ave	232+00	35	77	85		51	75	N	26	40	N
Los Angeles	Yeshiva Rav Isacsohn 540 N La Brea Ave	236+00	30	83	88		51	75	N	26	40	N
Los Angeles	Yeshiva Rav Isacsohn 555 N La Brea Ave	236+00	35	83	90		51	75	N	25	40	N
Los Angeles	The Hole 844 N La Brea Ave	253+50	20	75	78		52	75	N	28	40	N
Los Angeles	Angelene WeHo 915 N La Brea Ave	256+00	28	79	84		51	75	N	26	40	N

CITY	BUILDING ADDRESS	TRACK STATIONING	LATERAL DISTANCE TO NEAREST TRACK (FEET)	DEPTH TO TOP OF RAIL (FEET)	SLANT DISTANCE (FEET)	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	Prizmal 904 N La Brea Ave	256+00	30	79	85		51	75	N	26	40	N
West Hollywood	The Dylan 7111 Santa Monica Blvd	270+00	30	76	82		51	75	N	26	40	N
West Hollywood	1145 N La Brea Ave	274+00	31	82	88		51	75	N	26	40	N
West Hollywood	Hollywood Cat and Dog Hospital 1150 N La Brea Ave	274+80	48	84	97		51	75	N	25	40	N
West Hollywood	Congregation Kol Ami 1200 N La Brea Ave	277+00	0	81	81		52	75	N	28	40	N
Los Angeles	The Highland 1411 N Highland Ave – Mixed Use/Multifamily	297+00	0	68	68		53	75	N	30	40	N
Los Angeles	Modera Hollywood 6775 Selma Ave – Mixed Use/Multifamily	310+00	25	95	98	Yes	64	75	N	30	40	N
Los Angeles	1724 Highland – Mixed Use/Multifamily	320+00	30	118	122	Yes	59	75	N	31	40	N

Source: Connect Los Angeles Partners 2023
[1] Correction for special trackwork is 10 VdB for 0 to 100 feet and 5 VdB for 100 to 200 feet. No correction beyond 200 feet.
[2] A value of -5 dB can be used for K_{rad} for typical residential rooms.
[3] As a safety factor, no building loss was assumed.
dBA = A-weighted decibels; GBN = ground-borne noise; GBV = ground-borne vibration; VdB = vibration decibels

TABLE 6-15. HOLLYWOOD BOWL DESIGN OPTION PREDICTED VIBRATION LEVELS AT FTA CATEGORY 2 RESIDENTIAL LAND USES

CITY	BUILDING ADDRESS	TRACK STATIONING	LATERAL DISTANCE TO NEAREST TRACK (FEET)	DEPTH TO TOP OF RAIL (FEET)	SLANT DISTANCE (FEET)	CROSSOVER[1]	PREDICTED GBV[3]	FTA GBV CRITERIA (VdB)	GBV EXCEEDANCE (Y/N)	PREDICTED GBN[2]	FTA GBN CRITERIA (dBA)	GBN EXCEEDANCE (Y/N)
Los Angeles	1921 N Highland Ave	30+00	0	77	77		52	72	N	28	35	N
Los Angeles	1940 N Highland Ave	35+00	0	70	70		53	72	N	30	35	N

Source: Connect Los Angeles Partners 2023
[1] Correction for special trackwork is 10 VdB for 0 to 100 feet and 5 VdB for 100 to 200 feet. No correction beyond 200 feet.
[2] A value of -5 dB can be used for K_{rad} for typical residential rooms.
[3] As a safety factor, no building loss was assumed.
dBA = A-weighted decibels; GBN = ground-borne noise; GBV = ground-borne vibration; VdB = vibration decibels

6.1.5 IMPACT NOI-3: AIRPORT NOISE

Impact NOI-3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the project area to excessive noise levels?

6.1.5.1 ALIGNMENT ALTERNATIVE 1: SAN VICENTE-FAIRFAX

CONSTRUCTION IMPACTS

No Impact. The San Vicente-Fairfax Alignment Alternative would not be located within two miles of a private airstrip, airport land use plan, or public airport. The closest airport or airstrip is the Santa Monica Airport, located 5.4 miles southwest of the alignment alternative. LAX is located six miles from the southern extent of the alignment alternative. Therefore, construction of the San Vicente-Fairfax Alignment Alternative would not expose people residing or working in the Project area to excessive noise levels and no impact would occur.

OPERATIONAL IMPACTS

No Impact. The San Vicente-Fairfax Alignment Alternative would not be located within two miles of a private airstrip, airport land use plan, or public airport. The closest airport or airstrip is the Santa Monica Airport, located 5.4 miles southwest of the alignment alternative. LAX is located six miles from the southern extent of the alignment alternative. Therefore, operation of the San Vicente-Fairfax Alignment Alternative would not expose people residing or working in the Project area to excessive noise levels and no impact would occur.

6.1.5.2 ALIGNMENT ALTERNATIVE 2: FAIRFAX

CONSTRUCTION IMPACTS

No Impact. The Fairfax Alignment Alternative is not within two miles of a private airstrip, airport land use plan, or public airport. The closest airport or airstrip is the Santa Monica Airport, located 5.5 miles southwest of the alignment alternative. LAX is located six miles from the southern extent of the alignment alternative. Therefore, construction of the Fairfax Alignment Alternative would not expose people residing or working in the Project area to excessive noise levels and no impact would occur.

OPERATIONAL IMPACTS

No Impact. The Fairfax Alignment Alternative would not be located within two miles of a private airstrip, airport land use plan, or public airport. The closest airport or airstrip is the Santa Monica Airport, located 5.5 miles southwest of the alignment alternative. LAX is located six miles from the southern extent of the alignment alternative. Therefore, operation of the Fairfax Alignment Alternative would not expose people residing or working in the Project area to excessive noise levels and no impact would occur.

6.1.5.3 ALIGNMENT ALTERNATIVE 3: LA BREA

CONSTRUCTION IMPACTS

No Impact. The La Brea Alignment Alternative would not be located within two miles of a private airstrip, airport land use plan, or public airport. The closest airport or airstrip is the Santa Monica Airport, located six miles southwest of the alignment alternative. LAX is located six miles from the southern extent of the alignment alternative. Therefore, construction of the La Brea Alignment Alternative would not expose people residing or working in the Project area to excessive noise levels and no impact would occur.

OPERATIONAL IMPACTS

No Impact. The La Brea Alignment Alternative would not be located within two miles of a private airstrip, airport land use plan, or public airport. The closest airport or airstrip is the Santa Monica Airport, located six miles southwest of the alignment alternative. LAX is located six miles from the southern extent of the alignment alternative. Therefore, operation of the La Brea Alignment Alternative would not expose people residing or working in the Project area to excessive noise levels and no impact would occur.

6.1.5.4 HOLLYWOOD BOWL DESIGN OPTION

CONSTRUCTION IMPACTS

No Impact. The Hollywood Bowl Design Option would not be within two miles of a private airstrip, airport land use plan, or public airport. The closest airport or airstrip is Hollywood Burbank Airport, located 5.8 miles northeast of the design option. LAX is located 12 miles from the design option. Therefore, construction of the Hollywood Bowl Design Option would not expose people residing or working in the Project area to excessive noise levels and no impact would occur.

OPERATIONAL IMPACTS

No Impact. The Hollywood Bowl Design Option would not be within two miles of a private airstrip, airport land use plan, or public airport. The closest airport or airstrip is Hollywood Burbank Airport, located 5.8 miles northeast of the design option. LAX is located 12 miles from the design option. Therefore, operation of The Hollywood Bowl Design Option would not expose people residing or working in the Project area to excessive noise levels and no impact would occur.

6.1.5.5 MAINTENANCE AND STORAGE FACILITY

CONSTRUCTION IMPACT

Less Than Significant Impact. The MSF site is within 0.5 mile of LAX. Construction of the MSF could expose people residing and working in the area to new noise sources, but because the area is located in the 65 to 70 CNEL contour for the aircraft landing path at LAX, noise from construction activities associated with the MSF would add only 1 to 2 dB to the current high noise levels in the surrounding area and would not expose people residing or working in the Project area to excessive noise levels. Therefore, noise impacts for the MSF would be less than significant.

OPERATIONAL IMPACTS

Less Than Significant Impact. The MSF site is within 0.5 mile of LAX. Operation of the MSF would expose people residing and working in the area to new noise sources, but because the area is located in the 65 to 70 CNEL contour for the aircraft landing path at LAX, operations of the MSF would add only 1 to 2 dB to the current high noise levels in the surrounding area and would not expose people residing or working in the Project area to excessive noise levels. Therefore, noise impacts for the MSF would be less than significant.

6.1.6 SUMMARY OF IMPACT CONCLUSIONS

Table 6-16 provides a summary of the impact conclusions discussed in this section.

TABLE 6-16. IMPACT CONCLUSION SUMMARY TABLE

IMPACT SIGNIFICANCE THRESHOLD	IMPACT CONCLUSION				
	ALIGNMENT ALTERNATIVE 1: SAN VICENTE-FAIRFAX	ALIGNMENT ALTERNATIVE 2: FAIRFAX	ALIGNMENT ALTERNATIVE 3: LA BREA	HOLLYWOOD BOWL DESIGN OPTION	MAINTENANCE AND STORAGE FACILITY
Impact NOI-1: Would the Project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Construction: Significant Impact Operations: No Impact	Construction: Significant Impact Operations: No Impact	Construction: Significant Impact Operations: No Impact	Construction: Significant Impact Operations No Impact	Construction: No Impact Operations: No Impact
Impact NOI-2: Would the Project result in generation of excessive GBV or GBN levels?	Construction: LTS Operations: LTS	Construction: LTS Operations: LTS	Construction: LTS Operations: LTS	Construction: No Impact Operations: No Impact	Construction: No Impact Operations: No Impact
Impact NOI-3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the project area to excessive noise levels?	Construction: No Impact Operations: No Impact	Construction: No Impact Operations: No Impact	Construction: No Impact Operations: No Impact	Construction: No Impact Operations: No Impact	Construction: Less Than Significant Impact Operations: Less Than Significant Impact

Source: Connect Los Angeles Partners 2023

6.2 MITIGATION MEASURES

The following mitigation measure is provided to reduce the significant project impacts identified in Section 6.1, under Impact NOI-1: Ambient Noise, to less than significant levels.

6.2.1 MITIGATION MEASURE MM NOI-1: NOISE CONTROL PLAN

Prior to the initiation of construction activities, Metro's contractor shall conduct an ambient noise study and develop a Noise Control Plan demonstrating how the FTA 1-hour L_{eq} noise criteria would be achieved during construction. The Noise Control Plan shall be prepared by a board-certified acoustical engineer and would be designed to follow Metro requirements and would include measurements of existing noise, a list of the major pieces of construction equipment that would be used, and predictions of the noise levels at the closest noise-sensitive receivers (i.e., residences, hotels, schools, churches, temples, and similar facilities). The Noise Control Plan shall be approved by Metro prior to initiating construction. Where construction cannot be performed in accordance with the FTA 1-hour L_{eq} construction noise standards, the contractor would investigate alternative construction measures that would result in lower sound levels. The applicable FTA 1-hour L_{eq} construction noise standards, as set forth in the FTA Design Manual, are as follows:

- Residential daytime standard of 90 dBA L_{eq} and nighttime standard of 80 dBA L_{eq}
- Commercial and industrial daytime standard of 100 dBA L_{eq} and nighttime standard of 100 dBA L_{eq}

The contractor shall conduct noise monitoring to demonstrate compliance with contract noise limits. The contractor shall establish a public information compliant system and contractor shall respond to and provide corrective action for noise-related complaints filed within a time period of 24-hours. In addition, Metro would comply with local noise ordinances when applicable (e.g. noise standards in City of Los Angeles Municipal Code Section 41.40 and the ambient noise level increase limit of 5 dBA in the LA City CEQA Threshold Guidelines), including by obtaining a variance(s) from the applicable local jurisdiction when nighttime work is required. Noise-reducing methods that may be implemented by Metro include:

- If nighttime construction is planned, a noise variance may be prepared by the contractor, if required by the jurisdiction, that demonstrates the implementation of control measures to maintain noise levels below the applicable FTA standards.
- Where construction occurs near noise-sensitive land uses, specialty equipment with enclosed engines, acoustically attenuating shields, and/or high-performance mufflers may be used.
- Limit unnecessary idling of equipment.
- Install temporary noise barriers or noise-control curtains, where feasible and desirable.
- Reroute construction-related truck traffic away from local residential streets and/or sensitive receivers.
- Limit impact pile driving where feasible and effective or use pre-auger pile insertion.

- Use electric instead of diesel-powered equipment and hydraulic instead of pneumatic tools where feasible.
- Minimize the use of impact devices such as jackhammers and hoe rams, using concrete crushers and pavement saws instead.

6.2.2 IMPACT SIGNIFICANCE AFTER MITIGATION

Less Than Significant. MM NOI-1, Noise Control Plan, would be implemented to reduce the significant construction impacts identified in Section 6.1 under Impact NOI-1 for the San Vicente-Fairfax, Fairfax, and La Brea Alignment Alternatives and the Hollywood Bowl Design Option. MM NOI-1 would focus on the areas and phases relevant to aboveground construction. Specifically for the San Vicente-Fairfax and Fairfax Alignment Alternatives, special consideration may need to be given to construction at the Wilshire/Fairfax Station to reduce noise levels at the Academy Museum of Motion Pictures, which may require additional coordination to identify areas of concern on the grounds and time of events planned at the museum. This would allow the contractor to schedule construction activities so that the phases with greater noise or vibration are not during events at the Academy Museum of Motion Pictures.

Implementation of the mitigation measure will reduce these ambient noise construction impacts to a less than significant level.

CHAPTER 7 **CUMULATIVE IMPACTS**

7.1 INTRODUCTION

Under the state CEQA Guidelines, cumulative impacts are defined as two or more individual impacts that, when considered together, are considerable or would compound and increase other environmental impacts (Section 15355). These cumulative impacts must be discussed in an EIR when the project's incremental effect is "cumulatively considerable" (Section 15130). "Cumulatively considerable" is defined as when the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Section 15065(a)(3)).

CEQA Guidelines Section 15130(b)(1) includes two methodology approaches for assessing cumulative impacts. One approach is a "list of past, present, and probable future projects producing related or cumulative impacts" (CEQA Guidelines Section 15130(b)(1)(A)). The other approach is a "summary of projections contained in an adopted local, regional, or statewide plan, or related document, that describes or evaluates conditions contributing to the cumulative effect" (CEQA Guidelines Section 15030 (b)(1)(B)). For the purposes of this analysis, the latter approach is used due to the long Project implementation time. The forecasted Project completion timeframe is in the mid- to late-2040s based on Metro Measure M funding. Due to the long-term nature of the Project's implementation, a list of land use and transportation projects is insufficient for the cumulative analysis since the currently known projects would be completed and operational by the Project's forecasted completion. In addition, it is highly likely many additional projects will be proposed and constructed between now and project implementation in 20 years; therefore, any project list developed now would be incomplete and incorrect.

The SCAG 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) Plan is the adopted long-range forecast for population, households, and employment within the six-county Southern California region, which includes all Project elements. The Project is also included in the SCAG 2020 RTP/SCS Plan, as well as Metro's 2020 Long Range Transportation Plan. The RTP/SCS was adopted in 2020 and proposes land use and transportation strategies to improve mobility options and achieve a more sustainable growth pattern (SCAG 2020). SCAG worked in close coordination with decision-makers and the public across multiple jurisdictions throughout the SCAG region to create the plan. The population, household, and employment growth projections from this plan are used to assess regional growth and its cumulative impact within the vicinity of the Project.

For the cumulative analysis, the RSA is defined as a half-mile radius from the stations, the design option, and the MSF. The half-mile radius is used for all resources to ensure consistency in evaluating cumulative effects. Table 7-1 shows the projected net growth in population, households, and employment between 2019 and 2045 for a half-mile radius from all Project stations, the design option, and the MSF. The data in the table were calculated by merging the SCAG 2020 RTP/SCS growth projections with the SCAG Tier 2 Transportation Analysis Zone boundaries for Los Angeles County, then assessed for a half-mile radius around the stations, the design option, and the MSF. The data show the projected growth from transportation and development projects, as well as associated infrastructure, that when combined with the Project's construction and operation, could result in cumulative effects.

TABLE 7-1. SCAG PROJECTED PERCENT GROWTH FOR HALF-MILE BUFFER AREAS, 2019-2045

HALF-MILE BUFFER AREA	POPULATION % GROWTH	HOUSEHOLD % GROWTH	EMPLOYMENT % GROWTH
STATIONS			
Expo/Crenshaw	46.0	65.9	26.4
Crenshaw/Adams	35.6	56.3	19.6
Midtown Crossing	20.2	33.1	21.1
Wilshire/Fairfax	19.8	21.2	6.2
Fairfax/3rd	21.9	23.1	6.5
La Cienega/Beverly	30.7	31.3	6.1
San Vicente/Santa Monica	11.5	11.4	46.2
Fairfax/Santa Monica	7.2	7.7	49.5
La Brea/Santa Monica	16.0	17.2	42.6
Hollywood/Highland	16.2	15.0	3.0
Wilshire/La Brea	22.8	24.3	9.4
La Brea/Beverly	17.9	24.5	14.5
DESIGN OPTION			
Hollywood Bowl Design Option	30.4	29.0	17.4
MAINTENANCE AND STORAGE FACILITY			
MSF	14.0	15.9	9.9

Source: SCAG 2020 RTP/SCS Growth Forecast
MSF = maintenance and storage facility

7.2 CUMULATIVE IMPACTS

Less than Significant Impact. Implementation of the Project's alignment alternatives and stations, design option, and MSF would cause temporary noise increases during construction, but adherence to local noise ordinances and federal guidelines would avoid exceedance of noise-level limits. In addition, in order for there to be cumulative noise or vibration impacts, projects must occur at the same time and be in very close proximity to each other, which is unlikely given the construction horizon of the Project. As described in Section 6.2, after implementation of mitigation measure MM NO1-1, any impacts would be reduced to a less than significant level. Each past, present, and probable future project would follow the applicable federal and local regulations regarding noise and vibration, which would reduce the noise and vibration impacts associated with related projects. Therefore, the Project would not generate a cumulatively considerable increase in noise or vibration, and would result in a less than significant cumulative impact.

7.3 CUMULATIVE MITIGATION MEASURES

The Project's effects on noise and vibration for the alignment alternatives and stations, design option, and MSF would not be cumulatively considerable. Therefore, no mitigation is required under CEQA.

CHAPTER 8 REFERENCES

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APPENDIX A **G-176 BOREHOLE TEST RESULTS**

SITE DESCRIPTION

This site was located on Warner Avenue between Thayer Avenue and Rochester Avenue in West Los Angeles, a residential street with no apparent background vibration sources. The closest street with significant traffic was approximately 500 feet away from the line of accelerometers. Testing was performed on December 27 and 28, 2010, at test depths of 80, 90, and 97 feet. The accelerometers were arrayed downhill along Warner Avenue at horizontal distances of 25, 37, 50, 75, 100, and 150 feet from the borehole (ATS Consulting 2010). The signal to noise ratio was very low for the closest three accelerometers and because of electromagnetic interference. The signals at the farther three accelerometers were good. The following are some observations from the measurements:

- Two sets of 100 hits each were collected at the 80-foot test depth. Force levels ranged from 10,000 to 13,000 pounds.
- At the 90-foot test depth two set of 100 hits each were recorded. Force levels were in the 7,000- to 9,000-pound range.
- At the 97-foot depth a single set of 100 hits was recorded. Force levels were in the 6,000- to 7,000-pound range.

RESULTS FOR G-176

- The measurement coherence values at the closest three accelerometers from the borehole were at very similar low levels."
- The PSTM for all depths were similar showing potentially lower attenuation rate for vibration.

PLOTS AND TABLES

FIGURE A-1. G-176 MEASURED PSTM AT DEPTH OF 80 FEET

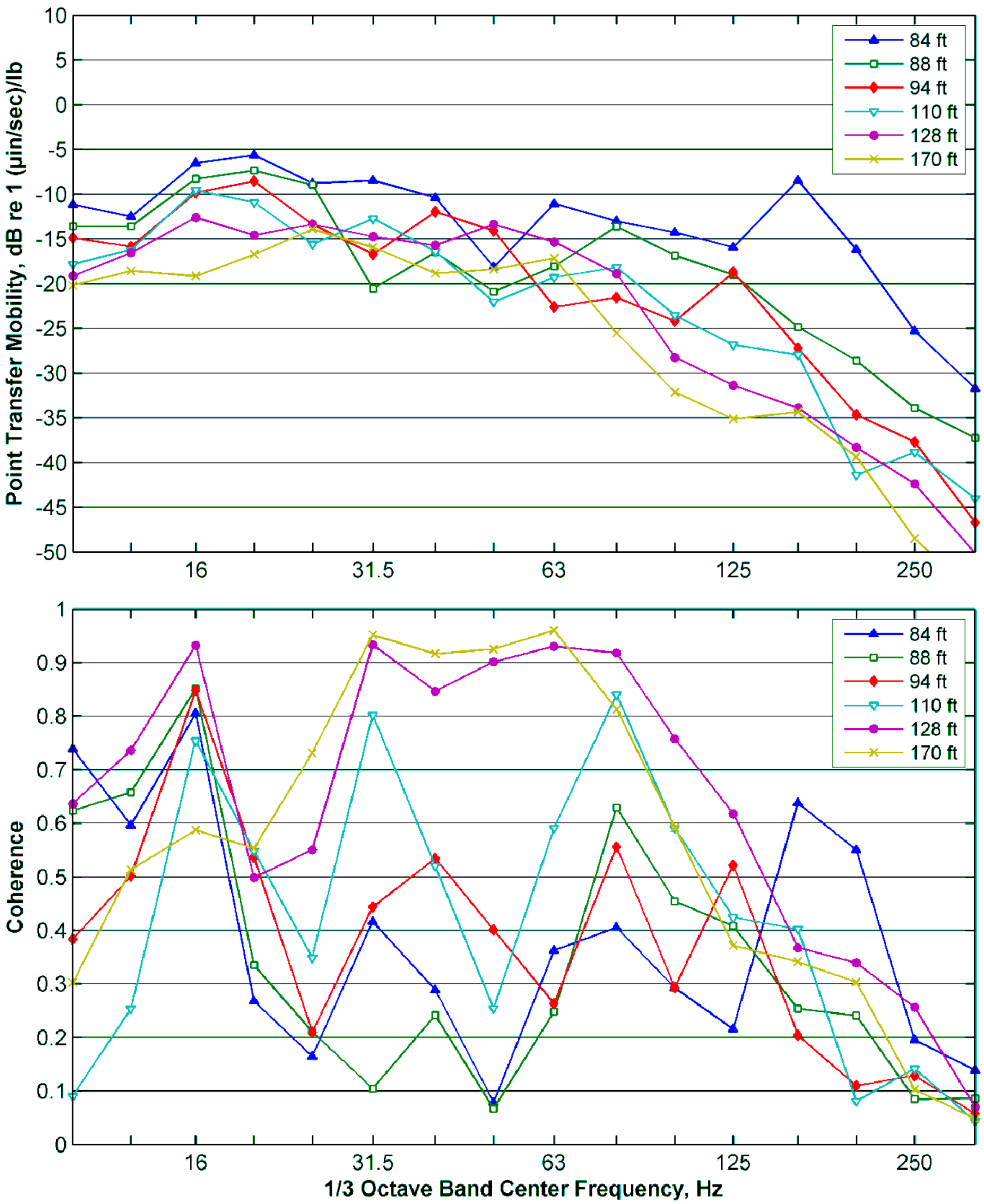


FIGURE A-2. G-176. MEASURED PSTM AT DEPTH OF 90 FEET

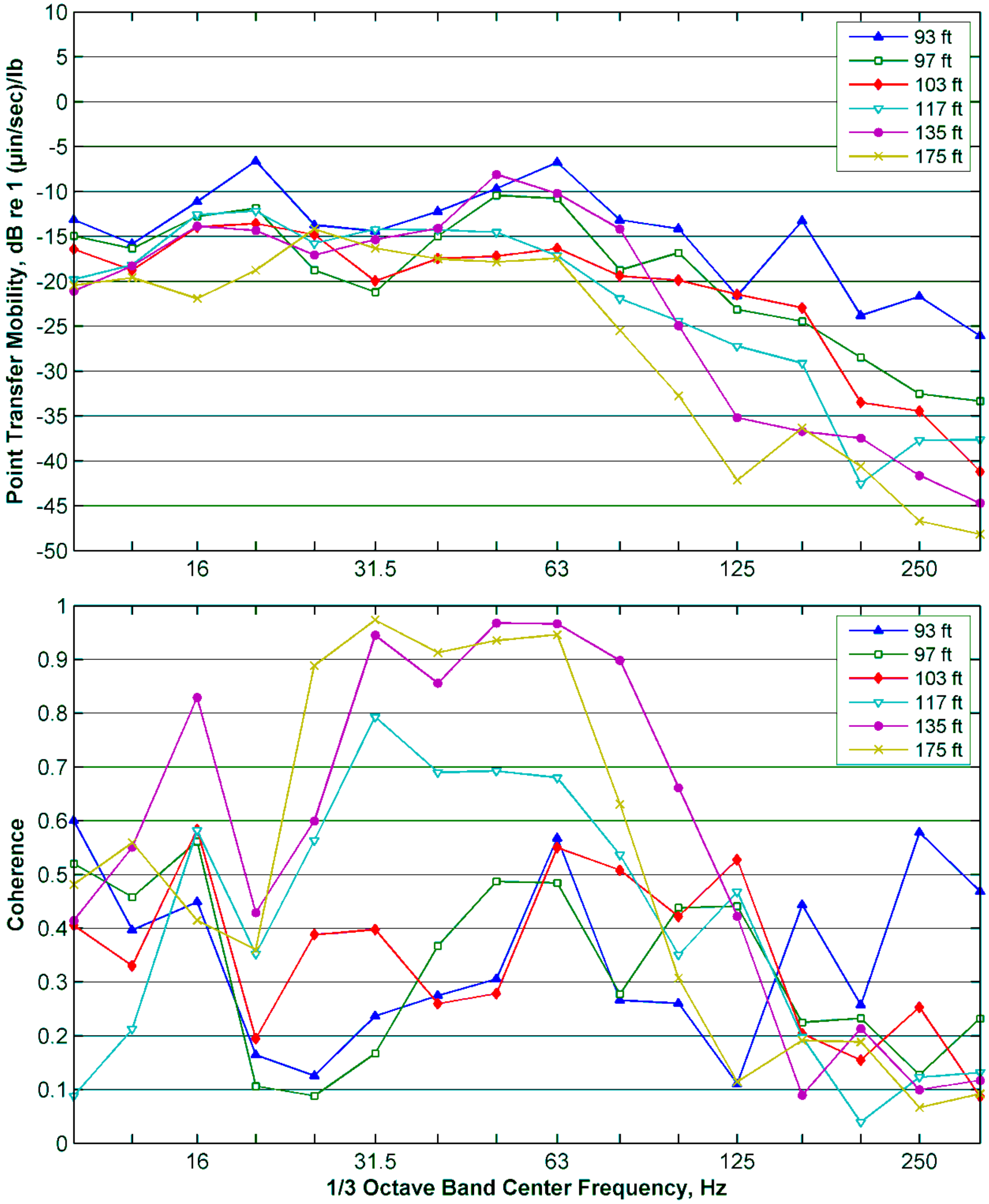


FIGURE A-3. G-176. MEASURED PSTM AT DEPTH OF 97 FEET

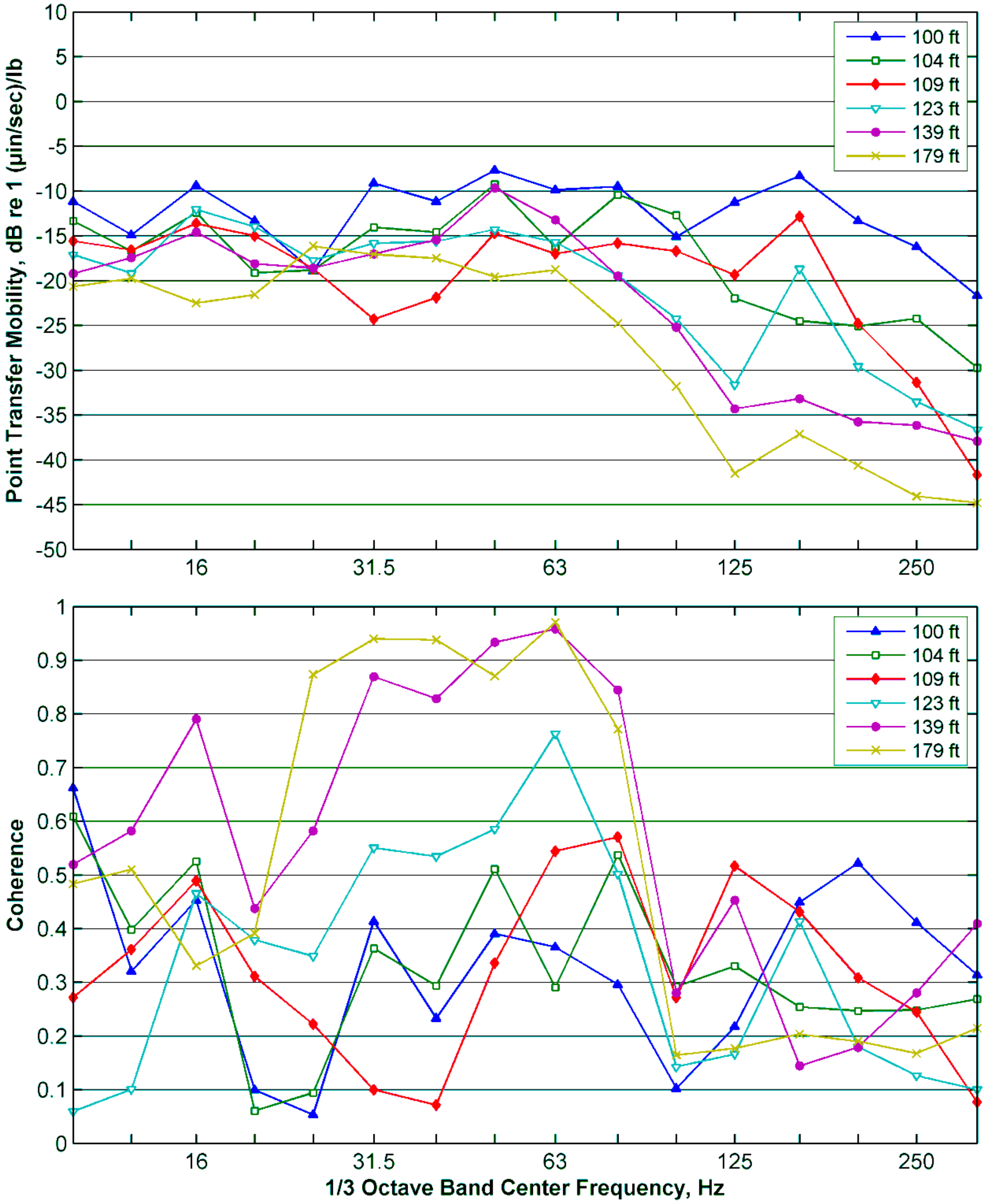
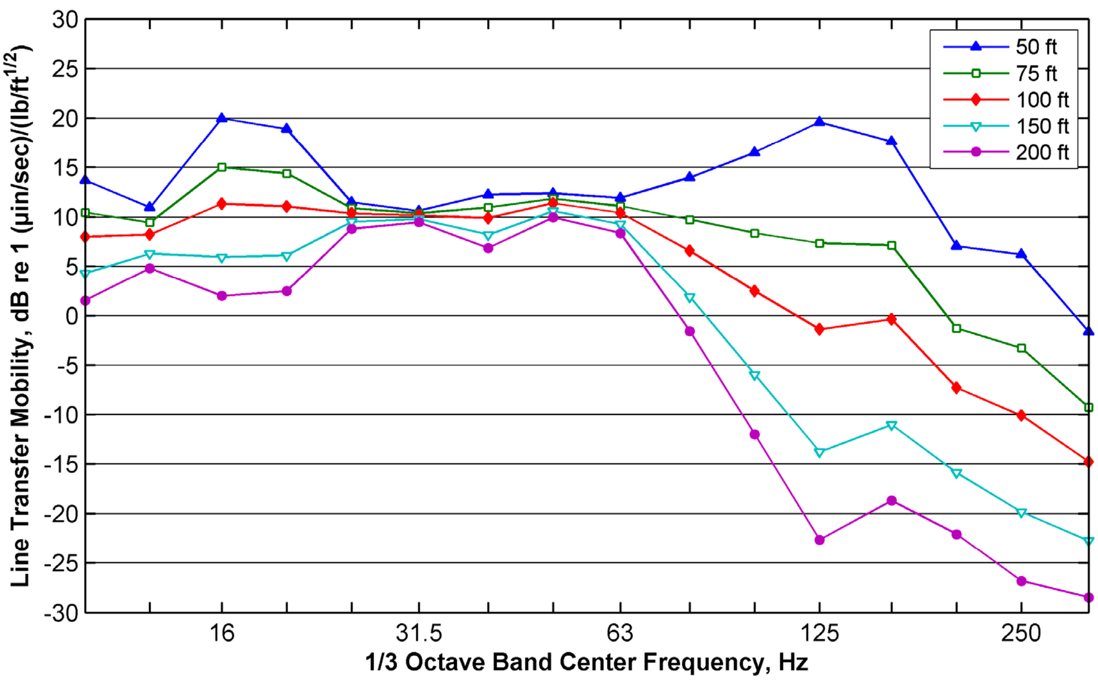


TABLE A-1. G-176. COEFFICIENTS FOR BEST FIT LSTM

FREQ. (HZ)	A	B	C	FREQ. (HZ)	A	B	C
10	31.59	-3.38	-4.21	**63**	10.72	5.56	-2.87
12.5	13.52	4.89	-3.77	**80**	42.13	-9.76	-4.01
16	55.83	-14.66	-3.80	**100**	86.38	-36.51	-2.72
20	49.82	-11.52	-3.94	**125**	132.40	-63.62	-1.64
25	9.69	5.05	-2.37	**160**	112.05	-52.11	-2.05
31.5	9.09	2.94	-1.21	**200**	78.81	-37.72	-2.66
40	13.48	5.35	-3.58	**250**	90.46	-45.66	-2.31
50	10.54	4.85	-2.22	**315**	62.95	-33.10	-2.88

FIGURE A-4. G-176. BEST FIT LSTM



APPENDIX B **FIELD MEASUREMENT LOGS AND METER CALIBRATION CERTIFICATION**

FIGURE B-1. NOISE MEASUREMENT LOG (SHEET 1 OF 9)

KNE 24 Hour Noise Report Template

Interval Report — **Crenshaw Adams - LT1** — Model 820 SN 1232
Data from: **2614 S Victoria Ave**

	Date	Time
Begin:	9-May-23	11:00 A.M.
End:	10-May-23	11:00 A.M.
Total:		24 hours

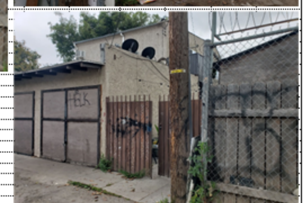
Notes:

Location:

Interval: 1 hour

Date	Time	Leq	Lmax	Lmin	L(1)	L(10)	L(50)	L(90)
10May 23	0:00:00	50.3	65.6	42.2	58.7	52.2	47.2	44.5
10May 23	1:00:00	49.4	66.9	40.1	58.3	51.1	45.6	42.9
10May 23	2:00:00	46.7	63.9	41.2	54.1	48.9	44.8	42.4
10May 23	3:00:00	47.4	64.9	40.7	56.2	49.6	44.7	42.8
10May 23	4:00:00	50.0	69.2	41.9	59.3	51.3	46.3	43.9
10May 23	5:00:00	55.8	81.5	44.9	64.6	55.8	50.5	47.3
10May 23	6:00:00	60.8	86.6	47.5	66.5	59.0	53.9	50.5
10May 23	7:00:00	62.5	77.7	57.8	67.2	64.0	62.0	60.0
10May 23	8:00:00	62.8	74.9	48.7	67.1	64.3	62.5	60.6
10May 23	9:00:00	63.5	76.2	47.5	67.7	64.9	63.1	61.2
10May 23	10:00:00	61.7	83.5	48.5	66.9	62.1	58.6	56.3
09May 23	11:00:00	56.9	79.8	46.9	66.4	58.1	53.5	50.5
09May 23	12:00:00	56.1	75.5	47.1	65.1	57.8	53.8	51.0
09May 23	13:00:00	56.7	75.3	48.5	65.3	58.1	54.6	51.8
09May 23	14:00:00	62.8	86.8	47.5	72.1	61.8	57.0	53.9
09May 23	15:00:00	65.1	91.1	48.3	74.3	64.7	59.2	55.2
09May 23	16:00:00	56.6	75.6	47.8	65.5	59.1	53.9	51.1
09May 23	17:00:00	56.0	73.1	48.9	64.3	58.3	53.9	51.6
09May 23	18:00:00	58.2	79.4	49.5	67.7	60.2	54.8	52.3
09May 23	19:00:00	56.7	76.8	50.4	64.6	58.7	54.6	52.6
09May 23	20:00:00	56.7	75.9	50.1	63.8	58.2	54.9	53.0
09May 23	21:00:00	60.6	86.6	47.6	69.9	59.3	52.8	50.6
09May 23	22:00:00	53.7	74	47.3	62.6	55.4	51.3	49.1
09May 23	23:00:00	52.3	65.4	46	60.0	54.7	50.5	48.4
	LDN	62.0						

Comments:



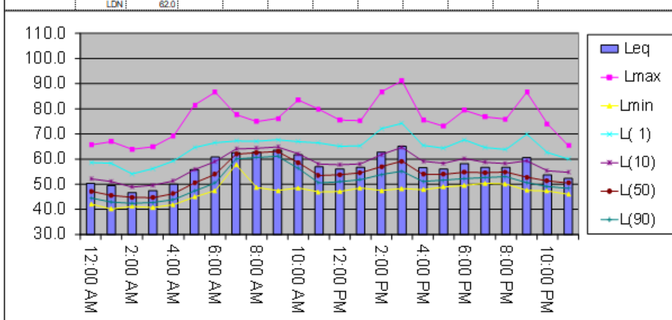


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FIGURE B-2. NOISE MEASUREMENT LOG (SHEET 2 OF 9)

KNE 24 Hour Noise Report Template

Interval Report — **Midtown LT2** — Model 712 SN 0343

Data from: **4729 San Vicente Blvd**

	Date	Time
Begin:	9-May-23	12:00 A.M.
End:	10-May-23	11:00 A.M.
Total:		24 hours

Notes:

Location:

Interval: 1 hour

Date	Time	Leq	Lmax	Lmin	L(1)	L(10)	L(50)	L(90)
10May 23	0:00:00	57.4	76	40.1	67.2	61.1	51.2	44.8
10May 23	1:00:00	54.5	70.1	39	65.7	58.9	46.1	40.7
10May 23	2:00:00	54.0	73.3	38.8	65.9	57.8	43.8	40.2
10May 23	3:00:00	54.9	71.4	39.8	66.4	58.0	47.8	45.1
10May 23	4:00:00	58.8	81.1	41	70.1	61.8	49.9	44.4
10May 23	5:00:00	63.7	86.1	41.6	72.9	66.3	55.8	47.8
10May 23	6:00:00	68.3	90.9	47.4	76.2	71.1	65.3	55.9
10May 23	7:00:00	69.7	91.6	50.9	77.4	72.2	67.6	61.8
10May 23	8:00:00	70.9	97.5	51.6	78.4	71.8	67.2	63.0
10May 23	9:00:00	69.2	88.6	53.6	77.5	71.7	66.9	61.6
10May 23	10:00:00	68.3	87.6	52.1	76.3	71.0	66.3	59.9
10May 23	11:00:00	69.2	96.8	49.3	76.1	70.4	65.3	58.8
09May 23	12:00:00	67.5	82.2	52	75.2	70.6	65.6	59.9
09May 23	13:00:00	68.3	93.6	50.2	76.7	70.3	65.8	59.3
09May 23	14:00:00	69.1	91	52.4	78.7	70.7	65.9	60.3
09May 23	15:00:00	72.6	100.9	53.8	79.0	70.6	66.1	61.3
09May 23	16:00:00	70.1	94.8	54.2	77.9	71.4	66.6	62.1
09May 23	17:00:00	68.0	85.1	53.4	76.8	70.6	65.7	61.5
09May 23	18:00:00	71.3	94.8	52.9	80.5	71.1	65.8	60.3
09May 23	19:00:00	67.1	89.8	51.7	76.1	69.3	64.4	58.1
09May 23	20:00:00	65.8	86.6	50.7	74.2	67.7	62.4	55.4
09May 23	21:00:00	62.7	81.3	46.9	70.7	65.9	60.0	53.6
09May 23	22:00:00	63.3	87.3	45.7	73.8	65.0	58.0	50.7
09May 23	23:00:00	62.3	89.5	43.4	70.4	64.2	55.4	48.6
	LDN	71.0						

Comments

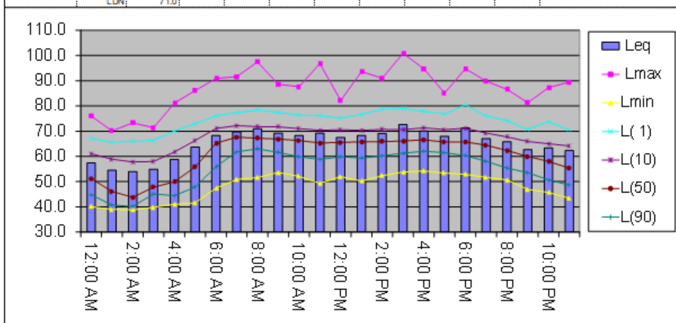

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FIGURE B-3. NOISE MEASUREMENT LOG (SHEET 3 OF 9)

KNE 24 Hour Noise Report Template

Interval Report — **Wilshire La Brea LT3** — Model 720 SN 0666

Data from: — **618 S Detroit Street**

	Date	**Time**
Begin:	9-May-23	12:00 A.M.
End:	10-May-23	11:00 A.M.
Total:		24 hours

Notes:

Location:

Interval: 1 hour

Date	Time	Leq	Lmax	Lmin	L(1)	L(10)	L(50)	L(90)	**Comments**
10May23	0:00:00	70.6	101.5	42.5	68.9	63.0	55.9	49.0	
10May23	1:00:00	56.3	79.6	47.0	62.8	58.3	54.3	50.8	
10May23	2:00:00	56.6	83.1	46.9	62.6	57.4	53.9	50.6	
10May23	3:00:00	55.9	82.3	47.0	62.4	57.5	53.8	50.6	
10May23	4:00:00	56.1	76.2	46.9	61.9	58.7	54.0	50.7	
10May23	5:00:00	60.1	86.5	47.1	66.6	62.1	57.4	51.9	
10May23	6:00:00	63.8	94.1	47.0	69.7	64.7	60.5	54.1	
10May23	7:00:00	67.8	87.0	48.8	73.0	70.9	62.9	56.7	
10May23	8:00:00	69.5	92.8	49.7	74.9	73.3	64.6	57.5	
10May23	9:00:00	69.9	89.3	50.7	76.7	73.3	64.9	57.9	
10May23	10:00:00	70.0	98.3	47.7	76.4	74.0	65.0	58.1	
10May23	11:00:00	68.1	92.2	51.2	72.9	70.9	63.7	57.8	
09May23	12:00:00	65.2	83.2	53.2	69.9	68.4	62.4	57.7	
09May23	13:00:00	65.3	82.0	52.7	70.0	68.5	62.9	58.2	
09May23	14:00:00	66.2	85.1	54.1	69.6	68.0	63.0	58.6	
09May23	15:00:00	68.1	89.8	53.1	71.9	70.1	64.0	58.8	
09May23	16:00:00	68.1	85.7	55.6	73.3	71.9	64.9	59.9	
09May23	17:00:00	68.5	87.3	53.6	73.9	72.0	65.2	60.4	
09May23	18:00:00	68.0	85.2	55.0	73.1	71.7	65.2	60.0	
09May23	19:00:00	66.1	82.6	51.9	71.0	69.3	63.7	59.1	
09May23	20:00:00	65.0	87.1	50.7	69.8	67.9	62.5	57.8	
09May23	21:00:00	62.1	78.6	48.1	66.7	65.3	60.2	54.7	
09May23	22:00:00	62.5	82.6	46.3	67.2	65.6	60.0	53.2	
09May23	23:00:00	62.1	88.9	43.5	66.6	64.9	58.6	50.7	
	LDN	71.0							

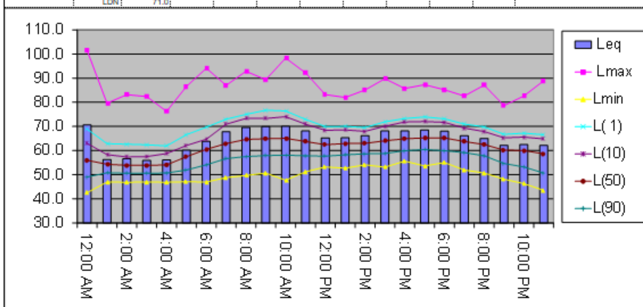

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FIGURE B-4. NOISE MEASUREMENT LOG (SHEET 4 OF 9)

KNE 24 Hour Noise Report Template

Interval Report — **Beverly LT4** — Model 712 Sn 3043

Data from: **317 N Detroit Street**

	Date	Time
Begin:	10-May-23	10:00 A.M.
End:	11-May-23	11:00 A.M.
Total:		24 hours

Notes:

Location:

Interval: 1 hour

Date	Time	Leq	Lmax	Lmin	L(1)	L(10)	L(50)	L(90)
11May 23	0:00:00	58.7	82.7	51.5	67.125	58.775	54.75	52.575
11May 23	1:00:00	55.5	73	50.8	63.625	57.675	53.25	51.6
11May 23	2:00:00	55.7	76.5	50.7	63.425	56.75	52.85	51.425
11May 23	3:00:00	55	75.7	50.8	63.15	56.875	52.775	51.425
11May 23	4:00:00	55.3	69.6	50.7	62.7	58.125	53	51.5
11May 23	5:00:00	59.3	79.9	50.9	67.375	61.45	56.4	52.75
11May 23	6:00:00	62.9	87.5	50.8	70.475	64.05	59.45	54.925
11May 23	7:00:00	67	80.4	52.6	73.775	70.3	61.85	57.5
11May 23	8:00:00	68.6	86.2	53.5	75.725	72.675	63.525	58.3
11May 23	9:00:00	69	82.7	54.5	77.5	72.7	63.85	58.75
11May 23	10:00:00	69.1	91.7	51.5	77.175	73.4	64	58.925
10May 23	11:00:00	69.1	83.2	54.5	76.925	73.225	63.725	58.55
10May 23	12:00:00	68.1	79.6	56.1	75.2	72.4	63.35	58.875
10May 23	13:00:00	69	81.7	56.2	75.975	72.725	64.525	58.9
10May 23	14:00:00	69.2	88.6	56.0	76.675	72.575	64.7	58.5
10May 23	15:00:00	68.6	84.6	56.4	76.05	72.275	63.975	58.9
10May 23	16:00:00	67.6	78.9	55.9	74.25	72	62.375	58.3
10May 23	17:00:00	68.5	80.9	55.7	75.875	72.15	64.275	58.8
10May 23	18:00:00	68.2	79.6	55.8	75.275	72	63.6	58.625
10May 23	19:00:00	67.8	78.7	55.2	75.525	72.075	62.225	58
10May 23	20:00:00	65	78.5	54.1	71.325	66.975	59.575	56.575
10May 23	21:00:00	59.2	77.8	53.8	66.175	60.9	57.775	55.575
10May 23	22:00:00	60.5	83.6	52.4	69.075	61.4	57.4	54.725
10May 23	23:00:00	57.8	76.5	51.8	64.65	59.65	56.575	53.7
	LDN	68						

Comments:

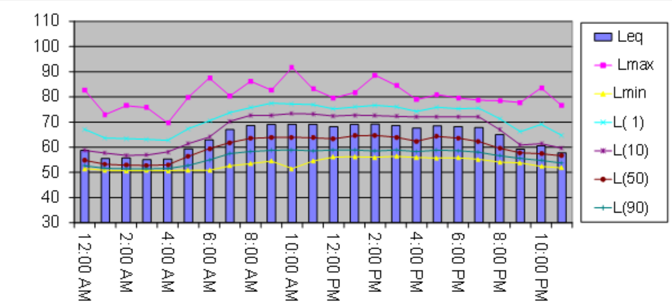

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FIGURE B-5. NOISE MEASUREMENT LOG (SHEET 5 OF 9)

KNE 24 Hour Noise Report Template

Interval Report				**Santa Monica LT 5**					Model 720 SN 0666
Data from:			**The Dylan 7100 Santa Monica Blvd**						
	Date	**Time**				**Notes:**			
Begin:	10-May-23	11:00 A.M.							
End:	11-May-23	10:00 A.M.							
Total:		24 hours							
Location:									
Interval:	1 hour								

Comments:

Date	Time	Leq	Lmax	Lmin	L(1)	L(10)	L(50)	L(90)
11 May 23	0:00:00	58.7	82.7	51.5	67.125	58.775	54.75	52.575
11 May 23	1:00:00	55.5	73	50.8	63.625	57.675	53.25	51.6
11 May 23	2:00:00	55.7	76.5	50.7	63.425	56.75	52.85	51.425
11 May 23	3:00:00	55	75.7	50.8	63.15	56.875	52.775	51.425
11 May 23	4:00:00	55.3	69.6	50.7	62.7	58.125	53	51.5
11 May 23	5:00:00	59.3	79.9	50.9	67.375	61.45	56.4	52.75
11 May 23	6:00:00	62.9	87.5	50.8	70.475	64.05	59.45	54.925
11 May 23	7:00:00	67	80.4	52.6	73.775	70.3	61.85	57.5
11 May 23	8:00:00	68.6	86.2	53.5	75.725	72.675	63.525	58.3
11 May 23	9:00:00	69	82.7	54.5	77.5	72.7	63.85	58.75
11 May 23	10:00:00	69.1	91.7	51.5	77.175	73.4	64	58.925
10 May 23	11:00:00	69.1	83.2	54.5	76.925	73.225	63.725	58.55
10 May 23	12:00:00	68.1	79.6	56.1	75.2	72.4	63.35	58.875
10 May 23	13:00:00	69	81.7	56.2	75.975	72.725	64.525	58.9
10 May 23	14:00:00	69.2	88.6	56.0	76.675	72.575	64.7	58.5
10 May 23	15:00:00	68.6	84.6	56.4	76.05	72.275	63.975	58.9
10 May 23	16:00:00	67.6	78.9	55.9	74.25	72	62.375	58.3
10 May 23	17:00:00	68.5	80.9	55.7	75.875	72.15	64.275	58.8
10 May 23	18:00:00	68.2	79.6	55.8	75.275	72	63.6	58.625
10 May 23	19:00:00	67.8	78.7	55.2	75.525	72.075	62.225	58
10 May 23	20:00:00	65	78.5	54.1	71.325	66.975	59.575	56.575
10 May 23	21:00:00	59.2	77.8	53.8	66.175	60.9	57.775	55.575
10 May 23	22:00:00	60.5	83.6	52.4	69.075	61.4	57.4	54.725
10 May 23	23:00:00	57.8	76.5	51.8	64.65	59.65	56.575	53.7
	LDN	74						

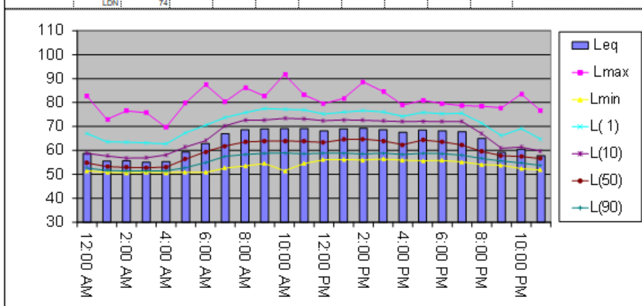

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FIGURE B-6. NOISE MEASUREMENT LOG (SHEET 6 OF 9)

Interval Report — **Wilshire Fairfax LT 6** — Model 820 SN 1232

Data from: **6122 Orange Street**

	Date	Time
Begin:	10-May-23	1:00 P.M.
End:	11-May-23	12:00 A.M.
Total:		24 hours

Notes:

Location:

Interval: 1 hour

Date	Time	Leq	Lmax	Lmin	L(1)	L(10)	L(50)	L(90)
11 May 23	0:00:00	52.8	70.7	39.6	58.3	56.1	49.2	43.7
11 May 23	1:00:00	49.2	63.3	38.3	55.3	53.3	45.0	40.6
11 May 23	2:00:00	49.3	66.9	38.8	54.5	52.3	43.8	41.0
11 May 23	3:00:00	47.9	61	39	54.0	52.1	43.8	40.4
11 May 23	4:00:00	49.4	66.9	37.9	55.3	53.2	44.4	40.9
11 May 23	5:00:00	53.9	68.2	39.9	58.6	56.9	51.0	46.5
11 May 23	6:00:00	59.7	83.4	46.4	63.0	60.9	54.9	50.5
11 May 23	7:00:00	60.6	81.8	47.8	65.2	61.4	55.9	52.1
11 May 23	8:00:00	59.2	85.1	45.8	62.6	60.2	54.4	50.9
11 May 23	9:00:00	60.7	80.5	46	62.9	61.0	55.5	52.2
11 May 23	10:00:00	61.0	82.9	48	63.9	62.0	56.2	52.5
11 May 23	11:00:00	59.4	83.5	46.9	62.4	60.0	54.6	51.1
11 May 23	12:00:00	57.0	75.1	48.8	60.5	58.8	54.8	52.3
10 May 23	13:00:00	57.9	85	48.7	60.5	58.7	55.0	52.2
10 May 23	14:00:00	56.8	79.4	48	60.8	58.8	54.5	51.1
10 May 23	15:00:00	56.7	73.7	46.2	60.6	58.4	54.0	50.6
10 May 23	16:00:00	56.1	71.9	47.5	60.5	58.6	54.1	50.8
10 May 23	17:00:00	59.3	84.2	47.3	61.9	59.4	53.9	50.5
10 May 23	18:00:00	56.8	73	47.8	61.3	59.1	54.0	51.0
10 May 23	19:00:00	56.6	80.9	46.9	59.8	58.1	53.9	50.7
10 May 23	20:00:00	56.3	77.9	45.1	59.9	57.8	53.0	49.3
10 May 23	21:00:00	56.9	81.9	44.4	60.3	57.6	52.7	48.9
10 May 23	22:00:00	54.9	76	45.6	58.3	56.8	52.6	49.1
10 May 23	23:00:00	53.3	71.5	45	57.3	56.2	51.7	48.3
	LDN	61.0						

Comments:

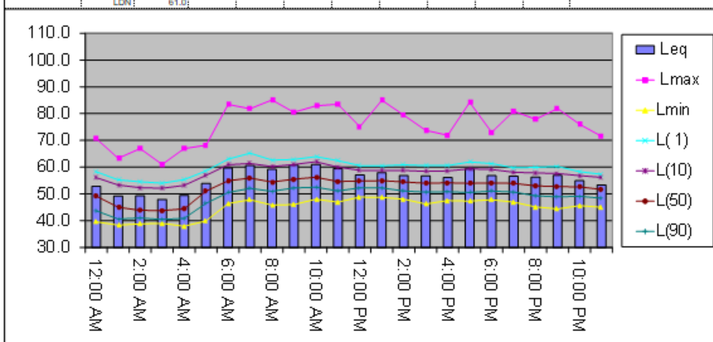

FIGURE B-7. NOISE MEASUREMENT LOG (SHEET 7 OF 9)

KNE 24 Hour Noise Report Template

Interval Report				**La Cienga LT7**					Model 712 SN 0343
Data from:				**321 Alfred Street**					
	Date	**Time**				**Notes:**			
Begin:	11-May-23	12:00 A.M.							
End:	12-May-23	11:00 A.M.							
Total:		24 hours							
Location:									
Interval:	1 hour								

Date	Time	Leq	Lmax	Lmin	L(1)	L(10)	L(50)	L(90)	**Comments**
12 May 23	0:00:00	60.1	83.9	49.7	66.5	58.7	53.2	51.2	
12 May 23	1:00:00	54.7	78.3	48.6	61.5	55.8	52.0	50.1	
12 May 23	2:00:00	52.0	69.6	48.6	57.5	53.3	50.9	49.4	
12 May 23	3:00:00	51.6	64.6	48.9	56.7	53.1	50.9	49.8	
12 May 23	4:00:00	51.6	62.4	49	57.1	53.1	51.0	50.0	
12 May 23	5:00:00	53.0	69.4	49.4	58.7	54.6	52.2	50.8	
12 May 23	6:00:00	55.2	71.6	50.3	63.0	56.8	53.7	51.8	
12 May 23	7:00:00	59.9	79.8	51.5	70.4	60.1	55.3	53.4	
12 May 23	8:00:00	63.9	92.7	51	68.4	62.0	55.8	53.6	
12 May 23	9:00:00	57.7	72.9	51.9	64.5	59.7	56.3	54.2	
12 May 23	10:00:00	60.0	80.9	51.6	67.9	60.9	56.9	54.9	
12 May 23	11:00:00	57.6	74.9	51.7	65.7	59.3	55.7	53.6	
11 May 23	12:00:00	59.1	77.6	51.8	68.2	61.5	55.6	53.5	
11 May 23	13:00:00	60.9	85.2	52.3	69.6	63.2	57.2	54.4	
11 May 23	14:00:00	59.4	82.1	52.6	67.5	62.0	56.8	54.6	
11 May 23	15:00:00	60.3	81.5	52.1	69.0	62.8	57.0	54.2	
11 May 23	16:00:00	62.2	87.3	52.3	71.2	62.6	57.0	54.3	
11 May 23	17:00:00	58.9	77.1	52.5	68.1	60.5	56.2	54.2	
11 May 23	18:00:00	57.5	78.4	51.6	67.1	58.0	54.7	53.1	
11 May 23	19:00:00	57.5	76.5	51	66.4	58.8	54.8	53.1	
11 May 23	20:00:00	56.5	72.7	50.8	65.6	57.8	54.1	52.5	
11 May 23	21:00:00	56.5	73.2	50.8	65.7	57.6	54.5	52.6	
11 May 23	22:00:00	55.7	74.5	49.8	64.0	56.9	54.0	52.4	
11 May 23	23:00:00	55.9	71.1	49.9	63.9	57.4	53.9	51.8	
	LDN	63.0							

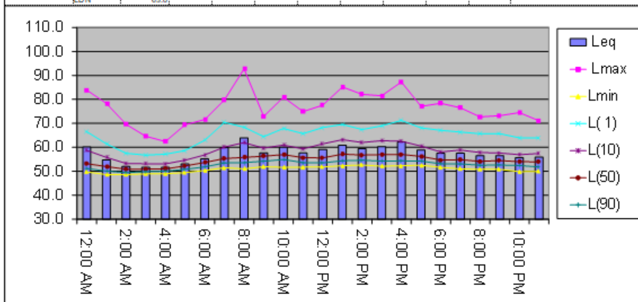

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FIGURE B-8. NOISE MEASUREMENT LOG (SHEET 8 OF 9)

KNE 24 Hour Noise Report Template

Interval Report				**San Vicenet Santa Monica LT8**					Model 720 SN 0666
Data from:				**840 Larrabee Street**					
	Date	**Time**					**Notes:**		
Begin:	11-May-23	12:00 A.M.							
End:	12-May-23	11:00 A.M.							
Total:		24 hours							
Location:									
Interval:	1 hour								

Date	Time	Leq	Lmax	Lmin	L(1)	L(10)	L(50)	L(90)
12 May 23	0:00:00	56.1	81.4	49.5	64.6	57.5	53.7	51.9
12 May 23	1:00:00	56.0	73	44.5	66.2	57.6	53.3	50.9
12 May 23	2:00:00	55.8	68.9	43.4	64.4	57.7	53.5	47.5
12 May 23	3:00:00	50.5	69.8	44.5	58.8	51.4	48.5	46.8
12 May 23	4:00:00	50.4	70.5	44.8	59.8	51.8	47.7	46.1
12 May 23	5:00:00	52.3	71.4	44.5	62.2	53.9	48.9	46.2
12 May 23	6:00:00	56.8	74.7	44.7	68.5	58.1	51.8	47.5
12 May 23	7:00:00	58.5	80.4	45.9	68.8	62.0	53.3	48.9
12 May 23	8:00:00	62.5	80.4	46.9	73.5	65.3	56.7	52.9
12 May 23	9:00:00	60.4	81.8	48.3	70.4	63.1	55.7	51.9
12 May 23	10:00:00	60.2	79.9	50.2	69.4	62.6	56.6	53.6
12 May 23	11:00:00	60.6	81.9	48.8	70.1	63.1	56.3	52.4
11 May 23	12:00:00	58.9	77.2	47.4	68.6	61.6	55.3	52.4
11 May 23	13:00:00	59.9	81.3	48.1	69.9	61.7	55.4	51.6
11 May 23	14:00:00	58.2	75.5	49.5	67.5	61.3	54.8	51.9
11 May 23	15:00:00	58.3	75.2	49.5	67.1	61.6	55.2	52.0
11 May 23	16:00:00	58.0	74.2	48	66.9	61.0	55.1	52.5
11 May 23	17:00:00	63.5	78.3	47.6	70.0	64.8	55.6	51.0
11 May 23	18:00:00	58.3	76.6	47.6	68.3	61.9	53.5	49.9
11 May 23	19:00:00	57.4	76.6	46.1	67.5	60.8	52.1	48.7
11 May 23	20:00:00	58.2	84.4	44.5	67.8	60.2	51.7	47.9
11 May 23	21:00:00	55.8	74.1	45.6	65.6	59.6	50.6	48.2
11 May 23	22:00:00	55.5	72.1	47.1	64.8	58.9	52.0	50.2
11 May 23	23:00:00	56.3	72.8	50.2	65.7	59.0	53.6	51.9
	LDN	63.0						

Comments

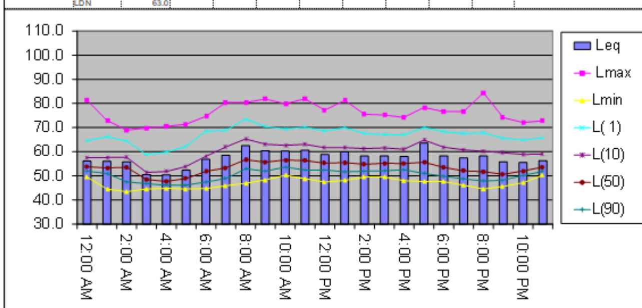

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FIGURE B-9. NOISE MEASUREMENT LOG (SHEET 9 OF 9)

KNE 24 Hour Noise Report Template

Interval Report				**MSF 1 LT9**			Model 820	SN 1232
Data from:				**8922 Reading Ave**				
	Date	**Time**				**Notes:**	Area under landing path to LAX	
Begin:	11-May-23	1:00 P.M.						
End:	12-May-23	1:00 P.M.						
Total:		24 hours						
Location:								
Interval:	1 hour							

Date	Time	Leq	Lmax	Lmin	L(1)	L(10)	L(50)	L(90)
12May 23	0:00:00	48.6	62.5	39.8	53.9	51.7	45.0	42.5
12May 23	1:00:00	44.9	64.6	36.2	48.4	46.4	42.1	39.3
12May 23	2:00:00	41.9	65.2	33.7	43.6	42.1	38.8	35.5
12May 23	3:00:00	41.7	57.7	35.3	44.6	43.3	40.0	37.8
12May 23	4:00:00	43.3	57.6	38.5	46.8	44.5	41.6	40.1
12May 23	5:00:00	47.5	61.8	40.5	50.0	48.6	45.7	43.9
12May 23	6:00:00	62.7	92.6	41.1	61.9	56.8	48.2	45.6
12May 23	7:00:00	65.7	92.1	42.8	69.7	63.4	53.2	47.1
12May 23	8:00:00	64.8	84.4	42.3	71.7	64.5	53.3	47.5
12May 23	9:00:00	66.8	91.4	43.2	71.9	63.8	51.3	46.8
12May 23	10:00:00	65.4	85.5	43.6	71.4	64.6	51.5	47.6
12May 23	11:00:00	66.4	83.9	44.8	73.4	67.0	53.5	48.5
12May 23	12:00:00	66.1	86.4	47.7	72.8	64.9	54.1	51.0
11May 23	13:00:00	65.2	84.8	47.1	70.8	64.5	53.9	50.1
11May 23	14:00:00	66.9	87.6	47	73.8	67.1	54.0	50.2
11May 23	15:00:00	64.2	82.2	46.5	69.1	63.4	54.1	50.6
11May 23	16:00:00	66.9	85.4	47.9	73.3	66.1	54.3	50.7
11May 23	17:00:00	65.4	85	48.3	71.5	65.1	54.2	50.9
11May 23	18:00:00	66.9	85.3	47.4	74.5	68.7	54.4	50.9
11May 23	19:00:00	64.7	82.4	44.5	69.8	62.8	52.1	48.4
11May 23	20:00:00	66.7	84.7	43.1	73.5	66.5	51.1	46.0
11May 23	21:00:00	64.9	83.1	42	71.5	65.0	50.3	44.9
11May 23	22:00:00	64.9	82.3	43.6	71.8	65.1	50.5	46.2
11May 23	23:00:00	62.0	81.5	42.5	63.9	57.9	49.4	45.5
	LDN	67.0						

Comments

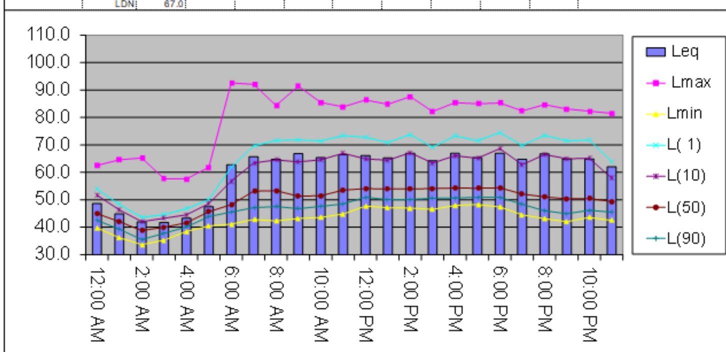

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FIGURE B-10. METER CALIBRATION CERTIFICATES (SHEET 1 OF 4)

CERTIFICATE OF CALIBRATION
26916-2
FOR LARSON DAVIS PRECISION INTEGRATING SOUND LEVEL METER

Model **712** — Serial No. **0343**
ID No. **N/A**
With Microphone Model **N/A** — Serial No. **B9828**

Customer: **WSP USA**
Orange, CA 92868
P.O. No. **Project# 7330**

was tested to Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 2: IEC 651-1979 Type 2

on **18 FEB 2022** BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specifications.
Re-calibration due on: **18 FEB 2023**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	4134	1315901	16 FEB 2022	16 FEB 2023
B&K	4226	3274134	30 NOV 2021	30 NOV 2022
HP	34401A	3146A48348	16 OCT 2021	16 OCT 2022

Calibration System operates in conformance to ANSI/ NCSL Z540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **Odin Metrology Procedure for Larson Davis 712.**
Uncertainty of Reference 4226 in Pressure:
31.5 Hz-4k Hz: ± .20 dB 4k Hz-8k Hz: ± .25 dB
Uncertainty of ANSI Type 2 S.L.M.: 31.5 Hz-2k Hz: ± 2 dB
2k Hz-4k Hz: ± 2.5 dB 4k Hz-5k Hz: ± 3.0 dB 5k Hz-6.3k Hz: ± 3.5 dB 6.3k Hz-8k Hz: ± 4.5 dB
Uncertainty Ratio: > 4:1

Temperature	Relative Humidity	Barometric Pressure
23°C	27 %	997.33 hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed: [signature]

ODIN METROLOGY, INC.
CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

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FIGURE B-11. METER CALIBRATION CERTIFICATES (SHEET 2 OF4)

CERTIFICATE OF CALIBRATION
26916-4
FOR LARSON DAVIS
PRECISION INTEGRATING AND LOGGING SOUND LEVEL METER

Model **820** — Serial No. **1232**
ID No. **N/A**

With Microphone Model **2560** — Serial No. **2158**
With Preamplifier Model **900B** — Serial No. **2956**

Customer: **WSP USA**
Orange, CA 92868

P.O. No. **Project# 7330**

was tested and met Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 1; IEC 651-1979 Type 1

on **17 FEB 2022** BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specification.
Re-calibration due on: **17 FEB 2023**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	1051	1777523	28 SEP 2021	28 SEP 2022
B&K	2636	1423390	03 JAN 2022	03 JAN 2023
B&K	4226	3274134	30 NOV 2021	30 NOV 2022
B&K	4231	1770857	09 SEP 2021	09 SEP 2022
HP	34401A	MY45023668	25 JAN 2022	25 JAN 2023
HP	3458A	2823A07179	21 AUG 2021	21 AUG 2022

Performed in Compliance with ANSI, NCSL Z-540-1, 1994
and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" condition.

Reference Test Procedure: **ACCT Procedure 812-820 Version 3.5.1.**

Temperature	Relative Humidity	Barometric Pressure
23°C	27 %	997.74 hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed: [signature]

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FIGURE B-12. METER CALIBRATION CERTIFICATES (SHEET 3 OF 4)

CERTIFICATE OF CALIBRATION
26752-2
FOR LARSON DAVIS
INTEGRATING SOUND LEVEL METER

Model **720**

With 3/8" electret microphone

Serial No. **0666**
ID No. **N/A**
Serial No. **B9830**

Customer: **WSP USA**
New York, NY 10119

P.O. No. **Verbal/Brian Isoldi**

was tested to Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 2; IEC 651-1979 Type 2

on **18 NOV 2021**

BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specifications.
Re-calibration due on: **18 NOV 2022**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	4134	1315901	24 MAR 2021	24 MAR 2022
B&K	4226	3274134	30 NOV 2020	30 NOV 2021
HP	34401A	3146A48348	16 OCT 2021	16 OCT 2022

Calibration System operates in conformance to ANSI/ NCSL Z540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252

*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **Odin Metrology Procedure for Larson Davis 720.**
Uncertainty of Reference 4226 in Pressure:
31.5 Hz-4k Hz: ± .20 dB 4k Hz-8k Hz: ± .25 dB
Uncertainty of ANSI Type 2 S.L.M.: 31.5 Hz-2k Hz: ± 2 dB
2k Hz-4k Hz: ± 2.5 dB 4k Hz-5k Hz: ± 3.0 dB 5k Hz-6.3k Hz: ± 3.5 dB 6.3k Hz-8k Hz: ± 4.5 dB
Uncertainty Ratio: > 4:1

Temperature	Relative Humidity	Barometric Pressure
23°C	**39 %**	**993.03 hPa**

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed: [signature]

ODIN METROLOGY, INC.
CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

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FIGURE B-13. METER CALIBRATION CERTIFICATES (SHEET 4 OF 4)

Odin Metrology, Inc.
Calibration of Sound & Vibration Instruments

Certificate Number: **26752-3**

Certificate of Calibration for Brüel & Kjær Sound Level Calibrator

This calibration is performed by comparison with measurement reference standard pistonphones:

Type No.	4228	4228
Serial No.	1793011	1504084
Calibrated by	TE	TE
Cal Date	24 NOV 2020	24 NOV 2020
Due Date	24 NOV 2021	24 NOV 2021

a) Estimated uncertainty of comparison: ± 0.05 dB
b) Estimated uncertainty of calibration service for standard pistonphone: ± 0.06 dB
c) Total uncertainty: $\sqrt{a^2+b^2}$ = ± 0.08 dB
d) Expanded uncertainty (coverage factor k = 2 for 95% confidence level): = ± 0.16 dB

This acoustic calibrator has been calibrated using standards with values traceable to the National Institute of Standards and Technology. This calibration is traceable to NIST Test Number **683/289533-17.**

Condition of Test		
Ambient Pressure	993.03	hPa
Temperature	23	°C
Relative Humidity	39	%
Date of Calibration	18 NOV 2021	
Re-calibration due on	18 NOV 2022	

The calibration of this acoustic calibrator was performed using a test system conforming to the requirements of ANSI/NCSLZ540-1, 1994, ISO 17025, and ISO 9001:2015, Certification NQA No. 11252.

Calibration procedure: **OM-P-1001-Acoustic_Calibrator, Rev. 1.0 20130522.**

Calibration performed by [signature]

Harold Lynch, Service Manager

Calibrator type **4230**
Serial no. **1351753**
Submitted by **WSP USA**
New York, NY 10119
Purchase order no. **Verbal/Brian Isoldi**
Asset no. **N/A**

This calibrator has been found to perform **within** the specifications listed below at the normalized conditions stated.

SPL produced in coupler terminated by a loading volume of 1.333 cm^3	94.0 ± 0.3 dB
Frequency	1,000 Hz ± 15 Hz
Distortion	< 1% (serial # ≤ 1550000) < 1.5% (serial # >1550000)
Equivalent coupler volume	140 cm^3
At 1,013 hPa, 23°C, and 65% relative humidity	

Performance as Received		
Frequency	999.5	Hz
SPL	94.01	dB
Volume Check (Tol.: ±0.12):	-0.02	dB
Distortion	0.4	%
Battery Voltage	9.6	V

Was repair or adjustment performed? **No**
Were parts replaced? **No**
Were batteries replaced? **No**

Final Performance		
Frequency	999.5	Hz
SPL	94.01	dB
Volume Check (Tol.: ± 0.12):	-0.02	dB
Distortion	0.4	%

Note: This calibrator was **within** manufacturer's specifications as received.

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