Appendix O. Noise and Vibration Technical Report

SEPULVEDA TRANSIT CORRIDOR PROJECT

Noise and Vibration Technical Report

March 2025

Metro

SEPULVEDA TRANSIT CORRIDOR PROJECT

Contract No. AE67085000

Noise and Vibration Technical Report

Task 5.24.11

Prepared for:

Metro

Los Angeles County
Metropolitan Transportation Authority

Prepared by:

HTA PARTNERS
HNTB + TAHA + AECOM

777 S. Figueroa Street, Suite 2300
Los Angeles, California 90017

Review		
	Date	Name
Originator	3/19/25	Peter Feldman
Checker	3/19/25	Allyson Dong
Backchecker/Updater	3/19/25	Peter Feldman/Steven Edmonds
Verifier	3/19/25	Peter Feldman/Steven Edmonds
QA Review	3/21/2025	Aaron Grisel

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Abbreviations and Acronyms

>	greater than
<	less than
µPa	micro-Pascals
ABC	Accelerated Bridge Construction
APM	automated people mover
BRT	bus rapid transit
CEQA	California Environmental Quality Act
CIDH	cast-in-drilled-hole
CNEL	Community Noise Equivalent Level
CPUC	California Public Utilities Commission
dB	decibel
dBA	A-weighted decibel
EIR	Environmental Impact Report
ExpressLanes project	I-405 Sepulveda Pass ExpressLanes project
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Program
GBN	groundborne noise
GBV	groundborne vibration
GIS	geographic information systems
HRDF	high resilience direct fixation rail fasteners
HRT	heavy rail transit
HTA	HTA Partners
Hz	hertz
I-10	Interstate 10
I-405	Interstate 405
in/sec	inches per second
kHz	kilohertz
LADWP	City of Los Angeles Department of Water and Power
LASRE	LA SkyRail Express
L_{dn}	day-night noise level
L_{eq}	equivalent noise level
$L_{eq.equip}$	equivalent noise level of equipment
LAX	Los Angeles International Airport
LOSSAN	Los Angeles-San Diego-San Luis Obispo

LRT	light rail transit
LRTP	Long-Range Transportation Plan
Metro	Los Angeles County Metropolitan Transportation Authority
MM	mitigation measure
MOW	maintenance-of-way
MRT	monorail transit
MSF	maintenance and storage facility
NOP	Notice of Preparation
PA	public address
PPV	peak particle velocity
Project	Sepulveda Transit Corridor Project
ROW	right-of-way
RTP	Regional Transportation Plan
SCAG	Southern California Association of Governments
SCORE	Southern California Optimized Rail Expansion
SCS	Sustainable Communities Strategy
SEL	sound exposure level
SFR	single-family residential
SPL	sound pressure level
STCP	Sepulveda Transit Corridor Partners
TBM	tunnel boring machine
TPSS	traction power substation
UCLA	University of California, Los Angeles
US-101	U.S. Highway 101
VA	U.S. Department of Veterans Affairs
Valley	San Fernando Valley
VdB	vibration decibel

1 INTRODUCTION

1.1 Project Background

The Sepulveda Transit Corridor Project (Project) is intended to provide a high-capacity rail transit alternative to serve the large and growing travel market and transit needs currently channeled through the Sepulveda Pass and nearby canyon roads between the San Fernando Valley (Valley) and the Westside of Los Angeles. The Project would have a northern terminus with a connection to the Van Nuys Metrolink/Amtrak Station and a southern terminus with a connection to the Los Angeles County Metropolitan Transportation Authority's (Metro) E Line. In addition to providing local and regional connections to the existing and future Metro rail and bus network, the Project is anticipated to improve access to major employment, educational, and cultural centers in the greater Los Angeles area.

In 2019, Metro completed the Sepulveda Transit Corridor Feasibility Study and released the Project's *Final Feasibility Report* (Metro, 2019), which documented the transportation conditions and travel patterns in the Sepulveda corridor; identified mobility problems affecting travel between the Valley and the Westside; and defined the Purpose and Need, goals, and objectives of the Project. Using an iterative evaluation process, the Feasibility Study identified feasible transit solutions that met the Purpose and Need, goals, and objectives of the Project. The Feasibility Study determined that a reliable, high-capacity, fixed guideway transit system connecting the Valley to the Westside could be constructed along several different alignments. Such a transit system, operated as either heavy rail transit (HRT) or monorail transit (MRT), would serve the major travel markets in the Sepulveda Transit corridor and would provide travel times competitive with the automobile.

1.2 Project Alternatives

In November 2021, Metro released a Notice of Preparation (NOP) of an Environmental Impact Report (EIR) pursuant to the California Environmental Quality Act, for the Project that included six alternatives (Metro, 2021). Alternatives 1 through 5 included a southern terminus station at the Metro E Line Expo/Sepulveda Station, and Alternative 6 included a southern terminus station at the Metro E Line Expo/Bundy Station. The alternatives were described in the NOP as follows:

- Alternative 1: Monorail with aerial alignment in the Interstate 405 (I-405) corridor and an electric bus connection to the University of California, Los Angeles (UCLA)
- Alternative 2: Monorail with aerial alignment in the I-405 corridor and an aerial automated people mover connection to UCLA
- Alternative 3: Monorail with aerial alignment in the I-405 corridor and underground alignment between the Getty Center and Wilshire Boulevard
- Alternative 4: Heavy rail with underground alignment south of Ventura Boulevard and aerial alignment generally along Sepulveda Boulevard in the San Fernando Valley
- Alternative 5: Heavy rail with underground alignment including along Sepulveda Boulevard in the San Fernando Valley
- Alternative 6: Heavy rail with underground alignment including along Van Nuys Boulevard in the San Fernando Valley and a southern terminus station on Bundy Drive

The NOP also stated that Metro is considering a No Project Alternative that would not include constructing a fixed guideway line. Metro established a public comment period of 74 days, extending from November 30, 2021 through February 11, 2022. Following the public comment period, refinements to the alternatives were made to address comments received. Further refinements to optimize the designs and address technical challenges of the alternatives were made in 2023 following two rounds of community open houses.

In July 2024, following community meetings held in May 2024, Alternative 2 was removed from further consideration in the environmental process because it did not provide advantages over the other alternatives, and the remaining alternatives represent a sufficient range of alternatives for environmental review, inclusive of modes and routes (Metro, 2024). Detailed descriptions of the No Project Alternative and the five remaining “build” alternatives are presented in Sections 5 through 10.

1.3 Project Study Area

Figure 1-1 shows the Project Study Area. It generally includes Transportation Analysis Zones from Metro’s travel demand model that are within 1 mile of the alignments of the four “Valley-Westside” alternatives from the *Sepulveda Transit Corridor Project Final Feasibility Report* (Metro, 2019). The Project Study Area represents the area in which the transit concepts and ancillary facilities are expected to be located. The analysis of potential impacts encompasses all areas that could potentially be affected by the Project, and the EIR will disclose all potential impacts related to the Project.

1.4 Purpose of this Report and Structure

This technical report examines the environmental impacts of the Project as it relates to noise and vibration. It describes existing noise and vibration conditions in the Project Study Area, the regulatory setting, methodology for impact evaluation, and potential impacts from operation and construction of the project alternatives, including maintenance and storage facility site options.

The report is organized according to the following sections:

- Section 1 Introduction
- Section 2 Regulatory and Policy Framework
- Section 3 Methodology
- Section 4 Future Background Projects
- Section 5 No Project Alternative
- Section 6 Alternative 1
- Section 7 Alternative 3
- Section 8 Alternative 4
- Section 9 Alternative 5
- Section 10 Alternative 6
- Section 11 Preparers of the Technical Report
- Section 12 References

Figure 1-1. Sepulveda Transit Corridor Project Study Area

Source: HTA, 2024

1.5 Fundamentals of Noise and Vibration

1.5.1 Noise Fundamentals

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

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

1.5.1.1 Frequency

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

1.5.1.2 Sound Pressure Levels and Decibels

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

1.5.1.3 Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB—rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dB louder than one source.

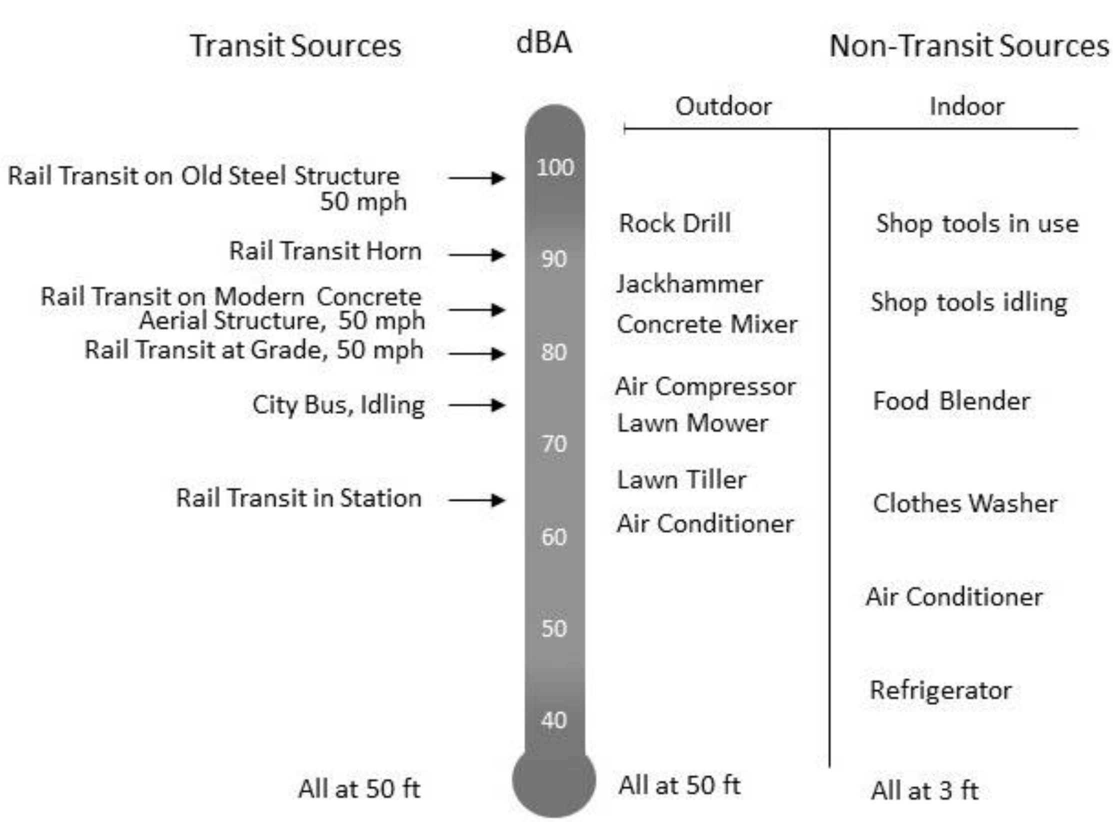
1.5.1.4 A-Weighted Decibels

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

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

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with transit noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels or dBA. Figure 1-2 describes typical A-weighted sound levels for various noise sources.

Figure 1-2. Typical A-Weighted Sound Levels



Source: FTA, 2018

1.5.1.5 Human Response to Changes in Noise Levels

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

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

The degree to which noise can impact the human environment ranges from levels that interfere with speech and sleep (annoyance and nuisance) to levels that cause adverse health effects (hearing loss and psychological effects). Human response to noise is subjective and can vary greatly from person to person. Factors that influence individual response include the intensity, frequency, and pattern of noise as well as the amount of background noise present before the intruding noise and the nature of work or human activity that is exposed to the noise source.

1.5.1.6 Noise Descriptors

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

- **Equivalent Sound Level (L_{eq}):** L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour A-weighted equivalent sound level (L_{eq}[h]) is the energy average of A-weighted sound levels occurring during a 1-hour period.
- **Maximum Sound Level (L_{max}):** L_{max} is the highest instantaneous sound level measured during a specified period.
- **Day-Night Level (L_{dn}):** L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during nighttime hours between 10:00pm and 7:00am.
- **Sound Exposure Level (SEL):** The cumulative noise exposure from a single noise event, normalized to one second. SEL contains the same overall sound energy as the actual varying sound energy during the event. It is the primary metric for the measurement of transit vehicle noise emissions and an intermediate metric in the measurement and calculation of both L_{eq}(1hr) and L_{dn}. The SEL metric is A-weighted and is expressed in the unit dBA.
- **Community Noise Equivalent Level (CNEL):** Similar to L_{dn}, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10:00pm and 7:00am, and approximately 5-dB penalty applied to the A-weighted sound levels occurring during evening hours between 7:00pm and 10:00pm.

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

1.5.1.7 Geometric Spreading

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

1.5.1.8 Ground Absorption

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

1.5.1.9 Atmospheric Effects

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

1.5.1.10 Shielding by Natural or Human-Made Features

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

1.5.2 Vibration Fundamentals

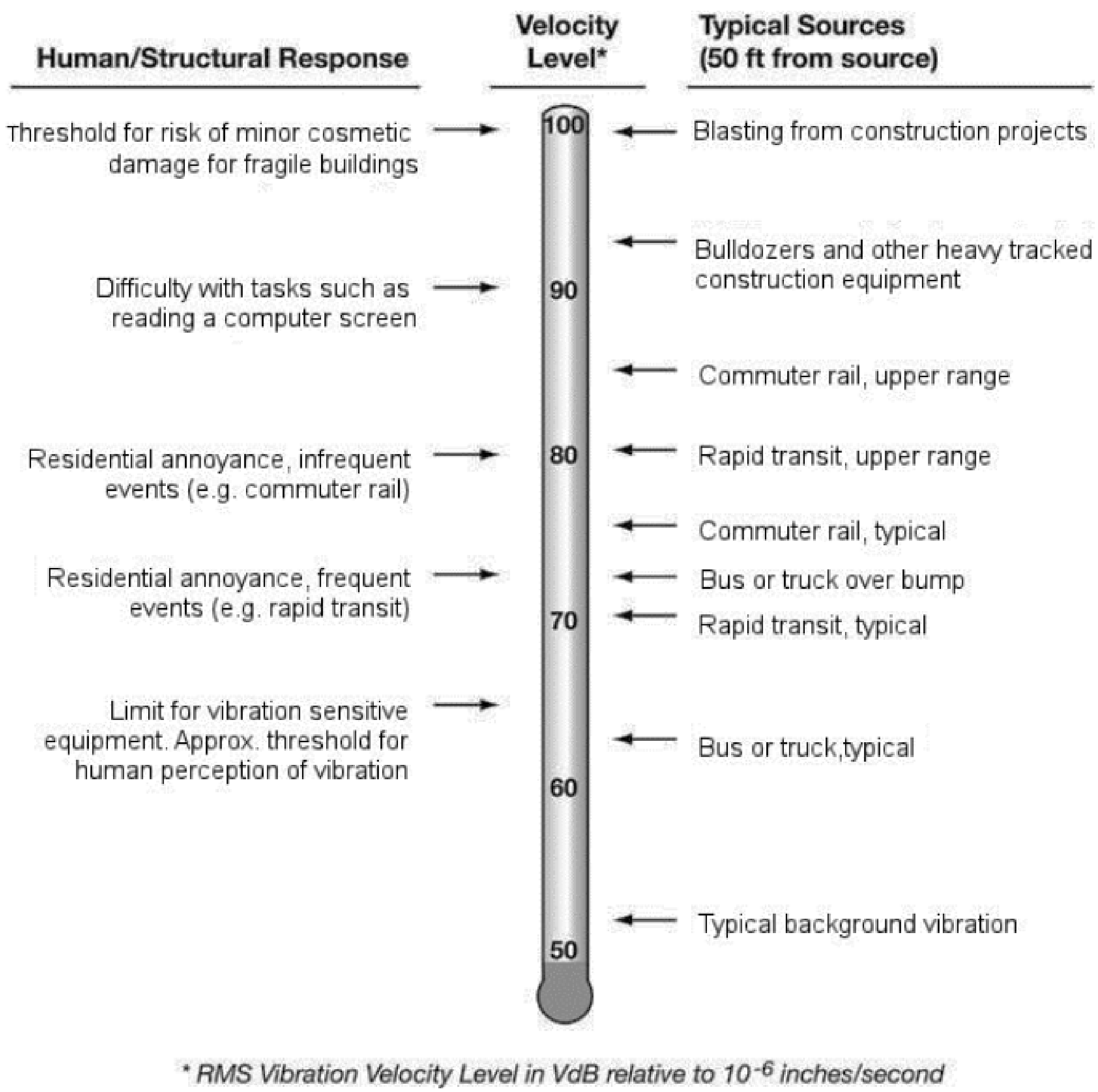
Vibration is an oscillatory motion that can be described in terms of the displacement, velocity, or acceleration of the motion. Of these, displacement is the most intuitive metric. For a vibrating floor, the displacement is simply the distance that a point on the floor moves away from its static position. The velocity represents the instantaneous speed of the floor movement and acceleration is the rate of change of the speed. Vibration that is transmitted from the tracks through the ground to adjacent sensitive structures is referred to as groundborne vibration (GBV).

The response of humans to vibration is very complex. However, the general consensus is that for the vibration frequencies generated by passenger trains, human response is best approximated by the vibration velocity level. Therefore, vibration velocity has been used in this study to describe train-generated vibration levels. To avoid confusion with sound decibels, the abbreviation "VdB" is used for vibration decibels. All vibration decibels in this report use a decibel reference of 1 micro inch per second.

High levels of vibration may cause damage to buildings. However, GBV levels rarely affect human health. Instead, most people consider GBV to be an annoyance that can affect concentration or disturb sleep. In addition, high levels of GBV can damage fragile buildings or interfere with equipment that is highly sensitive to GBV (e.g., electron microscopes).

Figure 1-3 shows typical GBV levels from rail and non-rail sources as well as the human and structure response to such levels.

Figure 1-3. Typical Groundborne Vibration Levels



Source: FTA, 2018

Experience has shown that it is rare that GBV from transit systems results in building damage, even minor cosmetic damage. The primary consideration therefore is whether vibration will be intrusive to building occupants or will interfere with interior activities or machinery.

As shown on Figure 1-3, the threshold of human perception is approximately 65 VdB. Vibration levels in the range of 70 to 75 VdB are often noticeable but acceptable. Beyond 80 VdB, vibration levels are often considered unacceptable. For human annoyance, there is a relationship between the number of daily events and the degree of annoyance caused by GBV. In this analysis, threshold of impact for GBV and groundborne noise (GBN) has been applied based on frequent daily events.

2 REGULATORY AND POLICY FRAMEWORK

2.1 Federal

2.1.1 Federal Transit Administration

2.1.1.1 Transit Noise and Construction Noise

Federal Transit Administration (FTA) standards and criteria for assessing noise impacts 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 increase in total noise exposure is allowed. Some land use activities are more sensitive to noise than others, such as parks, religious facilities, and residences, compared to industrial and commercial uses. Table 2-1 presents FTA's land use categories and metrics for transit noise impact criteria. Most commercial or industrial uses are not considered noise-sensitive because activities within these 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 as sound and motion picture recording studios. Parks used primarily for active recreation such as sports complexes and bike or running paths are not considered noise-sensitive. However, parks (even some in dense urban areas) primarily used for passive recreation such as reading, conversation, or meditation may be valued as havens from the noise and rapid pace of everyday city life. These types of parks are treated as noise-sensitive and are included in land use Category 3. Non-sensitive uses do not require a noise impact assessment.

Table 2-1. 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} (1 hr)[a]	This category is applicable to 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}[b]	This category is applicable to all residential land use and buildings where people normally sleep, such as hotels and hospitals.
3	Institutional	Outdoor L_{eq} (1 hr)[a]	This category is applicable to institutional land uses with primarily daytime and evening use. Example land uses include schools, libraries, theaters, and religious facilities, 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

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

[b]L_{dn} is the day-night average noise level with a 10-dBA penalty applied to noise levels occurring during nighttime hours between 10:00pm and 7:00am.

dBA = A-weighted decibel
hr = hour
L_{eq} = equivalent average noise level

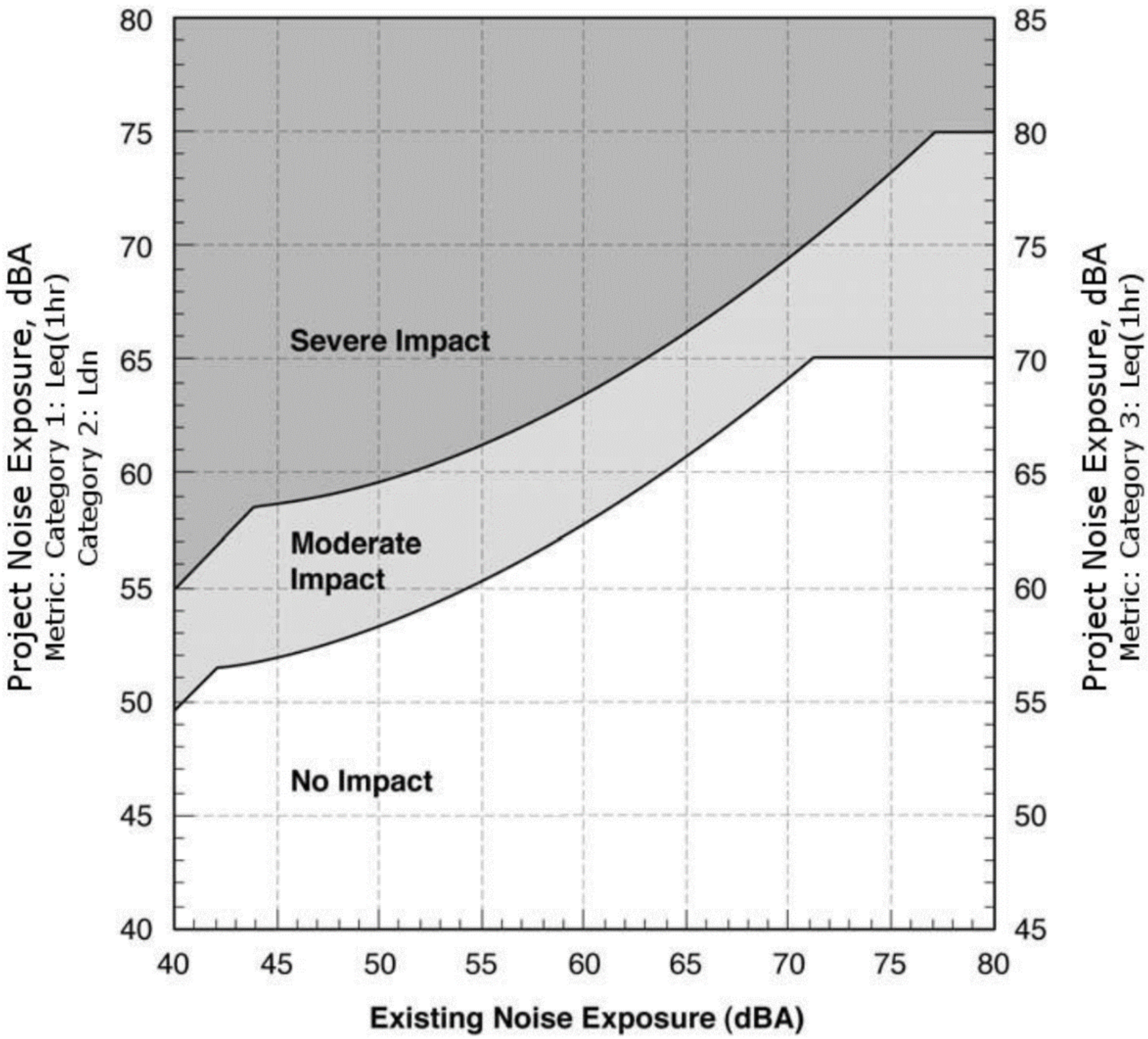
FTA has defined three levels of impacts for sensitive uses affected by transit projects: no impact, moderate impact, or severe impact. A description of each impact level is shown in Table 2-2 and illustrated on Figure 2-1.

Table 2-2. 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 the Federal Transit Administration, and mitigation is not required.
Moderate Impact	Project-generated noise in this range is considered to cause an impact at the threshold of measurable annoyance. Moderate impacts serve as alerts to project planners that potential adverse impacts and complaints from the community may occur. Mitigation should be considered at this level of impact depending 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 Federal Transit Administration's environmental impact regulations both encourage project sites that 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

Figure 2-1. Noise Impact Criteria for Transit Projects



Source: FTA, 2018

For mitigation of noise impacts, the following general approaches are employed:

- Severe: Noise mitigation will be specified for severe impact areas, unless there is no practical method of mitigating the noise.
- Moderate: 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 and/or 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 2-3. The first column shows the existing noise exposure and the remaining columns show the additional noise exposure caused by a transit project that would result in the two impact levels. As the existing noise exposure increases, the amount of allowable increase in noise exposure from the Build Alternatives decreases. For the purposes of this analysis, the FTA impact criteria was calculated for each cluster based on existing noise exposure using equations found within Table C-1 of the FTA *Transit Noise and Vibration Impact Assessment 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 2-3. Noise Impact Criteria for Transit Operations

Existing Noise Exposure, dBA L_{eq} (1 hr) or L_{dn}	Project Noise Impact Exposure, dBA					
	Category 1 (L_{eq} [1 hr]) or 2 (L_{dn}) Sites			Category 3 (L_{eq} [1 hr])		
	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	>65
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
74	<66	66-72	>72	<71	71-77	>77

Existing Noise Exposure, dBA L_{eq} (1 hr) or L_{dn}	Project Noise Impact Exposure, dBA					
	Category 1 (L_{eq} [1 hr]) or 2 (L_{dn}) Sites			Category 3 (L_{eq} [1 hr])		
	No Impact	Moderate Impact	Severe Impact	No Impact	Moderate Impact	Severe Impact
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

Construction noise is assessed using guidance provided in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018). FTA construction noise criteria are shown in Table 2-4.

Table 2-4. Federal Transit Administration Detailed Analysis Construction Noise Impact Criteria

Land Use	$L_{eq.equip\ (8\text{-}hr)}$ (dBA)	
	Day	Night
Residential	80	70
Commercial	85	85
Industrial	90	90

Source: FTA, 2018

$L_{eq.equip\ (8\text{-}hr)}$ = 8-hour equivalent noise level from construction equipment

2.1.1.2 Transit Vibration and Construction Vibration

FTA has developed impact criteria for acceptable levels of groundborne noise (GBN) and groundborne vibration (GBV). Table 2-5 summarizes the impact criteria and presents it in terms of acceptable indoor GBV and GBN levels. Impacts will occur if these levels are exceeded. Criteria for GBV are expressed in terms of root means square velocity levels in vibration decibel notation (VdB), and criteria for GBN are expressed in terms of A-weighted sound pressure levels in dBA. The FTA vibration impact criteria are based on the maximum indoor vibration level from a train passby. There are no impact criteria for outdoor spaces such as parks. The vibration criteria used in this technical report are based on the overall vibration velocity level for use in the General Vibration Impact Assessment in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018), which was used for this study.

Table 2-5. Groundborne Vibration and Groundborne Noise Impact Criteria for General Assessment

Land Use Category	GBV Impact Levels (VdB, 1 micro-inch per second)			GBN Impact Levels (dBA, 20 micro pascals)		
	Frequent Events[a]	Occasional Events[b]	Infrequent Events[c]	Frequent Events[a]	Occasional Events[b]	Infrequent Events[c]
Category 1: Buildings where vibration would interfere with interior operations[d]	65	65	65	NA	NA	NA
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

[a] "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.

[b]"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.

[c]"Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. Most commuter rail branch lines fall into this category.

[d]This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes.

GBN = groundborne noise
GBV = groundborne vibration
NA = not applicable
VdB = vibration decibels

Table 2-6 shows 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. As the Project may have more than 70 train passbys per day, the FTA criteria for frequent events is used to assess potential impact.

Table 2-6. Groundborne Vibration and Groundborne Noise Impact Criteria for Special Buildings

Type of Building or Room	GBV Impact Levels (VdB, 1 micro-inch per second)		GBN Impact Levels (dBA, 20 micro Pascals)	
	Frequent Events[a]	Occasional or Infrequent Events[b,c]	Frequent Events[a]	Occasional or Infrequent Events[b,c]
Concert Halls	65	65	25	25
Television Studios	65	65	25	25
Recording Studios	65	65	25	25
Auditoriums	72	80	30	38
Theaters	72	80	35	43

Source: FTA, 2018

[a]"Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.

[b]"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.

[c]"Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. Most commuter rail branch lines fall into this category.

Table 2-5 and Table 2-6 include the consideration of frequency of vibration events. If the combined frequency of existing and Project vibration events would change the Vibration Category, for example from occasional to frequent, the impact criteria for the higher frequency of events is applicable.

For at-grade or aerial transit systems, the GBN is not considered because the airborne noise from the train passby would result in higher noise levels at the interior of the receiver buildings. GBN is a 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 2-5 and Table 2-6 can be applied; however, short-term annoyance during construction is not a National Environmental Policy Act - significant impact. In most cases, the primary concern regarding construction vibration relates to potential damage effects. Table 2-7 provides the vibration damage criteria for various structural categories. A damage risk criterion of 0.2 inch per second (peak particle velocity [PPV]) is protective of all but the most fragile buildings. The limit of 0.12 PPV for fragile, historic structures is among the most restrictive limits used for vibration damage risk to buildings.

Table 2-7. Construction Vibration Damage Risk Criteria

Building Category	PPV (inches per 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

2.2 State

There are no State statutes related to noise criteria that would apply to the proposed Project. However, there are noise-related State codes that are included in Sections 2.2.1 and 2.2.2 for informational purposes.

2.2.1 California Public Utilities Commission

The California Public Utilities Commission (CPUC) has jurisdiction over the operation of passenger rail transit systems. CPUC regulations require the use of audible warning devices, including on-vehicle audible warnings and crossing bells, at all grade crossings that are protected by crossing gates. California Public Utilities Code Section 7604 states that "a bell, siren, horn, whistle or similar audible warning device should be sounded at any public crossing." CPUC General Order 75-D specifies that: "Bells or other audible warning devices shall be included in all automatic warning device assemblies and shall be operated in conjunction with the flashing light signals." The General Order does not specify a sound level for the bells and other audible warning devices.

CPUC has the final decision in designing grade crossings and implementing warning systems. Intersections with grade crossings must be designed to meet the CPUC regulations and the Federal Railroad Administration warning standards. CPUC considers each intersection during the final design process and works with the lead agency to install warning devices where necessary and wayside horns where appropriate.

The CPUC rules related to public crossings would not be applicable to the underground tunnel segments or aerial segments of the Project as neither include at-grade public crossings that would be subject to CPUC regulations.

2.2.2 California Government Code Section 65302(f)

California State Government Code Section 65302(f) mandates that noise elements be included as a part of county and city general plans and that counties and cities adopt comprehensive noise ordinances. At a minimum, the noise element should consider the following sources of noise:

- Highways and freeways
- Primary arterials and major local streets
- Passenger and freight on-line railroad operations and ground rapid transit systems

- Commercial, general aviation, heliport, helistop and military airport operations, aircraft overflights, jet engine test stands, and other ground facilities and maintenance functions related to airport operation
- Local industrial plants, including, but not limited to, railroad classification yards
- Other ground stationary noise sources identified by local agencies as contributing to the community noise environment

The noise element must assess current and future noise levels, establish standards for acceptable noise levels, and provide policies and regulations to control and reduce noise at noise sensitive uses.

2.3 Regional

The regulations of regional jurisdictions generally do not apply to transit noise, which is most appropriately assessed using guidance provided by the FTA. However, the regulations of regional jurisdictions are relevant with regard to project construction.

2.3.1 Los Angeles County

The *Los Angeles County General Plan 2035* provides the policy framework and establishes the long-range vision for how and where the unincorporated areas of the county will grow (LA County Planning, 2024). The Noise Element of the General Plan sets the goals and policy direction for the management of noise in the unincorporated areas. Los Angeles County's Noise Control Ordinance establishes standards to regulate intrusive noise in the county (Los Angeles County, 2024). Table 2-8 lists the applicable codes, goals, and policies designed to regulate noise.

Table 2-8. Los Angeles County – Relevant Noise and Vibration Codes, Goals, and Policies

Code/Goal/Policy	Description
Los Angeles County Noise Control Ordinance	
Section 12.08.390	**Exterior Noise Standards** • Noise Zone I, Noise Sensitive Area: 45 dB at any time of the day • Noise Zone II, Residential Properties: 45 dB from 10:00pm to 7:00am (nighttime) and 50 dB from 7:00am to 10:00pm (daytime) • Noise Zone III, Commercial Properties: 55 dB from 10:00pm to 7:00am (nighttime) and 70 dB from 7:00am to 10:00pm • Noise Zone IV, Industrial Properties: 70 dB at any time of the day
Section 12.08.400	**Interior Noise Standards** • Multi-family: 40 dB from 10:00pm to 7:00am • Residential 45 dB from 7:00am to 10:00pm
Section 12.08.440 (a)	Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work between weekday hours of 7:00pm and 7:00am, or at any time on Sundays or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real-property line, except for emergency work of public service utilities or by variance issued by the health officer is prohibited.

Code/Goal/Policy	Description
Section 12.08.440 (b)	**Noise Restrictions at Affected Structure** The contractor shall conduct construction activities in such a manner that the maximum noise levels at the affected buildings will not exceed those listed in the following schedule: **Maximum noise levels for short-term operation of mobile equipment (less than 10 days)** **7:00am to 8:00pm daily and all day Sundays and holidays** • Single-family residential 75 dBA • Multi-family residential 80 dBA • Semi-residential/commercial 85 dBA **8:00pm to 7:00am daily and all day Sundays and holidays** • Single-family residential 60 dBA • Multi-family residential 64 dBA • Semi-residential/commercial 70 dBA **At Business Structures daily, including Sunday and legal holidays, all hours** • 85 dBA **Maximum noise levels for long-term operation of stationary equipment (more than 10 days)** **7:00am to 8:00pm daily and all day Sundays and holidays** • Single-family residential 60 dBA • Multi-family residential 65 dBA • Semi-residential/commercial 70 dBA **8:00pm to 7:00am daily and all day Sundays and holidays** • Single-family residential 50 dBA • Multi-family residential 55 dBA • Semi-residential/commercial 60 dBA
Section 12.08.460	Loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans or similar objects between the hours of 10:00pm and 6:00am in such a manner as to cause noise disturbance is prohibited.
Section 12.08.560	Vibration. Operating or permitting the operation of any device that creates vibration, which is above the vibration perception threshold of any individual at or beyond the property boundary of the source if on private property, or at 150 feet (46 meters) from the source if on a public space or public right-of-way is prohibited. The perception threshold shall be a motion velocity of 0.01 inch per second over the range of 1 to 100 hertz.
12.08.570 (d) (1)	Exemption from exterior noise standards. The following activities are exclusively regulated by Part 4 of Chapter 12.08. • Construction
Los Angeles County General Plan 2035, Chapter 11: Noise Element	
Goal N 1	The reduction of excessive noise impacts.
Policy N 1.1	Utilize land uses to buffer noise-sensitive uses from sources of adverse noise impacts.
Policy N 1.3	Minimize impacts to noise-sensitive land uses by ensuring adequate site design, acoustical construction, and use of barriers, berms, or additional engineering controls through Best Available Technologies.
Policy N 1.7	Utilize traffic management and noise suppression techniques to minimize noise from traffic and transportation systems.
Policy N 1.8	Minimize noise impacts to pedestrians and transit-riders in the design of transportation facilities and mobility networks.

Code/Goal/Policy	Description
Policy N 1.9	Require construction of suitable noise attenuation barriers on noise sensitive uses that would be exposed to exterior noise levels of 65 dBA CNEL and above, when unavoidable impacts are identified.
Policy N 1.12	Decisions on land adjacent to transportation facilities, such as the airports, freeways, and other major highways, must consider both existing and future noise levels of these transportation facilities to assure the compatibility of proposed uses.

Source: Los Angeles County, 2024; LA County Planning, 2024

CNEL = community noise equivalent level
dB = decibel

2.4 Local

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

2.4.1 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 two documents designed to regulate noise within the City are Chapter XI, Noise Regulation, of the City of Los Angeles Municipal Code and the Noise Element of the City's General Plan (DCP, 1998). Codes and policies designed to regulate noise are shown in Table 2-9. It should be noted that not every policy would be directly applicable to the Project.

Table 2-9. City of Los Angeles – Relevant Noise and Vibration Codes and Policies

Code/Policy	Description
City of Los Angeles Municipal Code	
Section 41.40	Engaging in construction, repair, or excavation work with any construction type device or jobsite delivering of construction materials without a Police Commission approved variance would constitute a violation: • Between the hours of 9:00pm and 7:00am of the following day. • In any residential zone, or within 500 feet of land so occupied, before 8:00am or after 6:00pm 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 91.1206.14.2	Interior noise levels attributable to exterior sources shall not exceed 45 dB. in any habitable room. The noise metric shall be either the day-night average sound level (L_{dn}) or the CNEL, consistent with the noise element of the local general plan.

Code/Policy	Description
Section 112.04	Prohibits, except for emergency work, the use of powered equipment or powered hand tools within residential zones or within 500 feet of a residence during nighttime hours of 10:00pm to 7:00am.
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 between the hours of 7:00am and 10:00pm. 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.
City of Los Angeles General Plan Noise Element	
Policy 2.2	Enforce and/or implement applicable city, state and federal regulations intended to mitigate proposed noise producing activities, reduce intrusive noise and alleviate noise that is deemed a public nuisance.
P5	Continue to enforce, as applicable, city, state and federal regulations intended to abate or eliminate disturbances of the peace and other intrusive noise.
P10	Continue to encourage public transit and rail systems operating within the city's borders, but which are not within the jurisdiction of the city, to be constructed and operated in a manner that will assure compliance with the city's noise ordinance standards.
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 California Environmental Quality Act 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 California Environmental Quality Act 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.
P13	Continue to plan, design and construct or oversee construction of public projects, and projects on city owned properties, so as to minimize potential noise impacts on noise sensitive uses and to maintain or reduce existing ambient noise levels.
P16	Use, as appropriate, the "Guidelines for Noise Compatible Land Use" (Exhibit I),1 or other measures that are acceptable to the city, to guide land use and zoning reclassification, subdivision, conditional use and use variance determinations and environmental assessment considerations, especially relative to sensitive uses, as defined by this chapter, within a CNEL of 65 dB airport noise exposure areas and within a line-of-sight of freeways, major highways, railroads or truck haul routes.
P17	Continue to encourage the California Department of Transportation, the Los Angeles County Metropolitan Transportation Authority, or their successors, and other responsible agencies, to plan and construct transportation systems so as to reduce potential noise impacts on adjacent land uses, consistent with the standards and guidelines contained in the noise element.

Source: City of Los Angeles Municipal Code; DCP, 1998

2.4.2 City of Santa Monica

The City of Santa Monica is located within the Project Study Area. However, no sensitive receptors are located within the screening distance for noise or vibration. Chapter 4.12 of the Santa Monica Municipal Code has established exterior noise standards applicable to designated noise zones. The allowable exterior 15-minute L_{eq} for Noise Zone I, which includes residential properties, is 60 dBA between 7am and 10pm and 50 dBA between 10pm and 7am on weekdays. On Saturday and Sunday, 60 dBA 15-minute L_{eq} exterior noise limit is in effect between 8am and 10pm and the 50-dBA limit applies to the time period between 10pm and 8am. The City's exterior noise limits are increased by 5 dBA when noise duration is 5 minutes (i.e., 65 dBA daytime and 55 dBA nighttime).

Santa Monica Municipal Code also prohibits creation of any ground vibration that is perceptible without instruments at any point on any property. The Code defines the vibration perception threshold to be more than 0.05 inch per second root mean square velocity. The City exempts construction activities, moving vehicles, trains, and aircraft from its vibration limit.

3 METHODOLOGY

The project operation and construction noise and vibration impact analyses are based on the processes prescribed in the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018) to evaluate the Project for potential noise and vibration impacts under each of the five project alternatives. Where noise or vibration impacts are determined, measures necessary to mitigate adverse impacts are evaluated and considered for incorporation into the Project.

3.1 Operational Noise

The Project operational noise impact analysis follows the detailed noise analysis process in the FTA manual. As a first step in the project operational noise impact evaluation, land uses along each project alternative alignment were identified and categorized in terms of the three noise-sensitive categories defined by the FTA (Table 2-1). Screening distances outlined in the FTA manual were utilized for initial identification of land uses that may potentially be impacted by operations of each project alternative. The screening distances from each project alternative alignment were adjusted as needed based on the types of noise sources and operational features, such as vehicle speeds and frequency of operations. For the monorail alternatives, the noise screening distance was generally at 175 feet lateral distance from the tracks. For the aerial segments of heavy rail transit alternatives, a general screening distance of 300 feet was applied. In many instances where the first rows of noise-sensitive receptors are beyond the screening distances, such receptors were generally included in the analysis.

It should be noted that along the underground segments of proposed rail lines or their subterranean facilities, airborne surface noise would typically not be of concern. Therefore, only aboveground noise sources were evaluated throughout the Project Study Area. Groundborne noise (GBN) assessment is discussed under the vibration methodology.

After the noise-sensitive land uses were identified, short-term (two 1-hour measurements for each site) and 24-hour noise measurements were conducted at representative noise-sensitive receptors throughout the Project Study Area. Results of the existing noise measurements serve as the basis for determination of the Project operations noise impact criteria, as outlined in Chapter 2 of this report (Table 2-3).

Concurrent with noise-sensitive land use identification, Project-related noise sources were identified under each project alternative. Such sources include the specific types of vehicles used under the given project alternative, stationary sources such as aboveground traction power substation (TPSS) sites, maintenance and storage facilities (MSF), ventilation facilities, and transit stations and their associated parking facilities. Sound exposure level (SEL) from the specific vehicle type proposed for each project alternative and noise levels from stationary noise sources were utilized in the noise analysis.

Furthermore, information on special trackwork locations such as turnouts and crossovers was used to account for their effects of increased noise levels near such locations. Also, locations where rail curve radii may result in wheel squeal noise were identified and effects of such noise were included in the calculations. The following subsections outline the operational noise analysis methodology in further detail.

Lastly, public address (PA) systems will be installed at the stations to announce when trains are arriving at the stations and to provide other information to patrons. These systems will have automatic volume adjustment controls that are designed so the announcements are only a few decibels above ambient noise levels. With proper design of the PA systems and the automatic volume adjustment, the noise from the PA system would not generate any adverse effects in communities near the stations. Therefore, noise from the PA system is not included in the operational noise impact assessment.

Highway noise implications of the Project are deferred to the cumulative impacts discussion of the Project environmental document and addressed through ongoing studies related to future Interstate 405 improvements. Furthermore, the proposed project alternatives with aboveground tracks would result in slight changes in traffic lanes, turn lanes, and volumes in the vicinity of stations and locations where the Project would share the right-of-way with an existing street, such as Sepulveda Boulevard. In all cases, the minor changes in traffic volume or turn lanes would be insufficient to cause more than a 1 decibel change in traffic sound levels relative to existing conditions. Therefore, a detailed assessment of noise effects from traffic noise has not been performed as part of this study.

3.1.1 Train Noise

Noise exposure from train movements on the proposed Project rail tracks was evaluated using the detailed noise assessment procedure in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018). Rail operations noise levels at representative noise-sensitive receptors were estimated by using the reference SEL from six-car trains for Alternatives 1 and 3, three-car trains for Alternatives 4 and 5, and up to six cars (Metro fleet married pairs) for Alternative 6. Under Alternatives 1 and 3, the reference SEL used in the noise analysis for a six-car train traveling at a speed of 90 kilometers per hour or 56.3 miles per hour (mph) is 81.5 A-weighted decibel (dBA) at a reference distance of 50 feet from the track. The reference SEL for a three-car train traveling at 50 mph is 84.8 dBA at a distance of 50 feet under Alternatives 4 and 5. The reference SEL for a six-car train traveling at 50 mph would be 87.8 dBA at a distance of 50 feet for Alternative 6.

At each analyzed receptor location, train passby noise levels were computed by applying the reference noise levels for a single passby, adjusting for distances to the tracks and train speeds, and accounting for the total number of train passbys on each track. The 24-hour day-night noise level (L_{dn}) for Category 2 noise-sensitive receptors and the hourly equivalent noise level (L_{eq}) during peak headways for Category 3 noise-sensitive receptors were predicted based on anticipated rail operations volumes.

For Alternatives 4 and 5, the U-shaped structure atop the aerial guideway sections will act as a built-in soundwall for train noise from these project alternatives. Noise reductions due to the U-shaped aerial structures were accounted for at receivers along the segments where trains would operate on the viaduct structure.

Other factors accounted for in the noise model included the following:

- A noise increase factor of 5 dBA at receptors within 300 feet of rail crossover locations
- Noise barrier attenuations due to existing soundwalls along each project alignment, where applicable, calculated based on geometric relationship of source, barrier, and receivers
- A noise decrease factor of 5 dBA due to shielding afforded by first row of intervening buildings breaking the line-of-sight to the tracks, and a further 1.5-dBA attenuation due to each additional row of intervening buildings thereafter, where applicable
- A 4 dBA noise level increase factor to account for aerial structure on slab track (not applicable to monorail Alternatives 1 and 3); and
- A wheel squeal noise increase factor of 10 dBA at track locations with curve radii of less than 1,000 feet, where applicable.

At tunnel portals, sound reflections/reverberations from the tunnel siding may result in an increase in train noise levels at the portal opening. Such effects are not all-encompassing and would mainly affect receptors with a line of sight and in close proximity to the tunnel portal. Therefore, site geometry and receptor line-of-sight angles are factors in where portal noise effects may occur. For the proposed Project, airborne noise exposure at sensitive land uses near the portals have been analyzed consistent with the FTA methodology. Absorptive or textured tunnel lining maybe considered near the portal openings whereby the sound waves incident upon the tunnel lining would be absorbed or scattered resulting in minimization of reflected sound.

For assessment of train operations noise impacts, the calculated L_{dn} and L_{eq} were compared to the applicable FTA criteria (Table 2-3) determined based on the measured existing noise levels.

3.1.2 Wheel Squeal

Wheel squeal noise is generated by the slip-stick interaction of metal wheels and rails. It is not anticipated to be a factor under Alternative 1 and Alternative 3 operations, as the proposed vehicles for those alternatives will be rubber-tired vehicles moving along straddle-beams. As such, rubber-tired vehicles would not result in the slip-stick interaction that generates wheel squeal. Refer to Section 6.1.1.3 for further description of the monorail vehicles.

Wheel squeal is generally limited to curves with radii less than 1,000 feet. Under Alternatives 4 and 5 and Alternative 6, locations where wheel squeal noise would occur are limited. The only aboveground turn curve along the Alternative 4 aerial segment that would cause generation of wheel squeal is the curve at the northernmost point of Sepulveda Boulevard turning to the southeast to parallel the Los Angeles-San Diego-San Luis Obispo Corridor. Other wheel squeal locations are limited to the rail yard tracks within the proposed at-grade MSF under Alternatives 4 and 5 and Alternative 6.

For the Project noise impact assessment, it has been assumed that if wheel squeal occurs on a curve, the squeal noise will increase train noise by approximately 10 dBA per FTA guidance. For example, if the predicted L_{dn} from train operations is 50 dBA at a residence in the vicinity of a curve, if wheel squeal occurs on the curve the overall L_{dn} would be 60 dBA.

3.1.3 Ancillary Equipment Noise

Ancillary sources of noise associated with the Project include TPSS units and proposed ventilation facilities, where needed for underground segments. The ancillary equipment required is specific to each alternative alignment.

The primary noise sources on TPSS units are the transformer hum and noise from its cooling systems or ventilation fan. The cooling fans are the primary noise sources on the TPSS units used on other Metro projects. Metro specifications limit TPSS noise and ventilation fan noise to a maximum of 50 dBA at 50 feet from any side of the equipment (according to Metro Rail Design Criteria). Therefore, a noise level of 50 dBA at a distance of 50 feet was used to evaluate Project TPSS and ventilation facilities noise impacts.

The following formula has been used to predict TPSS and ventilation facility noise from the Project:

$$Lp = Lp_{ref} - 20xlog(\frac{D}{D_{ref}})$$

where:
D = Distance to receiver from the TPSS unit cooling fan or ventilation facility
D_{ref} = Reference distance from the TPSS unit cooling fan or ventilation facility (50 feet)

Lp = Level of TPSS or ventilation facility noise at receiver
Lp_{ref} = TPSS or ventilation facility sound level at reference distance (50 dBA)

3.1.4 Maintenance and Storage Facility Noise

Noise and vibration from the proposed MSF options associated with the project alternatives was predicted by inclusion of train movements on lead tracks, the car wash facility, the maintenance shop, and TPSS equipment within the MSF yard. Based on information in the Project Description for each alternative, the following assumptions, developed from data received from the project alternatives teams, were applied:

- Under Alternative 1, for both MSF Base Design and MSF Design Option 1, there would be 22 trains exiting the MSF (16 trains plus six spares for the morning peak). Of those, six trains would return to the MSF for interpeak, and six trains would be inserted back to operation for the evening peak. Since the assumption is that all trains will be stabled within the MSF, all 22 trains would have to enter the MSF (six after morning peak and 16 from the end of evening peak up to the end of operation).
- At the Electric Bus MSF under Alternative 1, electric bus fleet size would be a total of 14 buses (13 in operation plus one spare). Exiting/entering will be staggered throughout the day commensurate with the monorail trains operating windows and peak hour demand. It is assumed that half of the buses would be back to the depot for inter peak and back to the route for evening peak.
- Under Alternative 3, for both MSF Base Design and MSF Design Option 1, the peak fleet would be 18 trains and the interpeak would be 12 trains. This is a total of 24 trains exiting (six daytime and 18 nighttime) and 24 trains entering (12 daytime and 12 nighttime) the MSF yard per day.
- Under Alternatives 4 and 5, there would be 22 train movements (16 trains entering the MSF area and six trains exiting the MSF area) during the daytime hours (7am to 10pm); number of train movements during nighttime hours (10pm to 7am) would be 26 (eight trains entering the MSF area and 18 exiting the MSF area); and there would be some movements within the yard throughout the day (storage track to shop, shop to cleaning platform, etc.) estimated at 10 trains per day.
- Under Alternative 6, there would be 18 trains entering and exiting the MSF yard during daytime and 14 trains during nighttime. An average of 10 additional train movements have been assumed within the yard throughout the day.
- The FTA general assessment was used for predicting the GBV levels from train movements within the MSF.
- For all project alternatives, trains would travel up to 10 mph within the MSF yard. On tight curves, train speeds would be lower at approximately 5 mph.
- Wheel squeal noise would be generated on the curved tracks within the MSF under Alternatives 4, 5, and 6 if no mitigation is applied. For this, 10 dBA was added to train movements within the MSF.
- The car wash will be enclosed. If blowers are used to strip water off the vehicles, the blowers would be located inside the exit end of the car wash building. The noise at the car wash exterior is assumed to be 61 dBA L_{eq} at a distance of 50 feet from the building. This is based on measurements of the Green Line car wash conducted for the Metro E Line Expo project (Expo, 2009).
- The car wash would be used for 5 minutes per wash. The 5-minute duration is based on the wash cycle for a three-car Blue Line train (Expo, 2009).

- For a conservative (worst-case) assessment, it is assumed that all the operational trains under Alternatives 1, 3, and 6 may be washed on the same day and all the washes would occur during nighttime hours.
- For Alternatives 4 and 5, average number of car washes would be eight washes per day (one-third of the initial fleet) during daytime hours of 7am to 10pm.
- Noise sources associated with the car cleaning/inspection platform would include a vacuum system and an air compressor. Based on measurements of the Gold Line facility, the sound level at a distance of 50 feet from the facility is assumed to be 61 dBA (Expo, 2009). It is assumed that the car cleaning/inspection operations would be all during nighttime for a worst-case scenario.
- A blowdown facility is where a thorough cleaning of the undercarriage is completed for maintenance purposes, in a fully enclosed structure. For the purpose of this study, it has been assumed that noise from blowdowns would not be detectable outside the structure. Alternatives 1 and 3 would not require blowdowns. Under Alternatives 4, 5, and 6, blowdown operations would be no greater than approximately once a month per consist (i.e., multi-car train).
- TPSS noise level would be 50 dBA at 50 feet from the units (according to Metro Rail Design Criteria), and noise from TPSS units would persist throughout a 24-hour day.
- Noise from general maintenance activities inside the shop building would include use of hand tools, continuous intermittent operation of compressors and other mechanical equipment, and intermittent operation of equipment such as overhead cranes, vehicle lifts, and the wheel truer. The equipment would all be located inside the maintenance shop. Maintenance shop building will have doors on each bay to specifically address noise issues generated within the building. The predictions of the noise that would be emitted from the shop are based on measurements at the Green Line Yard (58 dBA at 50 feet from the building) (Expo, 2009). It is assumed that the noise coming from the shop will be continuous for 24 hours.

Based on the previously described assumptions, the noise level in terms of L_{dn} was calculated at nearest residential receptors in the vicinity of each potential MSF yard.

3.2 Operational Vibration

For the operations groundborne vibration (GBV) and GBN impact analyses, the FTA general vibration assessment is used to conservatively identify potential vibration impacts at the land use categories of interest along each project alternative alignment. Under this approach, buildings within vibration-sensitive land use categories are identified along each project alternative alignment, and pertinent GBV and GBN impact criteria are assigned to the identified land uses. For the vibration analyses, a lateral screening distance of 200 feet from underground tunnel or aerial guideway alignments was used for Category 2 and Category 3 land uses. The more sensitive Category 1 buildings were screened to a distance of 600 feet from the project alignment. Table 2-5 and Table 2-6 provide the applicable GBV and noise impact criteria.

GBV levels at the identified vibration-sensitive buildings are estimated by first selecting the appropriate base curve for ground surface vibration based on the transit mode of the project alternative being evaluated. Adjustments to the selected standard vibration curve are then applied based on factors such as vehicle speeds, distance to the tracks, and other adjustments based on project-specific features, including the following:

- A 5 vibration decibel (VdB) decrease in vibration levels at receptor locations behind transit station box structures
- A 10 VdB increase in vibration levels at buildings within a distance of 100 feet from track crossover points
- A 5 VdB increase in vibration levels at receptors between 100 to 200 feet of track crossovers
- A 5 VdB decrease in vibration levels at locations where resilient treatments, such as high resilience direct fixation rail fasteners, would be implemented
- A 10 VdB decrease in vibration levels from train movements on aerial structures

It should be added that since tracks on aerial structures typically experience a 10 VdB reduction in GBV levels, receptors in the vicinity of aerial guideways are generally not impacted by GBV. Similarly, GBN impacts at sensitive receptors in the vicinity of at-grade tracks or aerial guideways are not of concern as airborne noise tends to be the dominant source of transit noise at such locations. Therefore, GBV and noise are not likely to affect sensitive locations along the aerial segments of the Project.

For the proposed Project, continuous rail has been assumed at tunnel portal openings where trains transition from an aerial guideway to underground segment (or vice versa). Under this assumption, there would be no increase in GBV levels at portal openings relative to GBV levels along the underground segment.

Furthermore, path adjustment factors such as efficient ground propagation effects and receiver adjustment factors such as floor-to-floor attenuation or resonance amplification in a building were not included in the vibration analyses. In addition, since the type of intervening soil between the receptors and the proposed rail tunnel was not known at the time of vibration analyses, normal soil was assumed. Any significant impacts identified in areas with actual rock-based soil may be deemed to be less than significant impacts upon verification of actual soil information.

Evaluation of potential GBN impacts from the project is performed by converting the estimated GBV levels to GBN levels (as outlined in the FTA *Transit Noise and Vibration Impact Assessment Manual* [FTA, 2018]). GBN noise levels are estimated in dBA, meaning that site-specific conditions dictating the frequency range at which vibration levels would be prevalent are taken into account.

The standard vibration curves utilized under the FTA general vibration assessment represent upper ranges of vibration levels from well-maintained systems. Therefore, the use of these curves is inherently a conservative approach to identifying GBV and noise impacts. Vibration impacts developed through the use of this method therefore identifies locations where vibration impacts would be probable.

Detailed vibration assessment would be conducted during the Project final design at vibration-sensitive locations where the general vibration assessment has identified impacts. The detailed vibration assessment would require on-site vibration measurements at impacted locations to establish existing vibration levels and local point- or line-source transfer mobility and building outdoor-to-indoor vibration response, as needed. This method would estimate the vibration impacts more precisely according to site-specific characteristics and may result in a revised conclusion of no impacts or less costly mitigation measures than those initially determined through a general vibration assessment.

3.3 Construction Noise

Construction noise levels were estimated based on anticipated numbers and types of construction equipment to be utilized during each phase of project construction. Equipment noise levels from the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018) were used in the construction noise analysis. The FTA guidance manual includes noise levels for common pieces of construction equipment. For equipment noise levels not listed in the FTA guidance manual, noise levels from the Federal Highway Administration Roadway Construction Noise Model were used. Construction noise levels were assessed by applying the reference noise levels and utilization rates for each equipment type. Hourly L_{eq} noise levels for each phase of construction along the project alignment were estimated at a reference distance of 50 feet from construction activities and projected to the nearest noise-sensitive areas. The estimated construction noise levels were compared to the FTA detailed analysis 8-hour noise level from construction equipment (8-hour $L_{eq.equip}$) noise criteria to assess noise impacts.

3.4 Construction Vibration

Some project construction activities, such as pavement breaking, tunnel boring, and the use of heavy tracked vehicles (e.g., bulldozers), could result in perceptible levels of GBV in the vicinity of construction sites. A tunnel boring machine is slow moving and causes very little GBV and GBN to the surrounding area when operating at full tunnel depths. The approach used to estimate the vibration levels that would be generated during construction of the Project is as follows:

- Use the vibration source levels for construction equipment from the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018).
- Make the propagation adjustment according to the following formula:

$$PPV_{equip} = PPV_{ref} \times (\frac{25}{D})^{1.5}$$

- Where

PPV_{equip} = peak particle velocity in inch per second of the equipment adjusted for distance
PPV_{ref} = reference vibration level inch per second at 25 feet
D = distance from the equipment to the receiver

3.5 CEQA Thresholds of Significance

For the purposes of the Environmental Impact Report, impacts are considered significant if the Project would:

- 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 by the Federal Transit Administration.
- Result in generation of excessive groundborne vibration or groundborne noise levels.
- 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, result in exposing people residing or working in the project area to excessive noise levels.

4 FUTURE BACKGROUND PROJECTS

This section describes planned improvements to highway, transit, and regional rail facilities within the Project Study Area and the region that would occur whether or not the Project is constructed. These improvements are relevant to the analysis of the No Project Alternative and the project alternatives because they are part of the future regional transportation network within which the Project would be incorporated. These improvements would not be considered reasonably foreseeable consequences of not approving the Project as they would occur whether or not the Project is constructed.

The future background projects include all existing and under-construction highway and transit services and facilities, as well as the transit and highway projects scheduled to be operational by 2045 according to the *Measure R Expenditure Plan* (Metro, 2008), the *Measure M Expenditure Plan* (Metro, 2016), the Southern California Association of Governments (SCAG) *Connect SoCal, 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy* (2020-2045 RTP/SCS) (SCAG, 2020a, 2020b), and the Federal Transportation Improvement Program (FTIP), with the exception of the Sepulveda Transit Corridor Project (Project). The year 2045 was selected as the analysis year for the Project because it was the horizon year of SCAG's adopted RTP/SCS at the time Metro released the NOP for the Project.

4.1 Highway Improvements

The only major highway improvement in the Project Study Area included in the future background projects is the Interstate 405 (I-405) Sepulveda Pass ExpressLanes project (ExpressLanes project). This would include the ExpressLanes project as defined in the *2021 FTIP Technical Appendix, Volume II of III* (SCAG, 2021a), which is expected to provide for the addition of one travel lane in each direction on I-405 between U.S. Highway 101 (US-101) and Interstate 10 (I-10). Metro is currently studying several operational and physical configurations of the ExpressLanes project, which may also be used by commuter or rapid bus services, as are other ExpressLanes in Los Angeles County.

4.2 Transit Improvements

Table 4-1 lists the transit improvements that would be included in the future background projects. This list includes projects scheduled to be operational by 2045 as listed in the *Measure R and Measure M Expenditure Plans* (with the exception of the Project) as well as the Inglewood Transit Connector and LAX APM. In consultation with the Federal Transit Administration, Metro selected 2045 as the analysis year to provide consistency across studies for Measure M transit corridor projects. The Inglewood Transit Connector, a planned automated people mover (APM), which was added to the FTIP with *Consistency Amendment #21-05* in 2021, would also be included in the future background projects (SCAG, 2021b). These projects would also include the Los Angeles International Airport (LAX) APM, currently under construction by Los Angeles World Airports. The APM will extend from a new Consolidated Rent-A-Car Center to the Central Terminal Area of LAX and will include four intermediate stations. In addition, the new Airport Metro Connector Transit Station at Aviation Boulevard and 96th Street will also serve as a direct connection from the Metro K Line and Metro C Line to LAX by connecting with one of the APM stations.

During peak hours, heavy rail transit (HRT) services would generally operate at 4-minute headways (i.e., the time interval between trains traveling in the same direction), and light rail transit (LRT) services would operate at 5- to 6-minute headways. During off-peak hours, HRT services would generally operate at 8-minute headways and LRT services at 10- to 12-minute headways. Bus rapid transit (BRT) services would generally operate at peak headways between 5 and 10 minutes and off-peak headways between

10 and 14 minutes. The Inglewood Transit Connector would operate at a headway of 6 minutes, with more frequent service during major events. The LAX APM would operate at 2-minute headways during peak and off-peak periods.

Table 4-1. Fixed Guideway Transit System in 2045

Transit Line	Mode	Alignment Description[a]
Metro A Line	LRT	Claremont to downtown Long Beach via downtown Los Angeles
Metro B Line	HRT	Union Station to North Hollywood Station
Metro C Line	LRT	Norwalk to Torrance
Metro D Line	HRT	Union Station to Westwood/VA Hospital Station
Metro E Line	LRT	Downtown Santa Monica Station to Lambert Station (Whittier) via downtown Los Angeles
Metro G Line	BRT	Pasadena to Chatsworth[b]
Metro K Line	LRT	Norwalk to Expo/Crenshaw Station
East San Fernando Valley Light Rail Transit Line	LRT	Metrolink Sylmar/San Fernando Station to Metro G Line Van Nuys Station
Southeast Gateway Line	LRT	Union Station to Artesia
North San Fernando Valley Bus Rapid Transit Network Improvements	BRT	North Hollywood to Chatsworth[c]
Vermont Transit Corridor	BRT	Hollywood Boulevard to 120th Street
Inglewood Transit Connector	APM	Market Street/Florence Avenue to Prairie Avenue/Hardy Street
Los Angeles International Airport APM	APM	Aviation Boulevard/96th Street to LAX Central Terminal Area

Source: HTA, 2024

[a]Alignment descriptions reflect the project definition as of the date of the Project's Notice of Preparation (Metro, 2021).

[b]As defined in Metro Board actions of July 2018 and May 2021, the Metro G Line will have an eastern terminus near Pasadena City College and will include aerial stations at Sepulveda Boulevard and Van Nuys Boulevard.

[c]The North San Fernando Valley network improvements are assumed to be as approved by the Metro Board in December 2022.

4.3 Regional Rail Projects

The future background projects would include the Southern California Optimized Rail Expansion (SCORE) program, which is Metrolink's Capital Improvement Program that will upgrade the regional rail system (including grade crossings, stations, and signals) and add tracks as necessary to be ready in time for the 2028 Olympic and Paralympic Games. The SCORE program will also help Metrolink to move toward a zero emissions future. The following SCORE projects planned at Chatsworth and Burbank Stations will upgrade station facilities and allow 30-minute all-day service in each direction by 2045 on the Metrolink Ventura County Line:

1. Chatsworth Station: This SCORE project will include replacing an at-grade crossing and adding a new pedestrian bridge and several track improvements to enable more frequent and reliable service.
2. Burbank Station: This SCORE project will include replacing tracks, adding a new pedestrian crossing, and realigning tracks to achieve more frequency, efficiency, and shorter headways.

In addition, the Link Union Station project will provide improvements to Los Angeles Union Station that will transform the operations of the station by allowing trains to arrive and depart in both directions, rather than having to reverse direction to depart the station. Link Union Station will also prepare Union Station for the arrival of California High-Speed Rail, which will connect Union Station to other regional multimodal transportation hubs such as Hollywood Burbank Airport and the Anaheim Regional Transportation Intermodal Center.

5 NO PROJECT ALTERNATIVE

The only reasonably foreseeable transportation project under the No Project Alternative would be improvements to Metro Line 761, which would continue to serve as the primary transit option through the Sepulveda Pass with peak-period headways of 10 minutes in the peak direction and 15 minutes in the other direction. Metro Line 761 would operate between the Metro E Line Expo/Sepulveda Station and the Metro G Line Van Nuys Station, in coordination with the opening of the East San Fernando Valley Light Rail Transit Line, rather than to its current northern terminus at the Sylmar Metrolink Station.

5.1 Existing Conditions

5.1.1 Noise

The existing noise environment in the Project Study Area is dominated by traffic noise, including freeways such as I-405, I-10, and US-101, and arterial roads, including Sepulveda Boulevard, Santa Monica Boulevard, Wilshire Boulevard, and others. Aircraft flyovers are also contributors to the existing noise environment in most areas along the Project alignments. Existing transit lines also contribute to the existing noise environment. Land uses found along the alignment include:

- Single- and multi-family residential uses
- Lodging facilities
- Educational facilities
- Religious facilities
- Public facilities
- Public and commercial office buildings
- Various types of commercial uses
- Institutional uses
- Surface parking facilities
- Parking structures

There are also a number of Category 1 buildings, including recording studios, medical facilities, and laboratories in the Project Study Area.

The existing noise conditions along the project alternative alignments were documented through noise monitoring performed at representative noise-sensitive locations along the proposed alignments. This section provides a summary of the noise measurement results.

Representative noise-sensitive locations were identified by using preliminary alignment maps, aerial photographs, visual surveys, and proximity to aboveground noise sources associated with each of the project alternatives. Long-term (24-hour) noise measurements were conducted at a total of 48 locations representing Category 2 land uses. Short-term noise measurements (two one-hour measurements for each site) were obtained at 21 locations representing exterior areas of Category 3 land uses. Figure 5-1 and Figure 5-2 show the locations of 24-hour noise monitoring sites in the Project Study Area. Refer to Attachment 1 and Attachment 2 of this report for detailed results of 24-hour and short-term measurements, respectively. The appendix material also depicts photographic exhibits of the measurement locations.

Table 5-1 presents a summary of long-term (24-hour) noise measurements taken at Category 2 locations that are representative of the residential and lodging land uses and hospitals along the project alignments. The noise monitors were programmed to continuously collect data for a minimum of 24 hours. The microphones were generally placed on tripods approximately five feet above the ground at locations near the setbacks of habitable buildings within the Project Study Area.

Table 5-1. Summary of Existing 24-hour Noise Measurements for Category 2 Land Uses

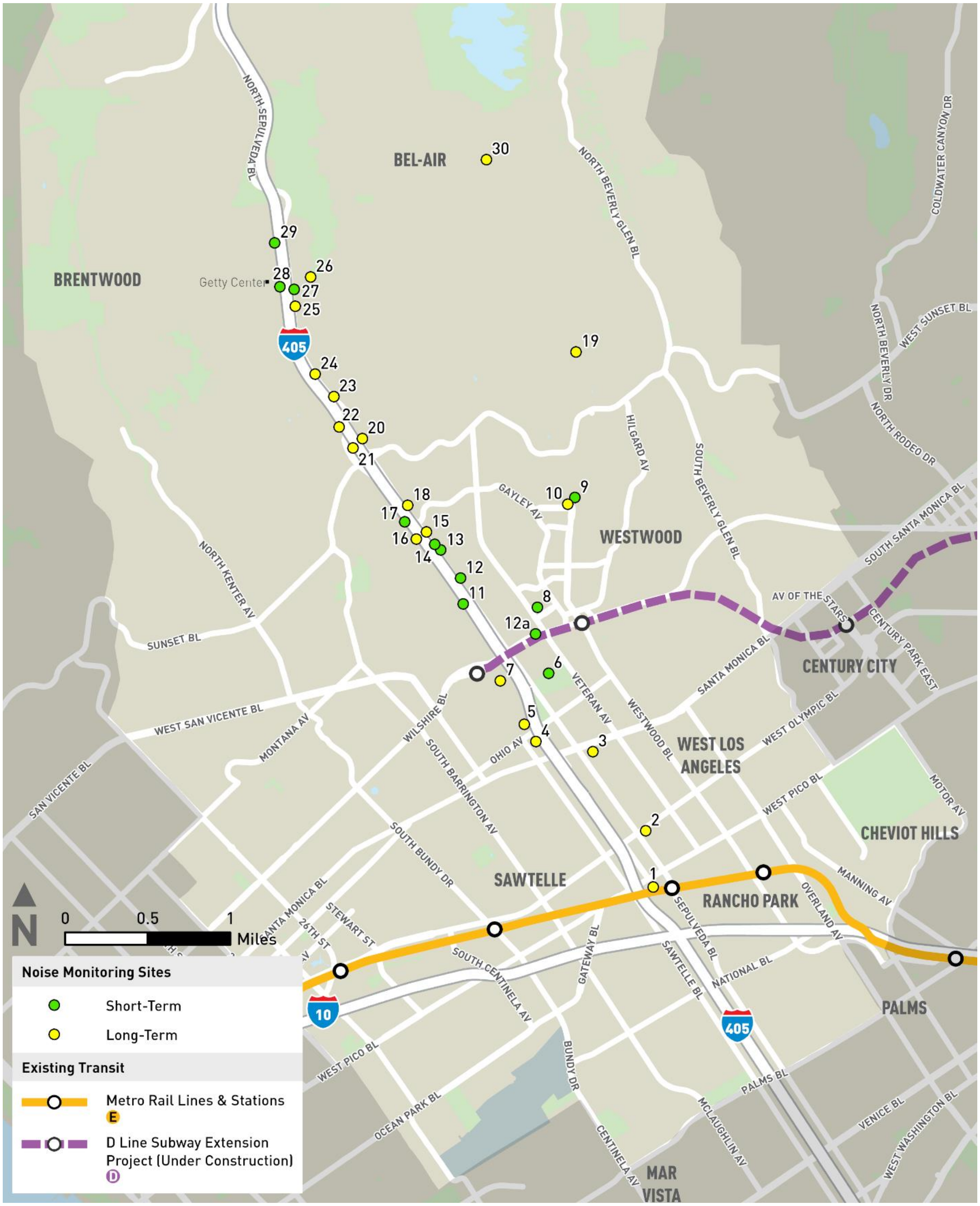
Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{dn} (dBA)
			Date	Time	
1	2435 S. Sepulveda Boulevard	I-405 traffic	6/28/2023	11:00am	73.9
2	2203 S. Bentley Avenue	Local traffic	7/5/2023	10:00am	65.9
3	1726 S. Bentley Avenue	Local traffic	7/12/2023	10:00am	62.0
4	1521 Beloit Avenue	I-405 and Santa Monica Boulevard	7/12/2023	10:00am	66.7
5	Greater LA Fisher House	I-405 traffic	7/25/2023	10:00am	69.5
7	West LA VA Medical Center	I-405 traffic	7/25/2023	9:00am	67.3
10	UCLA Luskin Conference Center	Local traffic	5/25/2023	3:00pm	62.2
15	426 S. Sepulveda Boulevard	I-405 and Sepulveda Boulevard	6/6/2023	11:00am	71.0
16	11330 Denair Street	I-405 traffic	6/7/2023	3:00pm	75.9
18	353 Dalkeith Avenue	I-405, Sepulveda Boulevard	6/7/2023	11:00am	72.0
19	10615 Bellagio Road	Bellagio Road	6/2/2023	12:00pm	63.4
20	11420 Thurston Circle	I-405, Sepulveda Boulevard	6/27/2023	10:00am	73.1
21	Hotel Bellagio 170 N. Church Lane	I-405 traffic	6/8/2023	12:00pm	87.0
23	11720 Bellagio Road	I-405, Sepulveda Boulevard	6/21/2023	11:00am	71.3
24	11812 Bellagio Road	I-405, Sepulveda Boulevard	6/6/2023	11:00am	70.5
25	Leonard I. Beeman Early Childhood Center	I-405, Sepulveda Boulevard	6/14/2023	12:00pm	71.7
26	1399 Casiano Road	I-405 traffic	5/17/2023	3:00pm	76.0
30	10635 Levico Way	Distant aircraft	6/6/2023	1:00pm	55.4
31	2607 Basil Lane	Distant aircraft	6/7/2023	12:00pm	47.4
32	2341 Donella Circle	Roscomare Road	6/6/2023	2:00pm	63.4
37	3490 Vista Haven Road	Distant aircraft, local traffic	5/30/2023	4:00pm	54.3
38	15460 Briarwood Drive	I-405 traffic	6/20/2023	9:00am	74.1
39	15515 Woodcrest Drive	I-405 traffic	5/30/2023	1:00pm	63.3
41	15371 Del Gado Drive	I-405 traffic	6/29/2023	10:00am	72.5
42	15350 Sutton Street	I-405 traffic	6/8/2023	9:00am	72.4
43	4440 Sepulveda Boulevard	I-405, Sepulveda Boulevard	3/25/2024	12:00pm	76.5
44	4800 Sepulveda Boulevard	Sepulveda Boulevard	5/30/2023	11:00am	65.8
45	15233½ Valleyheart Drive	Sepulveda Boulevard	7/25/2023	7:00am	63.7
47	14520 Magnolia Boulevard	Van Nuys Boulevard, Shell car wash	4/3/2024	7:00am	64.0
48	15231 Magnolia Boulevard	Sepulveda Boulevard	7/13/2023	12:00pm	66.9
49	5329 Sepulveda Boulevard	Sepulveda Boulevard	6/15/2023	8:00am	67.7
50	15353 Weddington Street	I-405 traffic	7/18/2023	9:00am	67.2
51	5450 Sepulveda Boulevard	Sepulveda Boulevard	6/13/2023	12:00pm	69.9

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{dn} (dBA)
			Date	Time	
52	6200 Blucher Avenue	I-405, G-Line, local traffic	3/25/2024	1:00pm	62.9
53	6201 Blucher Avenue	I-405, G-Line, local traffic	3/25/2024	1:00pm	62.9
55	6224 Peach Avenue	Sepulveda Boulevard	5/24/2023	2:00pm	57.3
56	6561 Sepulveda Boulevard	Sepulveda Boulevard	6/15/2023	8:00am	66.5
57	6546 Aqueduct Avenue	I-405 traffic	5/24/2023	12:00pm	69.1
58	14419 Vanowen Street	Sepulveda Boulevard, Vanowen Street	3/25/2024	2:00pm	59.6
59	6920 Sepulveda Boulevard	Sepulveda Boulevard	6/13/2023	11:00am	65.6
60	6841 Firmament Avenue	I-405 traffic	6/6/2023	9:00am	65.3
61	13917 Cohasset Street	LOSSAN Corridor, distant traffic	6/13/2023	10:00am	52.8
62	7467 Sylmar Avenue	Van Nuys Boulevard	6/14/2023	9:00am	55.1
63	15235 Wyandotte Street	Sepulveda Boulevard	7/18/2023	9:00am	60.0
64	15550 Wyandotte Street	I-405 traffic	5/30/203	11:00am	66.5
65	15559 Covello Street	I-405 traffic	6/27/2023	9:00am	66.7
66	15018 Marson Street	LOSSAN Corridor	5/24/2023	11:00am	60.5
67	7824 Zombar Avenue	Local traffic, distant aircraft	6/20/2023	9:00am	58.0

Source: HTA, 2024

dBA = A-weighted decibel
L_{dn} = day-night noise level

Figure 5-1. Noise Monitoring Sites – Project Study Area - South



Source: HTA, 2024

Figure 5-2. Noise Monitoring Sites – Project Study Area - North

Source: HTA, 2024

Short-term noise measurements for two one-hour periods at each site were also taken at Category 1 and Category 3 (institutional) land uses, including schools, religious facilities, museums, and amphitheaters, in the Project Study Area. The microphones were generally placed on tripods approximately five feet above the ground at locations near the setbacks of buildings. The general locations of the short-term measurement sites are shown on Figure 5-1 and Figure 5-2. Table 5-2 summarizes the results of each individual short-term measurement. The details of short-term measurements are included in Attachment 2 of this report.

Table 5-2. Summary of Existing Short-Term (1-Hour) Noise Measurements at Category 1 and Category 3 Land Uses

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{eq} (dBA)
			Date	Time	
6	Westwood Park, north of soccer field on lawn near parking lot	I-405 traffic, local traffic	4/12/2023	9:17am	54.2
			4/13/2023	10:23am	59.0
8	UCLA Williams Institute, southwest corner of building	Local traffic, fire station activities	5/26/2023	9:29am	63.9
			5/30/2023	1:41pm	61.3
9	UCLA Computer Science/ Engineering IV building	Local traffic, students' chatter	5/25/2023	1:04pm	57.9
			5/26/2023	3:36pm	58.8
11	LA National Cemetery Columbarium, near east wall	I-405 traffic	7/25/2023	1:21pm	59.7
			7/26/2023	9:26am	62.7
12a	LA National Cemetery north of Wilshire Boulevard	Wilshire Boulevard and I-405 traffic	7/25/2023	11:48am	65.4
			7/26/2023	10:48am	65.0
12	LA National Cemetery east of I-405, no freeway soundwall	I-405 and Sepulveda traffic	7/25/2023	10:10am	72.4
			7/26/2023	12:04pm	71.8
13	LA National Cemetery east of I-405, with freeway soundwall	I-405 and Sepulveda traffic	7/25/2023	10:10am	67.3
			7/26/2023	12:04pm	67.0
14	LA National Cemetery north fence, with freeway soundwall	I-405 and Sepulveda traffic	4/12/2023	11:55am	69.0
			4/13/2023	9:03am	69.5
17	Village Church, 343 S. Church Lane sidewalk next to front lawn	I-405 traffic	4/12/2023	1:32pm	63.6
			4/13/2023	8:55am	65.5
22	Getty South Building, near buildings setback west of I-405	I-405 traffic	5/17/2023	3:00pm	74.3
			5/18/2023	7:00am	78.0
27	Leo Baeck Temple, west of building, facing I-405	I-405 traffic, Sepulveda Boulevard	6/14/2023	12:19pm	67.1
			6/15/2023	10:40am	67.4
28	The Getty Tram Station, in lawn area north of the Station	I-405 traffic	5/17/2023	11:54am	59.4
			5/18/2023	11:25am	60.9
29	Future Oak parking lot at The Getty, in currently unpaved lot	I-405 traffic	5/17/2023	11:54am	66.9
			5/18/2023	11:25am	68.2
33	Skirball Cultural Center, Ziegler Amphitheater, east façade	I-405 traffic, Sepulveda Boulevard	5/17/2023	7:53am	60.9
			5/18/2023	7:45am	61.7
34	Skirball Cultural Center, Ziegler Amphitheater, at bleachers	I-405 traffic, Sepulveda Boulevard	5/17/2023	7:53am	56.6
			5/18/2023	7:45am	57.1
35	Milken Community School, first floor facing I-405	I-405 traffic, student chatter	5/17/2023	9:40am	70.9
			5/18/2023	9:20am	72.2
36	Milken Community School, second floor facing I-405	I-405 traffic, student chatter	5/17/2023	9:40am	70.6
			5/18/2023	9:20am	71.3

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{eq} (dBA)
			Date	Time	
40	15347 Del Gado Drive, at south end of vacant lot[a]	I-405 traffic	6/30/2023	8:42am	57.8
46	Ivy Bound Academy, basketball courts near US-101 to I-405 ramp	I-405 mainline and ramp traffic	5/25/2023	7:10am	67.9
			5/26/2023	6:57am	68.8
54	Contractors State License School, 6222 Sepulveda Boulevard	Sepulveda Boulevard traffic	4/13/2023	1:07pm	73.6
			5/11/2023	11:36am	72.4
68	La Iglesia de Jesucristo de los Santos de los Últimos Días	I-405 traffic, distant aircraft	4/13/2023	1:27pm	62.5
			5/11/2023	10:17am	64.5

Source: HTA, 2024

[a]This short-term measurement location was used to estimate noise levels at residential locations farther east of I-405 than the 24-hour site located at 15371 Del Gado Drive.

dBA = A-weighted decibel
L_{eq} = equivalent noise level

5.1.2 Vibration

The Project is located in an urban environment. Primary existing sources of GBV include trucks traveling along roadways, construction sites using heavy equipment, and existing transit lines. According to the Federal Transit Administration (FTA) guidance, the background vibration decibel (VdB) levels are expected to range from 50 to 65. Ambient vibration levels were not measured during this stage of the Project. However, measurement of vibration levels is not necessary to complete the general assessment procedure for vibration analysis. The FTA vibration impact assessment is based on FTA vibration impact criteria. These criteria were used to identify vibration-sensitive receivers within the Project Study Area based on existing land use activities.

5.2 Impact Evaluation

5.2.1 Impact NOI-1: Would the project cause generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established by the Federal Transit Administration?

5.2.1.1 Operational Impacts

Under the No Project Alternative, existing noise sources such as freeways, including I-405, I-10, and US-101, and arterial roads, including Sepulveda Boulevard, Santa Monica Boulevard, Wilshire Boulevard, and aircraft flyovers would remain the dominant noise sources in the Project Study Area. The only reasonably foreseeable transit improvement within the Project Study Area would be rerouting Metro Line 761 to serve the Van Nuys Metrolink Station and the Metro E Line Expo/Sepulveda Station. Metro Line 761 is an existing bus route that already operates along Sepulveda Boulevard and Van Nuys Boulevard. Routing buses to the Van Nuys Metrolink Station and the Metro E Line Expo/Sepulveda Station would result in no change to the ambient noise levels. Noise standards would not be exceeded under the conditions previously described. Therefore, the No Project Alternative would result in a less than significant impact related to operational noise.

5.2.1.2 Construction Impacts

Under the No Project Alternative, the proposed Project would not be constructed. The only reasonably foreseeable transit improvement within the Project Study Area would be rerouting Metro Line 761 to serve the Van Nuys Metrolink Station and the Metro E Line Expo/Sepulveda Station. Construction activities associated with rerouting Metro Line 761 would be limited to installation of bus stop infrastructure such as signs and street furniture. These activities would not require substantial heavy equipment or other particularly noisy equipment. It is not anticipated that construction noise impacts would occur and noise standards would not be exceeded under the conditions previously described. Therefore, the No Project Alternative would result in a less than significant impact related to construction noise.

5.2.2 Impact NOI-2: Would the project cause generation of excessive groundborne vibration or groundborne noise levels?

5.2.2.1 Operational Impacts

Under the No Project Alternative, the proposed Project would not be constructed. Metro Line 761 is an existing bus route that would be rerouted that is an existing source of GBV. Rubber tires and suspension systems of buses provide vibration isolation which makes it unusual for buses to cause GBV or GBN outside the roadway right-of-way. It is not anticipated that rerouting Metro Line 761 would have any effect on vibration level experienced by nearby land uses. No project-related operational vibration impacts would occur under the conditions previously described. Therefore, the No Project Alternative would result in a less than significant impact related to operational vibration.

5.2.2.2 Construction Impacts

Under the No Project Alternative, the proposed Project would not be constructed. Construction activities associated with rerouting Metro Line 761 would be limited to installation of bus stop infrastructure such as signs and street furniture. These activities would not require substantial heavy equipment that would generate excessive vibration. No project-related construction vibration impacts would occur under the conditions previously described. Therefore, the No Project Alternative would result in a less than significant impact related to construction vibration.

5.2.3 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 2 miles of a public airport or public use airport, would the project expose people residing or working in the Project Study Area to excessive noise levels?

5.2.3.1 Operational Impacts

The No Project Alternative would not construct any uses that would be exposed to excessive noise levels related to private airstrips or airports. No Impact would occur.

5.2.3.2 Construction Impacts

The No Project Alternative would not construct any uses that would be exposed to excessive noise levels related to private airstrips or airports. No Impact would occur.

5.3 Mitigation Measures

5.3.1 Operational

No mitigation measures are required.

5.3.2 Construction

No mitigation measures are required.

5.3.3 Impacts After Mitigation

No mitigation measures are required; impacts are less than significant.

6 ALTERNATIVE 1

6.1 Alternative Description

Alternative 1 is an entirely aerial monorail alignment that would run along the Interstate 405 (I-405) corridor and would include eight aerial monorail transit (MRT) stations and a new electric bus route from the Los Angeles County Metropolitan Transportation Authority's (Metro) D Line Westwood/VA Hospital Station to the University of California, Los Angeles (UCLA) Gateway Plaza via Wilshire Boulevard and Westwood Boulevard. This alternative would provide transfers to five high-frequency fixed guideway transit and commuter rail lines, including the Metro E, Metro D, and Metro G Lines, the East San Fernando Valley Light Rail Transit Line, and the Metrolink Ventura County Line. The length of the alignment between the terminus stations would be approximately 15.1 miles. The length of the bus route would be 1.5 miles.

The eight aerial MRT stations and three bus stops would be as follows:

1. Metro E Line Expo/Sepulveda Station (aerial)
2. Santa Monica Boulevard Station (aerial)
3. Wilshire Boulevard/Metro D Line Station (aerial)
    a. Wilshire Boulevard/VA Medical Center bus stop
    b. Westwood Village bus stop
    c. UCLA Gateway Plaza bus stop
4. Getty Center Station (aerial)
5. Ventura Boulevard/Sepulveda Boulevard Station (aerial)
6. Metro G Line Sepulveda Station (aerial)
7. Sherman Way Station (aerial)
8. Van Nuys Metrolink Station (aerial)

6.1.1 Operating Characteristics

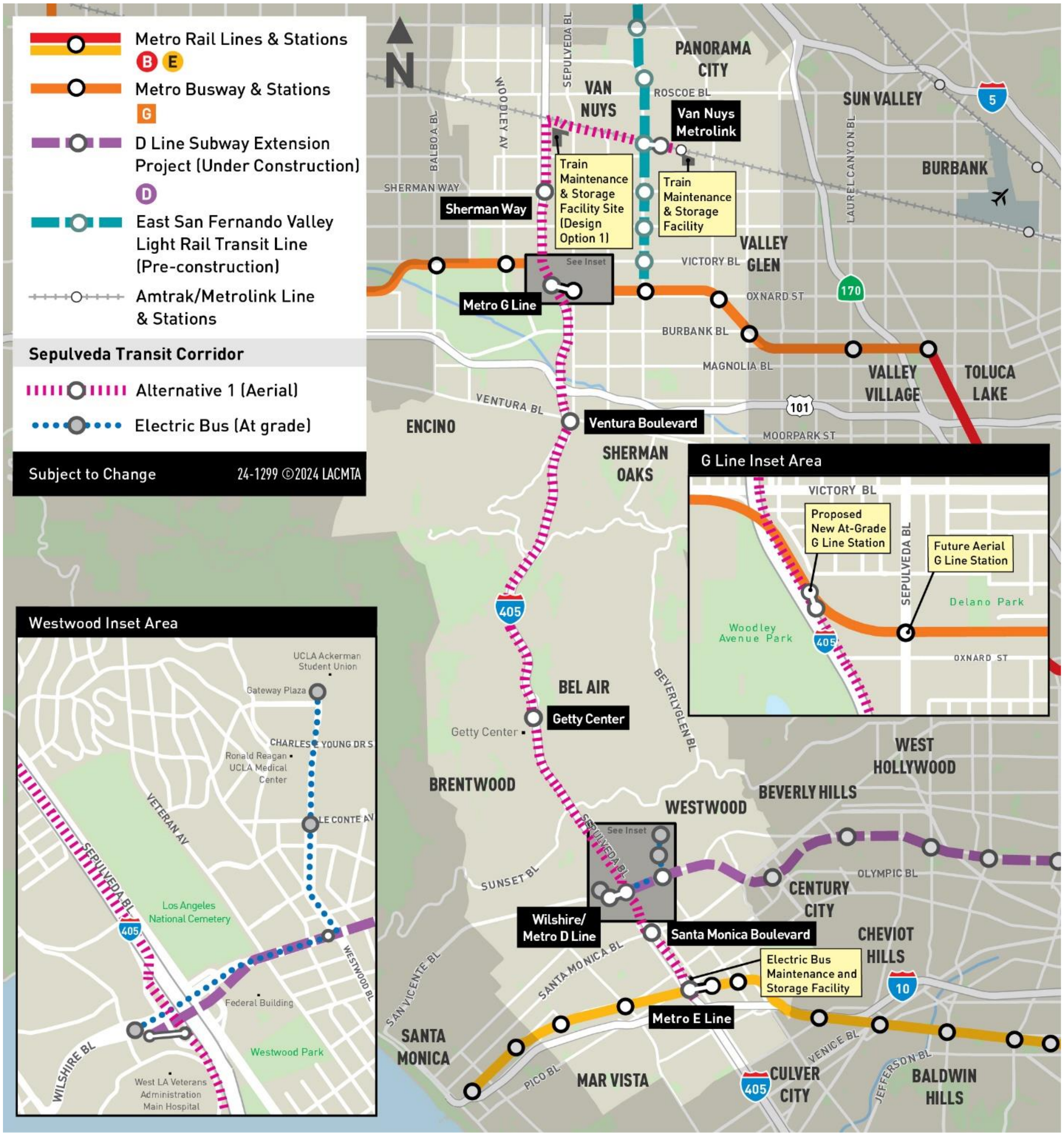
6.1.1.1 Alignment

As shown on Figure 6-1, from its southern terminus at the Metro E Line Expo/Sepulveda Station, the alignment of Alternative 1 would generally follow I-405 to the Los Angeles-San Diego-San Luis Obispo (LOSSAN) rail corridor near the alignment's northern terminus at the Van Nuys Metrolink Station. At several points, the alignment would transition from one side of the freeway to the other or to the median. North of U.S. Highway 101 (US-101), the alignment would be on the east side of the I-405 right-of-way and would then curve eastward along the south side of the LOSSAN rail corridor to Van Nuys Boulevard.

The proposed southern terminus station would be located west of the existing Metro E Line Expo/Sepulveda Station and east of I-405 between Pico Boulevard and Exposition Boulevard. Tail tracks would extend just south of the station adjacent to the eastbound Interstate 10 to northbound I-405 connector over Exposition Boulevard. North of the Metro E Line Expo/Sepulveda Station, a storage track would be located off the main alignment north of Pico Boulevard between I-405 and Cotner Avenue. The alignment would continue north along the east side of I-405 until just south of Santa Monica Boulevard, where a proposed station would be located between the I-405 northbound travel lanes and Cotner Avenue. The alignment would cross over the northbound and southbound freeway lanes north of Santa Monica Boulevard and travel along the west side of I-405, before reaching a proposed station within the

I-405 southbound-to-eastbound loop off-ramp to Wilshire Boulevard, near the Metro D Line Westwood/VA Hospital Station.

Figure 6-1. Alternative 1: Alignment



Source: LASRE, 2024; HTA, 2024

An electric bus would serve as a shuttle between the Wilshire Boulevard/Metro D Line Station and UCLA Gateway Plaza. From the Wilshire Boulevard/Metro D Line Station, the bus would travel east on Wilshire Boulevard and turn north on Westwood Boulevard to UCLA Gateway Plaza and make an intermediate stop in Westwood Village near the intersection of Le Conte Avenue and Westwood Boulevard.

North of Wilshire Boulevard, the monorail alignment would transition over the southbound I-405 freeway lanes to the freeway median, where it would continue north over the Sunset Boulevard overcrossing. The alignment would remain in the median to Getty Center Drive, where it would cross over the southbound freeway lanes to the west side of I-405, just north of the Getty Center Drive undercrossing, to the proposed Getty Center Station located north of the Getty Center tram station. The alignment would return to the median for a short distance before curving back to the west side of I-405, south of the Sepulveda Boulevard undercrossing north of the Getty Center Drive interchange. After crossing over Bel Air Crest Road and Skirball Center Drive, the alignment would return to the median and run under the Mulholland Drive Bridge, then continue north within the I-405 median to descend into the San Fernando Valley (Valley).

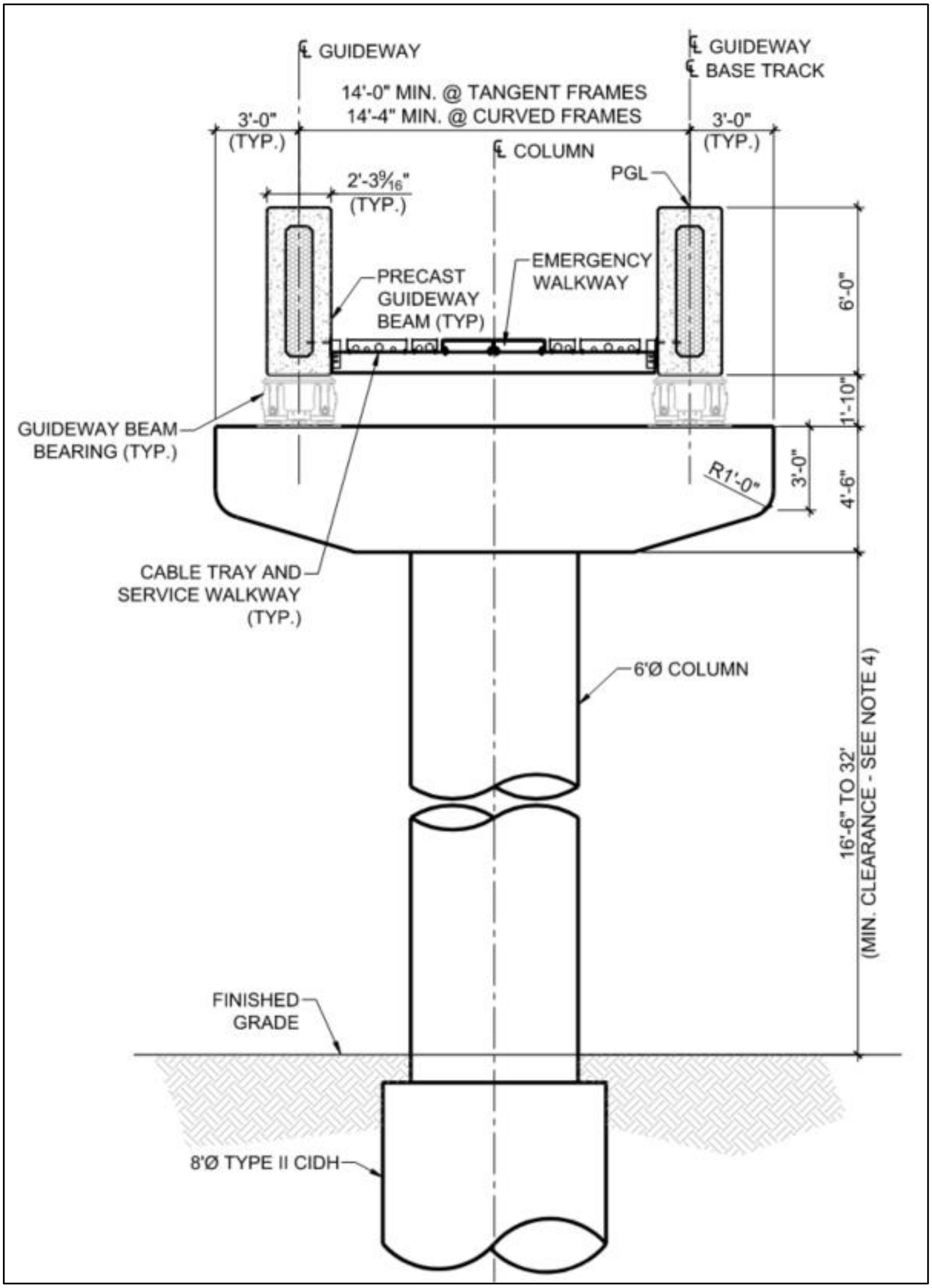
Near Greenleaf Street, the alignment would cross over the northbound freeway lanes and northbound on-ramps toward the proposed Ventura Boulevard Station on the east side of I-405. This station would be located above a transit plaza and would replace an existing segment of Dickens Street adjacent to I-405, just south of Ventura Boulevard. Immediately north of the Ventura Boulevard Station, the alignment would cross over northbound I-405 to the US-101 connector and continue north between the connector and the I-405 northbound travel lanes. The alignment would continue north along the east side of I-405—crossing over US-101 and the Los Angeles River—to a proposed station on the east side of I-405 near the Metro G Line Busway. A new at-grade station on the Metro G Line would be constructed for Alternative 1 adjacent to the proposed monorail station. These proposed stations are shown on the Metro G Line inset area on Figure 6-1.

The alignment would then continue north along the east side of I-405 to the proposed Sherman Way Station. The station would be located inside the I-405 northbound loop off-ramp to Sherman Way. North of the station, the alignment would continue along the eastern edge of I-405, then curve to the southeast parallel to the LOSSAN rail corridor. The alignment would remain aerial along Raymer Street east of Sepulveda Boulevard and cross over Van Nuys Boulevard to the proposed terminus station adjacent to the Van Nuys Metrolink/Amtrak Station. Overhead utilities along Raymer Street would be undergrounded where they would conflict with the guideway or its supporting columns. Tail tracks would be located southeast of this terminus station.

6.1.1.2 Guideway Characteristics

The monorail alignment of Alternative 1 would be entirely aerial, utilizing straddle-beam monorail technology, which allows the monorail vehicle to straddle a guide beam that both supports and guides the vehicle. Northbound and southbound trains would travel on parallel beams supported by either a single-column or a straddle-bent structure. Figure 6-2 shows a typical cross-section of the aerial monorail guideway.

Figure 6-2. Typical Monorail Guideway Cross-Section

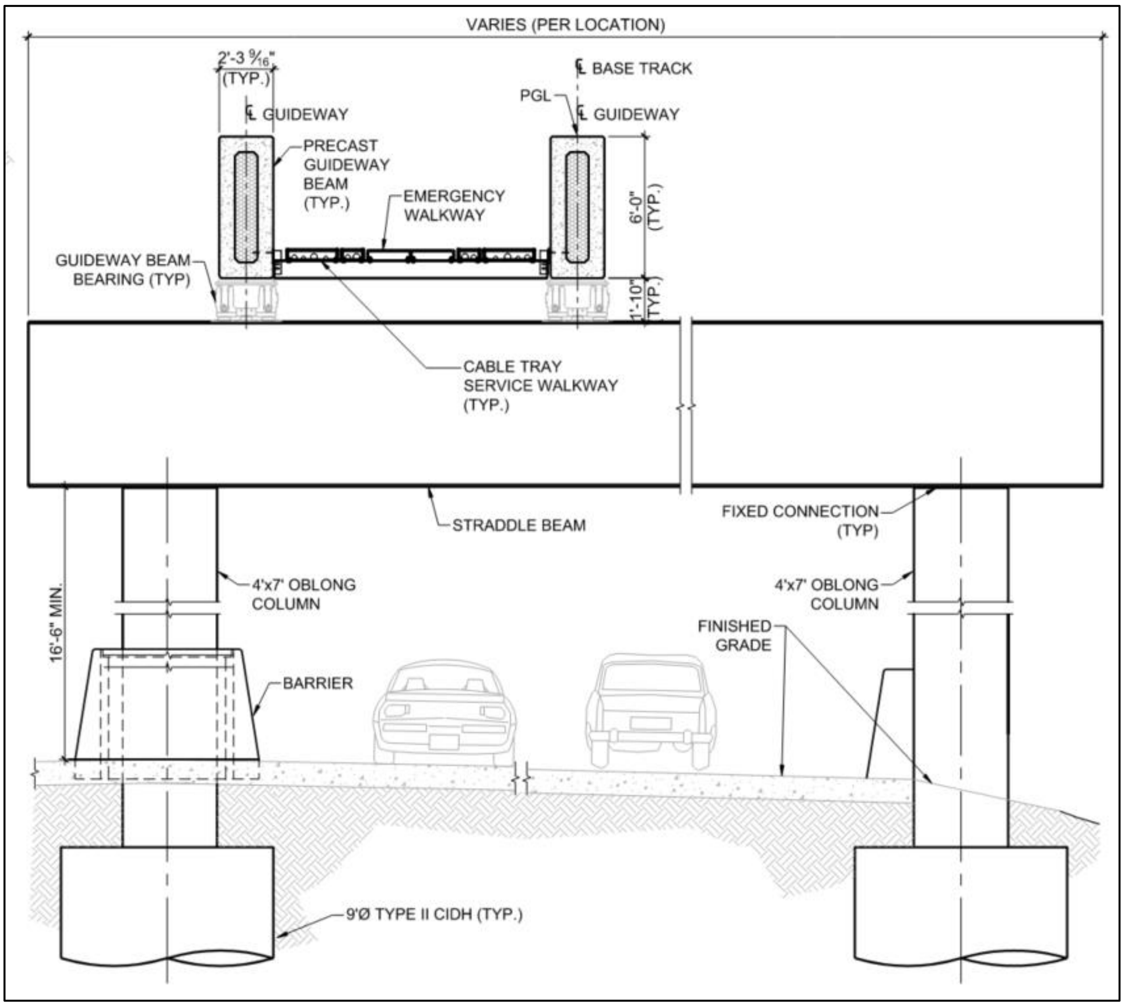


Source: LASRE, 2024

On a typical guideway section (i.e., not at a station), guide beams would rest on 20-foot-wide column caps (i.e., the structure connecting the columns and the guide beams), with typical spans (i.e., the distance between columns) ranging from 70 to 190 feet. The bottom of the column caps would typically be between 16.5 feet and 32 feet above ground level.

Over certain segments of roadway and freeway facilities, a straddle-bent configuration, as shown on Figure 6-3, consisting of two concrete columns constructed outside of the underlying roadway would be used to support the guide beams and column cap. Typical spans for these structures would range between 65 and 70 feet. A minimum 16.5-foot clearance would be maintained between the underlying roadway and the bottom of the column caps.

Figure 6-3. Typical Monorail Straddle-Bent Cross-Section



Source: LASRE, 2024

Structural support columns would vary in size and arrangement by alignment location. Columns would be 6 feet in diameter along main alignment segments adjacent to I-405 and be 4 feet wide by 6 feet long in the I-405 median. Straddle-bent columns would be 4 feet wide by 7 feet long. At stations, six rows of dual 5-foot by- 8-foot columns would support the aerial guideway. Beam switch locations and long-span structures would also utilize different sized columns, with dual 5-foot columns supporting switch locations and 9-foot- or 10-foot-diameter columns supporting long-span structures. Crash protection barriers would be used to protect the columns. Columns would have a cast-in-drilled-hole (CIDH) pile foundation extending 1 foot in diameter beyond the column width with varying depths for appropriate geotechnical considerations and structural support.

6.1.1.3 Vehicle Technology

Alternative 1 would utilize straddle-beam monorail technology, which allows the monorail vehicle to straddle a guide beam that both supports and guides the vehicle. Rubber tires would sit both atop and on each side of the guide beam to provide traction and guide the train. Trains would be automated and powered by power rails mounted to the guide beam, with planned peak-period headways of 166 seconds and off-peak-period headways of 5 minutes. Monorail trains could consist of up to eight cars. Alternative 1 would have a maximum operating speed of 56 miles per hour; actual operating speeds would depend on the design of the guideway and distance between stations.

Monorail train cars would be 10.5 feet wide, with two double doors on each side. End cars would be 46.1 feet long with a design capacity of 97 passengers, and intermediate cars would be 35.8 feet long and have a design capacity of 90 passengers.

The electric bus connecting the Wilshire Boulevard/Metro D Line Station, Westwood Village, and UCLA Gateway Plaza would be a battery electric, low-floor transit bus, either 40 or 60 feet in length. The buses would run with headways of 2 minutes during peak periods. The electric bus service would operate in existing mixed-flow travel lanes.

6.1.1.4 Stations

Alternative 1 would include eight aerial MRT stations with platforms approximately 320 feet long, elevated 50 feet to 75 feet above the existing ground level. The Metro E Line Expo/Sepulveda, Santa Monica Boulevard, Ventura Boulevard/Sepulveda Boulevard, Sherman Way, and Van Nuys Metrolink Stations would be center-platform stations where passengers would travel up to a shared platform that would serve both directions of travel. The Wilshire Boulevard/Metro D Line, Getty Center, and Metro G Line Sepulveda Stations would be side-platform stations where passengers would select and travel up to one of two station platforms, depending on their direction of travel. Each station, regardless of whether it has side or center platforms, would include a concourse level prior to reaching the train platforms. Each station would have a minimum of two elevators, two escalators, and one stairway from ground level to the concourse.

Station platforms would be approximately 320 feet long and would be supported by six rows of dual 5-foot by 8-foot columns. Station platforms would be covered, but not enclosed. Side-platform stations would be 61.5 feet wide to accommodate two 13-foot-wide station platforms with a 35.5-foot-wide intermediate gap for side-by-side trains. Center-platform stations would be 49 feet wide, with a 25-foot-wide center platform.

Monorail stations would include automatic, bi-parting fixed doors along the edges of station platforms. These doors would be integrated into the automatic train control system and would not open unless a train is stopped at the platform.

The following information describes each station, with relevant entrance, walkway, and transfer information. Bicycle parking would be provided at each station.

Metro E Line Expo/Sepulveda Station

- This aerial station would be located near the existing Metro E Line Expo/Sepulveda Station, just east of I-405 between Pico Boulevard and Exposition Boulevard.

- A transit plaza and station entrance would be located on the east side of the station.
- An off-street passenger pick-up/drop-off loop would be located south of Pico Boulevard west of Cotner Avenue.
- An elevated pedestrian walkway would connect the concourse level of the proposed station to the Metro E Line Expo/Sepulveda Station within the fare paid zone.
- Passengers would be able to park at the existing Metro E Line Expo/Sepulveda Station parking facility, which provides 260 parking spaces. No additional automobile parking would be provided at the proposed station.

Santa Monica Boulevard Station

- This aerial station would be located just south of Santa Monica Boulevard, between the I-405 northbound travel lanes and Cotner Avenue.
- Station entrances would be located on the southeast and southwest corners of Santa Monica Boulevard and Cotner Avenue. The entrance on the southeast corner of the intersection would be connected to the station concourse level via an elevated pedestrian walkway spanning Cotner Avenue.
- No dedicated station parking would be provided at this station.

Wilshire Boulevard/Metro D Line Station

- This aerial station would be located west of I-405 and south of Wilshire Boulevard within the southbound I-405 loop off-ramp to eastbound Wilshire Boulevard.
- An elevated pedestrian walkway spanning the adjacent I-405 ramps would connect the concourse level of the proposed station to a station plaza adjacent to the Metro D Line Westwood/VA Hospital Station within the fare paid zone. The station plaza would be the only entrance to the proposed station.
- The station plaza would include an electric bus stop and provide access to the Metro D Line Station via a new station entrance and concourse constructed using a knock-out panel provided in the Metro D Line Station.
- The passenger pick-up/drop-off facility at the Metro D Line Station would be reconfigured, maintaining the original capacity.
- No dedicated station parking would be provided at this station.

Getty Center Station

- This aerial station would be located on the west side of I-405 near the Getty Center, approximately 1,000 feet north of the Getty Center tram station.
- An elevated pedestrian walkway would connect the concourse level of the proposed station to the Getty Center tram station. The proposed connection would occur outside the fare paid zone.
- The pedestrian walkway would provide the only entrance to the proposed station.
- No dedicated station parking would be provided at this station.

Ventura Boulevard/Sepulveda Boulevard Station

- This aerial station would be located east of I-405, just south of Ventura Boulevard.

- A transit plaza, including two station entrances, would be located on the east side of the station. The plaza would require the closure of a 0.1-mile segment of Dickens Street between Sepulveda Boulevard and Ventura Boulevard, with a passenger pick-up/drop-off loop and bus stops provided south of the station, off Sepulveda Boulevard.
- No dedicated station parking would be provided at this station.

Metro G Line Sepulveda Station

- This aerial station would be located near the Metro G Line Sepulveda Station, between I-405 and the Metro G Line Busway.
- Entrances to the MRT station would be located on both sides of a proposed new Metro G Line bus rapid transit (BRT) station.
- An elevated pedestrian walkway would connect the concourse level of the proposed station to the proposed new Metro G Line BRT station outside of the fare paid zone.
- Passengers would be able to park at the existing Metro G Line Sepulveda Station parking facility, which has a capacity of 1,205 parking spaces. Currently, only 260 parking spaces are used for transit parking. No additional automobile parking would be provided at the proposed station.

Sherman Way Station

- This aerial station would be located inside the I-405 northbound loop off-ramp to Sherman Way.
- A station entrance would be located on the north side of Sherman Way.
- An on-street passenger pick-up/drop-off area would be provided on the north side of Sherman Way west of Firmament Avenue.
- No dedicated station parking would be provided at this station.

Van Nuys Metrolink Station

- This aerial station would be located on the east side of Van Nuys Boulevard, just south of the LOSSAN rail corridor, incorporating the site of the current Amtrak ticket office.
- A station entrance would be located on the east side of Van Nuys Boulevard just south of the LOSSAN rail corridor. A second entrance would be located north of the LOSSAN rail corridor with an elevated pedestrian walkway connecting to both the concourse level of the proposed station and the platform of the Van Nuys Metrolink/Amtrak Station.
- Existing Metrolink station parking would be reconfigured, maintaining approximately the same number of spaces, but 180 parking spaces would be relocated north of the LOSSAN rail corridor. Metrolink parking would not be available to Metro transit riders.

6.1.1.5 Station-to-Station Travel Times

Table 6-1 presents the station-to-station distance and travel times for Alternative 1. The travel times include both run time and dwell time. Dwell time is 30 seconds per station. Northbound and southbound travel times vary slightly because of grade differentials and operational considerations at end-of-line stations.

Table 6-1. Alternative 1: Station-to-Station Travel Times and Station Dwell Times

From Station	To Station	Distance (miles)	Northbound Station-to-Station Travel Time (seconds)	Southbound Station-to-Station Travel Time (seconds)	Dwell Time (seconds)
Metro E Line Station					*30*
Metro E Line	Santa Monica Boulevard	0.9	122	98	—
Santa Monica Boulevard Station					*30*
Santa Monica Boulevard	Wilshire/Metro D Line	0.7	99	104	—
Wilshire/Metro D Line Station					*30*
Wilshire/Metro D Line	Getty Center	2.9	263	266	—
Getty Center Station					*30*
Getty Center	Ventura Boulevard	4.7	419	418	—
Ventura Boulevard Station					*30*
Ventura Boulevard	Metro G Line	2.0	177	184	—
Metro G Line Station					*30*
Metro G Line	Sherman Way	1.5	135	134	—
Sherman Way Station					*30*
Sherman Way	Van Nuys Metrolink	2.4	284	284	—
Van Nuys Metrolink Station					*30*

Source: LASRE, 2024

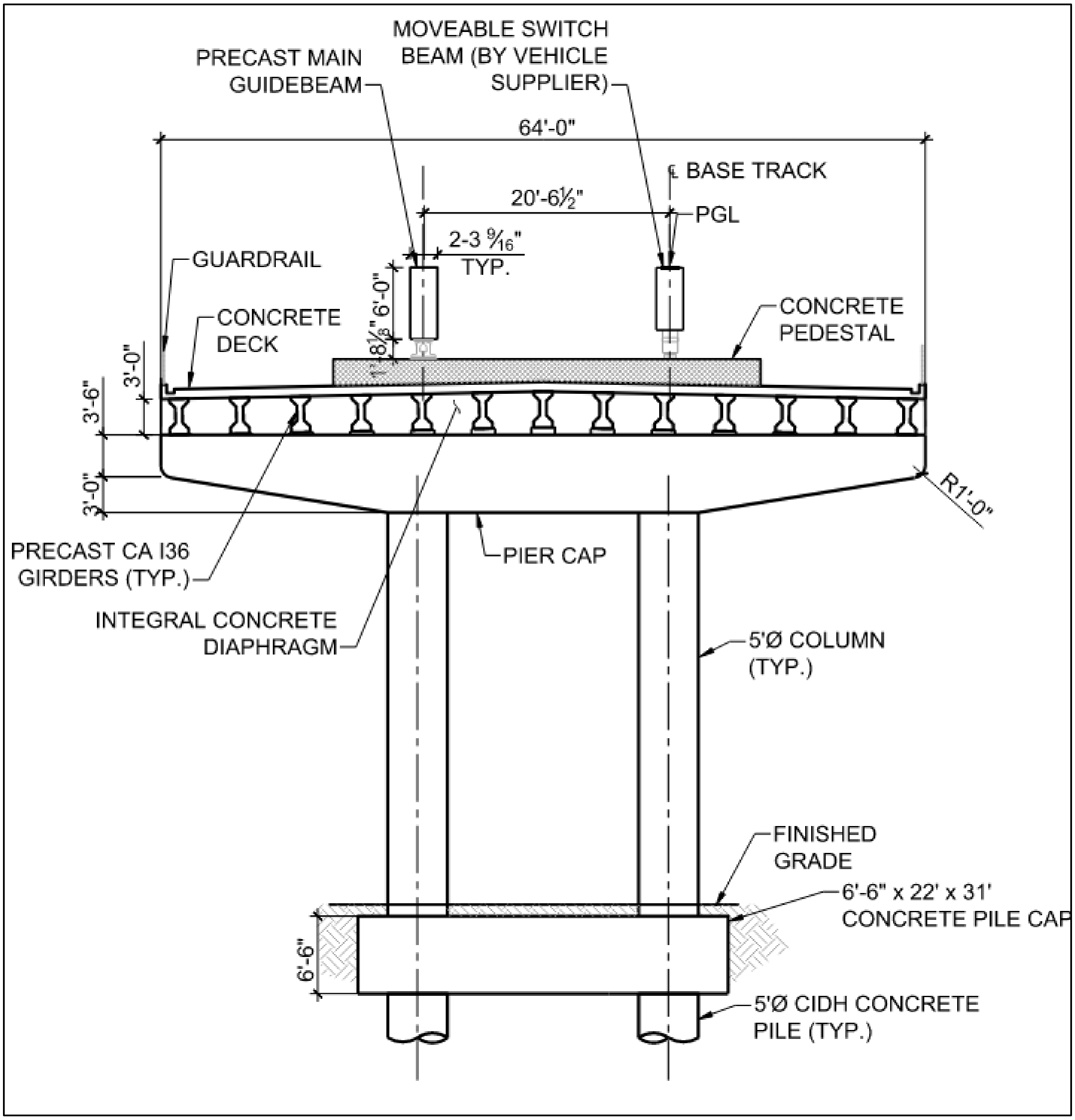
— = no data

6.1.1.6 Special Trackwork

Alternative 1 would include five pairs of beam switches to enable trains to cross over to the opposite beam. From south to north, the first pair of beam switches would be located just north of the Metro E Line Expo/Sepulveda Station. The second pair of beam switches would be located near the Wilshire Boulevard/Metro D Line Station on the north side of Wilshire Boulevard, within the Wilshire Boulevard westbound to I-405 southbound loop on-ramp. A third pair of beam switches would be located in the Sepulveda Pass just south of Mountaingate Drive and Sepulveda Boulevard. A fourth pair of beam switches would be located south of the Metro G Line Station between the I-405 northbound lanes and the Metro G Line Busway. The final pair would be located near the Van Nuys Metrolink Station.

At beam switch locations, the typical cross-section of the guideway would increase in column and column cap width. The column cap at these locations would be 64 feet wide, with dual 5-foot-diameter columns. Underground pile caps for additional structural support would also be required at beam switch locations. Figure 6-4 shows a typical cross-section of the monorail beam switch.

Figure 6-4. Typical Monorail Beam Switch Cross-Section



Source: LASRE, 2024

6.1.1.7 Monorail Maintenance and Storage Facility

MSF Base Design

In the maintenance and storage facility (MSF) Base Design for Alternative 1, the MSF would be located on City of Los Angeles Department of Water and Power (LADWP) property east of the Van Nuys Metrolink Station. The MSF Base Design site would be approximately 18 acres and would be designed to accommodate a fleet of 208 monorail vehicles. The site would be bounded by the LOSSAN rail corridor to the north, Saticoy Street to the south, and property lines extending north of Tyrone and Hazeltine Avenues to the east and west, respectively.

Monorail trains would access the site from the main alignment's northern tail tracks at the northwest corner of the site. Trains would travel parallel to the LOSSAN rail corridor before curving southeast to maintenance facilities and storage tracks. The guideway would remain in an aerial configuration within the MSF Base Design, including within maintenance facilities.

The site would include the following facilities:

- Primary entrance with guard shack
- Primary maintenance building that would include administrative offices, an operations control center, and a maintenance shop and office
- Train car wash building
- Emergency generator
- Traction power substation (TPSS)
- Maintenance-of-way (MOW) building
- Parking area for employees

MSF Design Option 1

In the MSF Design Option 1, the MSF would be located on industrial property, abutting Orion Avenue, south of the LOSSAN rail corridor. The MSF Design Option 1 site would be approximately 26 acres and would be designed to accommodate a fleet of 224 monorail vehicles. The site would be bounded by I-405 to the west, Stagg Street to the south, the LOSSAN rail corridor to the north, and Orion Avenue and Raymer Street to the east. The monorail guideway would travel along the northern edge of the site.

Monorail trains would access the site from the monorail guideway east of Sepulveda Boulevard, requiring additional property east of Sepulveda Boulevard and north of Raymer Street. From the northeast corner of the site, trains would travel parallel to the LOSSAN rail corridor before turning south to maintenance facilities and storage tracks parallel to I-405. The guideway would remain in an aerial configuration within the MSF Design Option 1, including within maintenance facilities.

The site would include the following facilities:

- Primary entrance with guard shack
- Primary maintenance building that would include administrative offices, an operations control center, and a maintenance shop and office
- Train car wash building
- Emergency generator
- TPSS
- MOW building
- Parking area for employees

Figure 6-5 shows the locations of the MSF Base Design and MSF Design Option 1 for Alternative 1.

Figure 6-5. Alternative 1: Maintenance and Storage Facility Options

Source: LASRE, 2024; HTA, 2024

6.1.1.8 Electric Bus Maintenance and Storage Facility

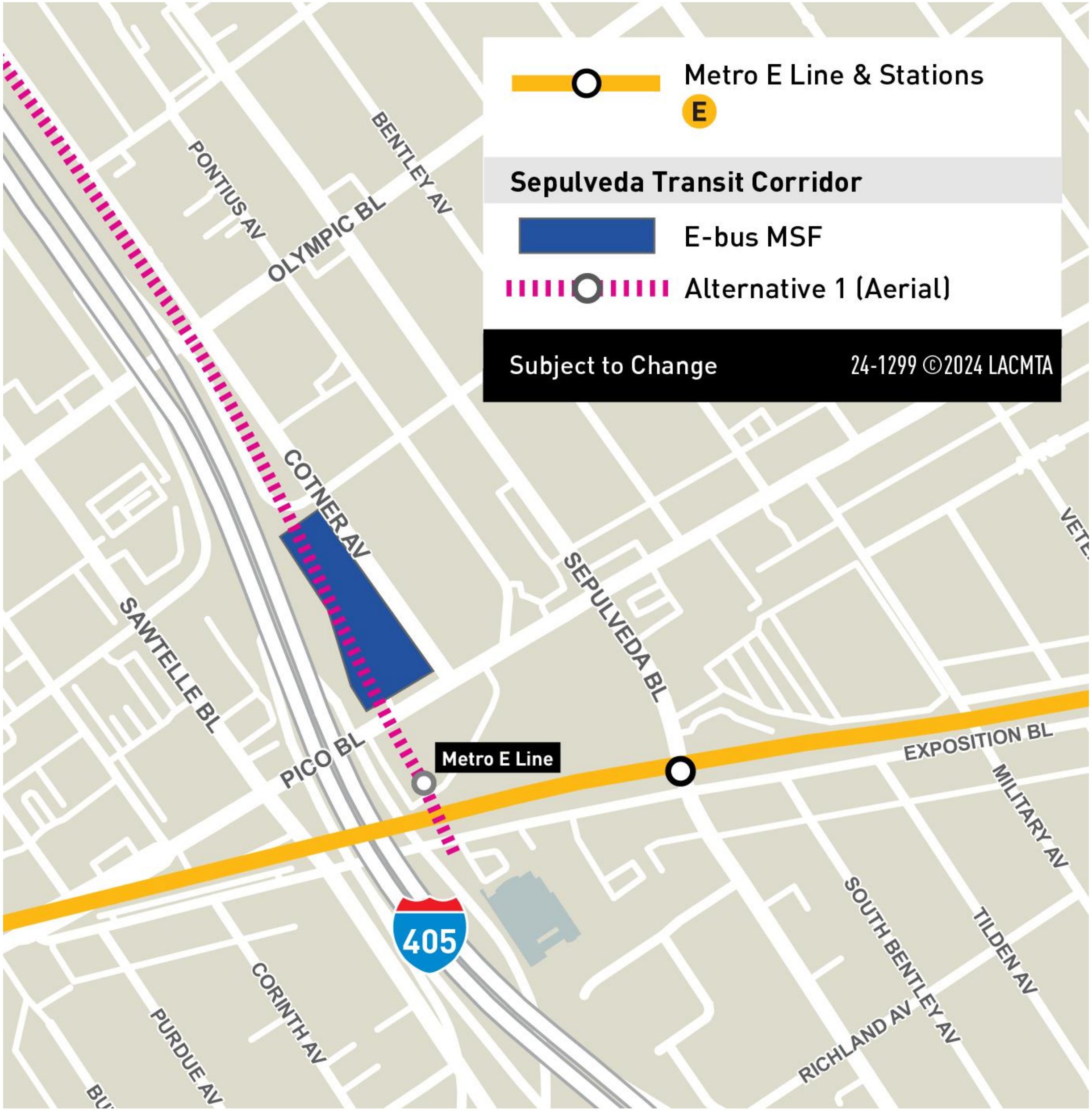
An electric bus MSF would be located on the northwest corner of Pico Boulevard and Cotner Avenue and would be designed to accommodate 14 electric buses. The site would be approximately 2 acres and would comprise six parcels bounded by Cotner Avenue to the east, I-405 to the west, Pico Boulevard to the south, and the I-405 northbound on-ramp to the north.

The site would include approximately 45,000 square feet of buildings and include the following facilities:

- Maintenance shop and bay
- Maintenance office
- Operations center
- Bus charging equipment
- Parts storeroom with service areas
- Parking area for employees

Figure 6-6 shows the location of the proposed electric bus MSF.

Figure 6-6. Alternative 1: Electric Bus Maintenance and Storage Facility



Source: LASRE, 2024; HTA, 2024

6.1.1.9 Traction Power Substations

TPSSs transform and convert high voltage alternating current supplied from power utility feeders into direct current suitable for transit operation. A TPSS on a site of approximately 8,000 square feet would be located approximately every 1 mile along the alignment. Table 6-2 lists the TPSS locations proposed for Alternative 1.

Figure 6-7 shows the TPSS locations along the Alternative 1 alignment.

Table 6-2. Alternative 1: Traction Power Substation Locations

TPSS No.	TPSS Location Description	Configuration
1	TPSS 1 would be located east of I-405, just south of Exposition Boulevard and the monorail guideway tail tracks.	At-grade
2	TPSS 2 would be located west of I-405, just north of Wilshire Boulevard, inside the westbound Wilshire Boulevard to I-405 Southbound Loop On-Ramp.	At-grade
3	TPSS 3 would be located west of I-405, just north of Sunset Boulevard, inside the Church Lane to I-405 Southbound Loop On-Ramp.	At-grade
4	TPSS 4 would be located east of I-405 and Sepulveda Boulevard, just north of the Getty Center Station.	At-grade
5	TPSS 5 would be located west of I-405, just east of the intersection between Promontory Road and Sepulveda Boulevard.	At-grade
6	TPSS 6 would be located between I-405 and Sepulveda Boulevard, just north of the Skirball Center Drive Overpass.	At-grade
7	TPSS 7 would be located east of I-405, just south of Ventura Boulevard Station, between Sepulveda Boulevard and Dickens Street.	At-grade
8	TPSS 8 would be located east of I-405, just south of the Metro G Line Sepulveda Station.	At-grade
9	TPSS 9 would be located east of I-405, just east of the Sherman Way Station, inside the I-405 Northbound Loop Off-Ramp to Sherman Way westbound.	At-grade
10	TPSS 10 would be located east of I-405, at the southeast quadrant of the I-405 overcrossing with the LOSSAN rail corridor.	At-grade
11	TPSS 11 would be located east of I-405, at the southeast quadrant of the I-405 overcrossing with the LOSSAN rail corridor.	At-grade (within MSF Design Option)
12	TPSS 12 would be located between Van Nuys Boulevard and Raymer Street, south of the LOSSAN rail corridor.	At-grade
13	TPSS 13 would be located south of the LOSSAN rail corridor, between Tyrone Avenue and Hazeltine Avenue.	At-grade (within MSF Base Design)

Source: LASRE, 2024; HTA, 2024

Figure 6-7. Alternative 1: Traction Power Substation Locations

Source: LASRE, 2024; HTA, 2024

6.1.1.10 Roadway Configuration Changes

Table 6-3 lists the roadway changes necessary to accommodate the guideway of Alternative 1. Figure 6-8 shows the location of these roadway changes in the Sepulveda Transit Corridor Project (Project) Study Area, except for I-405 configuration changes, which would occur throughout the corridor.

Table 6-3. Alternative 1: Roadway Changes

Location	From	To	Description of Change
Cotner Avenue	Nebraska Avenue	Santa Monica Boulevard	Roadway realignment to accommodate aerial guideway columns and station access
Beloit Avenue	Massachusetts Avenue	Ohio Avenue	Roadway narrowing to accommodate aerial guideway columns
I-405 Southbound On-Ramp, Southbound Off-Ramp, and Northbound On-Ramp at Wilshire Boulevard	Wilshire Boulevard	I-405	Ramp realignment to accommodate aerial guideway columns and I-405 widening
Sunset Boulevard	Gunston Drive	I-405 Northbound Off-Ramp at Sunset Boulevard	Removal of direct eastbound to southbound on-ramp to accommodate aerial guideway columns and I-405 widening. Widening of Sunset Boulevard bridge with additional westbound lane
I-405 Southbound On-Ramp and Off-Ramp at Sunset Boulevard and North Church Lane	Sunset Boulevard	Not Applicable	Ramp realignment to accommodate aerial guideway columns and I-405 widening
I-405 Northbound On-Ramp and Off-Ramp at Sepulveda Boulevard near I-405 Exit 59	Sepulveda Boulevard near I-405 Northbound Exit 59	Sepulveda Boulevard/ I-405 Undercrossing (near Getty Center)	Ramp realignment to accommodate aerial guideway columns and I-405 widening
Sepulveda Boulevard	I-405 Southbound Skirball Center Drive Ramps (north of Mountaingate Drive)	Skirball Center Drive	Roadway realignment into existing hillside to accommodate aerial guideway columns and I-405 widening
I-405 Northbound On-Ramp at Mulholland Drive	Mulholland Drive	Not Applicable	Roadway realignment into the existing hillside between the Mulholland Drive Bridge pier and abutment to accommodate aerial guideway columns and I-405 widening
Dickens Street	Sepulveda Boulevard	Ventura Boulevard	Vacation and permanent removal of street for Ventura Boulevard Station construction. Pick-up/drop-off area would be provided along Sepulveda Boulevard at the truncated Dickens Street
Sherman Way	Haskell Avenue	Firmament Avenue	Median improvements, passenger drop-off and pick-up areas, and bus pads within existing travel lanes
Raymer Street	Sepulveda Boulevard	Van Nuys Boulevard	Curb extensions and narrowing of roadway width to accommodate aerial guideway columns
I-405	Sunset Boulevard	Bel Terrace	I-405 widening to accommodate aerial guideway columns in the median

Location	From	To	Description of Change
I-405	Sepulveda Boulevard Northbound Off-Ramp (Getty Center Drive interchange)	Sepulveda Boulevard Northbound On-Ramp (Getty Center Drive interchange)	I-405 widening to accommodate aerial guideway columns in the median
I-405	Skirball Center Drive	I-405 Northbound On-Ramp at Mulholland Drive	I-405 widening to accommodate aerial guideway columns in the median

Source: LASRE, 2024; HTA, 2024

Figure 6-8. Alternative 1: Roadway Changes

Source: LASRE, 2024; HTA, 2024

In addition to the changes made to accommodate the guideway, as listed in Table 6-3, roadways and sidewalks near stations would be reconstructed, which would result in modifications to curb ramps and driveways.

6.1.1.11 Fire/Life Safety – Emergency Egress

Continuous emergency evacuation walkways would be provided along the guideway. The walkways would typically consist of structural steel frames anchored to the guideway beams to support non-slip walkway panels. The walkways would be located between the two guideway beams for most of the alignment; however, where the beams split apart, such as entering center-platform stations, short portions of the walkway would be located on the outside of the beams.

6.1.2 Construction Activities

Construction activities for Alternative 1 would include constructing the aerial guideway and stations, widening I-405, and constructing ancillary facilities. Construction of the transit through substantial completion is expected to have a duration of 6½ years. Early works, such as site preparation, demolition, and utility relocation, could start in advance of construction of the transit facilities.

Aerial guideway construction would begin at the southern and northern ends of the alignment and connect in the middle. Constructing the guideway would require a combination of freeway and local street lane closures throughout the work limits to provide sufficient work area. The first stage of I-405 widening would include a narrowing of adjacent freeway lanes to a minimum width of 11 feet (which would eliminate shoulders) and placing K-rail on the outside edge of the travel lanes to create outside work areas. Within these outside work zones, retaining walls, drainage infrastructure, and outer pavement widenings would be constructed to allow for I-405 widening. The reconstruction of on- and off-ramps would be the final stage of I-405 widening.

A median work zone along I-405 for the length of the alignment would be required for erection of the guideway structure. In the median work zone, demolition of the existing median and drainage infrastructure would be followed by the installation of new K-rail and installation of guideway structural components, which would include full directional freeway closures when guideway beams must be transported into the median work areas during late-night hours. Additional night and weekend directional closures would be required for installation of long-span structures over I-405 travel lanes where the guideway would transition from the median.

Aerial station construction is anticipated to last the duration of construction activities for Alternative 1 and would include the following general sequence of construction:

- Site clearing
- Utility relocation
- Construction fencing and rough grading
- CIDH pile drilling and installation
- Elevator pit excavation
- Soil and material removal
- Pile cap and pier column construction
- Concourse level and platform level falsework for cast-in-place structural concrete
- Guideway beam installation
- Elevator and escalator installation
- Completion of remaining concrete elements such as pedestrian bridges
- Architectural finishes and mechanical, electrical, and plumbing installation

Alternative 1 would require construction of a concrete casting facility for columns and beams associated with the elevated guideway. A specific site has not been identified; however, it is expected that the facility would be located on industrially zoned land adjacent to a truck route in either the Antelope Valley or Riverside County. When a site is identified, the contractor would obtain all permits and approvals necessary from the relevant jurisdiction, the appropriate air quality management entity, and other regulatory entities.

TPSS construction would require additional lane closures. Large equipment including transformers, rectifiers, and switchgears would be delivered and installed through prefabricated modules where possible in at-grade TPSSs. The installation of transformers would require temporary lane closures on Exposition Boulevard, Beloit Avenue, Sepulveda Boulevard just north of Cashmere Street, and the I-405 northbound on-ramp at Burbank Boulevard.

Table 6-4 and Figure 6-9 show the potential construction staging areas for Alternative 1. Staging areas would provide the necessary space for the following activities:

- Contractors' equipment
- Receiving deliveries
- Storing materials
- Site offices
- Work zone for excavation
- Other construction activities (including parking and change facilities for workers, location of construction office trailers, storage, staging and delivery of construction materials and permanent plant equipment, and maintenance of construction equipment)

Table 6-4. Alternative 1: Construction Staging Locations

No.	Location Description
1	Public Storage between Pico Boulevard and Exposition Boulevard, east of I-405
2	South of Dowlen Drive and east of Greater LA Fisher House
3	At 1400 N Sepulveda Boulevard
4	At 1760 N Sepulveda Boulevard
5	East of I-405 and north of Mulholland Drive Bridge
6	Inside of I-405 Northbound to US-101 Northbound Loop Connector, south of US-101
7	ElectroRent Building south of Metro G Line Busway, east of I-405
8	Inside the I-405 Northbound Loop Off-Ramp at Victory Boulevard
9	Along Cabrito Road east of Van Nuys Boulevard

Source: LASRE, 2024; HTA, 2024

Figure 6-9. Alternative 1: Construction Staging Locations

Source: LASRE, 2024; HTA, 2024

6.2 Existing Conditions

6.2.1 Noise

The noise environment in the Project Study Area is dominated by traffic noise, including freeways such as I-405, Interstate 10 (I-10), US-101, arterial roads such as Sepulveda Boulevard and Wilshire Boulevard, and other local roadways. Aircraft flyovers are also contributors to the existing noise environment in most areas along the Alternative 1 alignment. Land uses found along the alignment include single- and multi-family residential uses, lodging facilities, educational facilities, public facilities, public and commercial office buildings, various types of commercial uses, institutional uses, surface parking facilities, and parking structures.

Noise-sensitive land uses were identified using geographic information systems (GIS), assessor's parcel maps, aerial photographs, and field surveys. Land use data was obtained from the Southern California Association of Governments (SCAG) 2019 regional land use data set for Los Angeles County (SCAG, 2019). Sensitive land uses were classified into one of the three Federal Transit Administration (FTA) sensitive land use categories (FTA, 2018). Refer to Table 2-1 for a detailed description of each category.

- There are no Category 1 noise-sensitive land uses identified along the Alternative 1 alignment.
- Category 2 noise-sensitive land uses include single- and multi-family residential and lodging land uses located throughout the Alternative 1 alignment. Category 2 noise-sensitive land uses are more sparsely located in the mountainous segment of the Project Study Area.
- Category 3 noise-sensitive land uses found along the Alternative 1 alignment include KT Rehearsal Studios, Los Angeles National Cemetery, Village Church, Leo Baeck Temple and its affiliated facilities, The Getty Center, Skirball Cultural Center, Milken Community School, Ivy Bound Academy, Emek Hebrew Academy, and the Church of Jesus Christ of Latter Day Saints on Saticoy Street in Van Nuys.

Existing noise conditions along the Alternative 1 alignment were documented through noise monitoring performed at representative noise-sensitive locations along the proposed alignment. This section provides a summary of the noise measurement results.

Representative noise-sensitive locations were identified by using preliminary alignment maps, aerial photographs, visual surveys, and proximity to aboveground noise sources associated with Alternative 1. Long-term (24-hour) noise measurements were conducted at a total of 29 locations representing Category 2 land uses. Short-term noise measurements (two 1-hour measurements) were obtained at 18 locations representing exterior areas of Category 3 land uses. Figure 6-10 and Figure 6-11 show the locations of noise monitoring sites along Alternative 1 alignment. Refer to Attachment 1 and Attachment 2 of this report for detailed results of 24-hour and short-term measurements, respectively. The appendix material also depicts photographic exhibits of the measurement locations.

Table 6-5 presents a summary of long-term (24-hour) noise measurements taken at Category 2 locations that are representative of the residential and lodging land uses and hospitals along the Alternative 1 alignment. The noise monitors were programmed to continuously collect data for a minimum of 24 hours. The microphones were generally placed on tripods approximately 5 feet above the ground at locations near the setback of habitable buildings, between the buildings and the Alternative 1 alignment.

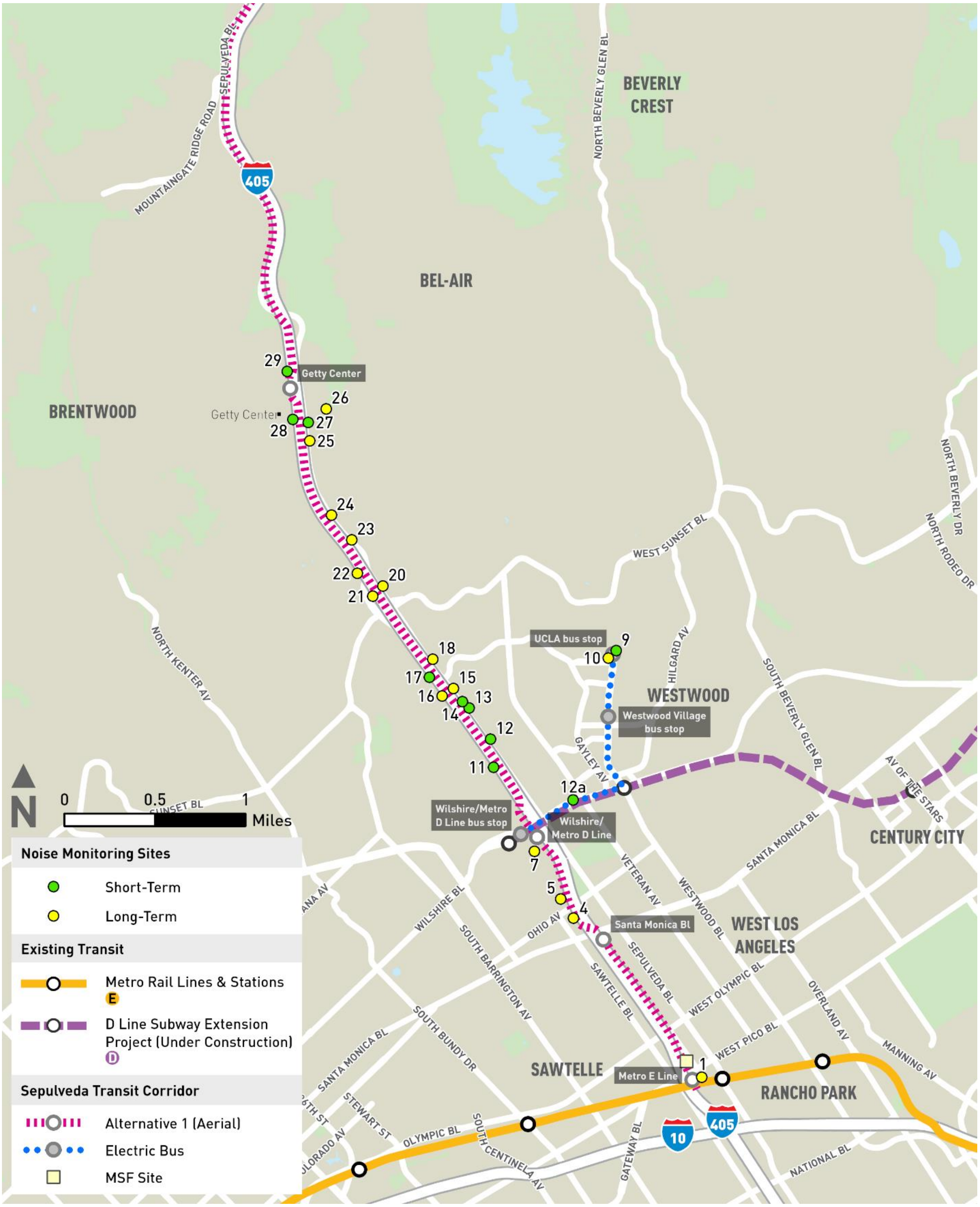
Table 6-5. Alternative 1: Summary of Existing 24-hour Noise Measurements at Category 2 Land Uses

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{dn} (dBA)
			Date	Time	
1	2435 S. Sepulveda Boulevard	I-405 traffic	6/28/2023	11:00am	73.9
4	1521 Beloit Avenue	I-405 and Santa Monica Boulevard	7/12/2023	10:00am	66.7
5	LA Fisher House	I-405 traffic	7/25/2023	10:00am	69.5
7	West LA VA Medical Center	I-405 traffic	7/25/2023	9:00am	67.3
10	UCLA Luskin Conference Center	Local traffic	5/25/2023	3:00pm	62.2
15	426 S. Sepulveda Boulevard	I-405 and Sepulveda Boulevard	6/6/2023	11:00am	71.0
16	11330 Denair Street	I-405 traffic	6/7/2023	3:00pm	75.9
18	353 Dalkeith Avenue	I-405, Sepulveda Boulevard	6/7/2023	11:00am	72.0
20	11420 Thurston Circle	I-405, Sepulveda Boulevard	6/27/2023	10:00am	73.1
21	Hotel Bellagio, 170 N. Church Lane	I-405 traffic	6/8/2023	12:00pm	87.0
23	11720 Bellagio Road	I-405, Sepulveda Boulevard	6/21/2023	11:00am	71.3
24	11812 Bellagio Road	I-405, Sepulveda Boulevard	6/6/2023	11:00am	70.5
25	Leonard I. Beeman Early Childhood Center	I-405, Sepulveda Boulevard	6/14/2023	12:00pm	71.7
26	1399 Casiano Road	I-405 traffic	5/17/2023	3:00pm	76.0
38	15460 Briarwood Drive	I-405 traffic	6/20/2023	9:00am	74.1
39	15515 Woodcrest Drive	I-405 traffic	5/30/2023	1:00pm	63.3
41	15371 Del Gado Drive	I-405 traffic	6/29/2023	10:00am	72.5
42	15350 Sutton Street	I-405 traffic	6/8/2023	9:00am	72.4
43	4440 Sepulveda Boulevard	I-405, Sepulveda Boulevard	3/25/2024	12:00pm	76.5
50	15353 Weddington	I-405 traffic	7/18/2023	9:00am	67.2
52	6200 Blucher Avenue	I-405, G-Line, local traffic	3/25/2024	1:00pm	62.9
53	6201 Blucher Avenue	I-405, G-Line, local traffic	3/25/2024	1:00pm	62.9
57	6546 Aqueduct Avenue	I-405 traffic	5/24/2023	12:00pm	69.1
60	6841 Firmament Avenue	I-405 traffic	6/6/2023	9:00am	65.3
61	13917 Cohasset Street	LOSSAN Corridor, distant traffic	6/13/2023	10:00am	52.8
64	15550 Wyandotte Street	I-405 traffic	5/30/203	11:00am	66.5
65	15559 Covello Street	I-405 traffic	6/27/2023	9:00am	66.7
66	15018 Marson Street	LOSSAN Corridor	5/24/2023	11:00am	60.5
67	7824 Zombar Avenue	Local traffic, distant aircraft	6/20/2023	9:00am	58.0

Source: HTA, 2024

dBA = A-weighted decibel
L_{dn} = day-night noise level

Figure 6-10. Alternative 1: Noise Monitoring Sites – South



Source: HTA, 2024

Figure 6-11. Alternative 1: Noise Monitoring Sites – North

Source: HTA, 2024

Short-term noise measurements for two 1-hour periods were also taken at Category 1 and Category 3 (institutional) land uses, including schools, religious facilities, museums, and amphitheaters, along the Alternative 1 alignment segments with aboveground noise sources. The general locations of the short-term measurement sites are shown on Figure 6-10 and Figure 6-11. Table 6-6 gives the summarized results of each individual short-term measurement. The details of short-term measurements are included in Attachment 2 of this report.

Table 6-6. Alternative 1: Summary of Existing Short-Term (1-Hour) Noise Measurements at Category 1 and Category 3 Land Uses

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{eq} (dBA)
			Date	Time	
9	UCLA Computer Science/ Engineering IV building	Local traffic, students' chatter	5/25/2023	1:04pm	57.9
			5/26/2023	3:36pm	58.8
11	LA National Cemetery Columbarium, near east wall	I-405 traffic	7/25/2023	1:21pm	59.7
			7/26/2023	9:26am	62.7
12a	LA National Cemetery, north of Wilshire Boulevard	Wilshire Boulevard and I-405 traffic	5/25/2023	11:48am	65.4
			5/26/2023	10:48am	65.0
12	LA National Cemetery east of I-405, no freeway soundwall	I-405 and Sepulveda traffic	7/25/2023	10:00am	72.4
			7/26/2023	12:04pm	71.8
13	LA National Cemetery east of I-405, with freeway soundwall	I-405 and Sepulveda traffic	7/25/2023	10:10am	67.3
			7/26/2023	12:04pm	67.0
14	LA National Cemetery north fence, with freeway soundwall	I-405 and Sepulveda traffic	4/12/2023	11:55am	69.0
			4/13/2023	9:03am	69.5
17	Village Church, 343 South Church Lane sidewalk next to front lawn	I-405 traffic	4/12/2023	1:32pm	63.6
			4/13/2023	8:55am	65.5
22	Getty South Building, near buildings setback west of I-405	I-405 traffic	5/17/2023	3:00pm	74.3
			5/18/2023	7:00am	78.0
27	Leo Baeck Temple, west of building, facing I-405	I-405 traffic, Sepulveda Boulevard	6/14/2023	12:19pm	67.1
			6/15/2023	10:40am	67.4
28	The Getty Tram Station, in lawn area north of the Station	I-405 traffic	5/17/2023	11:54am	59.4
			5/18/2023	11:25am	60.9
29	Future Oak parking lot at The Getty, in currently unpaved lot	I-405 traffic	5/17/2023	11:54am	66.9
			5/18/2023	11:25am	68.2
33	Skirball Cultural Center, Ziegler Amphitheater, east façade	I-405 traffic, Sepulveda Boulevard	5/17/2023	7:53am	60.9
			5/18/2023	7:45am	61.7
34	Skirball Cultural Center, Ziegler Amphitheater, at bleachers	I-405 traffic, Sepulveda Boulevard	5/17/2023	7:53am	56.6
			5/18/2023	7:45am	57.1
35	Milken Community School, first floor facing I-405	I-405 traffic, student chatter	5/17/2023	9:40am	70.9
			5/18/2023	9:20am	72.2
36	Milken Community School, second floor facing I-405	I-405 traffic, student chatter	5/17/2023	9:40am	70.6
			5/18/2023	9:20am	71.3
40	15347 Del Gado Drive, at south end of vacant lot[a]	I-405 traffic	6/30/2023	8:42am	57.8

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{eq} (dBA)
			Date	Time	
46	Ivy Bound Academy, basketball courts near US-101 to I-405 ramp	I-405 mainline and ramp traffic	5/25/2023	7:10am	67.9
			5/26/2023	6:57am	68.8
68	La Iglesia de Jesucristo de los Santos de los Últimos Días	I-405 traffic, distant aircraft	4/13/2023	1:27pm	62.5
			5/11/2023	10:17am	64.5

Source: HTA, 2024

[a]This short-term measurement location was used to estimate noise levels at residential locations farther east of I-405 than the 24-hour site located at 15371 Del Gado Drive.

L_{eq} = equivalent noise level

6.2.2 Vibration

The Alternative 1 alignment is located in an urban environment. Primary existing sources of groundborne vibration (GBV) include trucks traveling along roadways and construction sites using heavy equipment. According to FTA guidance, the background vibration decibel (VdB) levels are expected to range from 50 to 65 VdB (FTA, 2018). Ambient vibration levels were not measured during this stage of Alternative1. However, measurement of vibration levels is not necessary to complete the general assessment procedure for vibration analysis. The FTA vibration impact assessment is based on FTA vibration impact criteria. These criteria were used to identify vibration-sensitive receivers along the Alternative 1 alignment where potential impacts may occur, based on existing land use activities.

Vibration-sensitive land uses were identified using GIS, assessor's parcel maps, aerial photographs, and field surveys. Vibration-sensitive land uses in the Project Study Area include residences, hotel/motels, medical facilities, schools, and museums.

Sensitive land uses were classified as one of the following three FTA vibration-sensitive land use categories (Table 2-5 presents the details of criteria pertaining to each category):

- Category 1 – Buildings where vibration would interfere with interior operations
- Category 2 – Residences and buildings where people normally sleep
- Category 3 – Institutional land uses with primarily daytime use

There are no Category 1 vibration-sensitive land uses identified along the Alternative 1 alignment.

Category 2 vibration-sensitive land uses include single- and multi-family residences and hotels/motels which are located throughout the Alternative 1 alignment. Category 2 vibration-sensitive land uses are more sparsely located in the mountainous segment of the Alternative 1 alignment.

Examples of Category 3 vibration-sensitive land uses found along the Alternative 1 alignment include the same educational facilities, religious facilities, museum buildings, and cultural centers identified as Category 3 noise-sensitive land uses.

6.3 Impact Evaluation

6.3.1 Impact NOI-1: Would the project cause 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?

6.3.1.1 Operational Noise Impacts

Rail Operations Noise

Noise exposure from the train movements was evaluated using the detailed noise assessment procedure in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018). The rail operations noise analysis includes noise generated by vehicle passbys, consisting of motor noise, tire-guideway noise, aerodynamic noise, and noise from air conditioning and other auxiliary equipment on the vehicles. Other factors such as crossover noise and attenuation effects of intervening buildings and existing soundwalls are also included in the analysis. Refer to Section 3.1.1 for details of train noise analysis methodology. The 24-hour day-night noise level (L_{dn}) for Category 2 noise-sensitive receptors and the hourly equivalent noise level (L_{eq}) during peak headways for Category 3 noise-sensitive receptors was predicted based on the anticipated rail operations.

Based on operations reports prepared for Alternative 1 (Metro, 2023), noise modeling for this project alternative assumes a six-car monorail train with 2-minute headways during peak hours (6:00am to 10:00am and 3:00pm to 7:00pm), 5-minute headways during mid-day and evening hours (10:00am to 3:00pm and 7:00pm to 10:00pm), and 10-minute headways during the remaining nighttime hours (4:00am to 6:00am and 10:00pm to 2:00am). Total daily directional train operations would be 372 six-car trains, consisting of 306 daytime and 66 nighttime train movements in each direction of travel. Train speeds assumed in the noise model were obtained from travel speed profiles of Alternative 1.

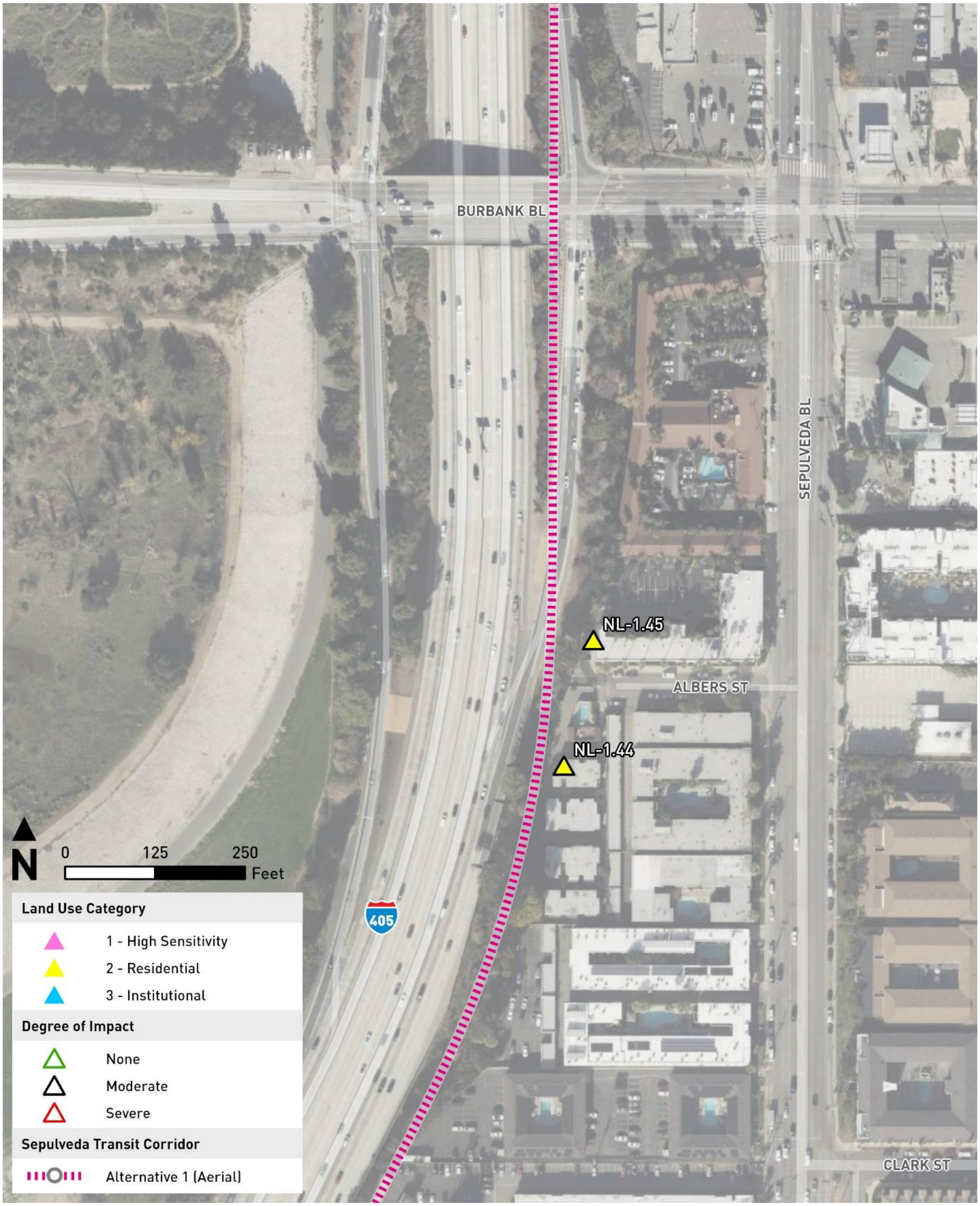
Attachment 3 shows the details of operations noise impact assessments at the representative noise-sensitive receptors and assumed daily and hourly train operations developed from the *Alternative 1 Operations Report* (Metro, 2023). Table 6-7 is a summary of noise-sensitive receptors where operational noise impacts would occur. Impacted receptors are shown on Figure 6-12, Figure 6-13, and Figure 6-14. Alternative 1 would result in four moderate impacts at Category 2 receptors, representing 26 single-family units, five multi-family buildings, and one hotel, and no noise impacts at Category 1 or Category 3 receptors. These noise impacts are considered potentially significant impacts. Other noise-sensitive receptors would not be exposed to noise levels in excess of the FTA noise impact criteria because they are located farther away from the tracks, train speeds may be slower in their vicinity resulting in decreased noise levels, or the presence of intervening building rows between the alignment and the noise-sensitive receptor. Therefore, operation of Alternative 1 would result in a significant impact related to rail operations noise.

Table 6-7. Alternative 1: Summary of Rail Operations Noise Impacts

Receptor ID	Location	Near Track Direction	Northbound Track Station	Calculated (L_{dn}, dBA)	Baseline (L_{dn}, dBA)	Noise Impact Limits (L_{dn}, dBA)		Impact
						Moderate	Severe	
NL-1.44	Alber's Apartments, 15328 Albers Street Sherman Oaks	Northbound	1049+83	67	70	65-69	>69	**Moderate**
NL-1.45	Best Western Plus Carriage Inn-South 5525 Sepulveda Boulevard Sherman Oaks	Northbound	1051+98	63	67	63-67	>67	**Moderate**
NL-1.59	Granada Apartments, 15630 Vanowen Street, Van Nuys	Northbound	1140+53	67	71	66-70	>70	**Moderate**
NL-1.62	15623 Hart Street, Van Nuys	Northbound	1156+33	65	67	63-67	>67	**Moderate**
NL-1.70	15559 Covello Street, Van Nuys	Northbound	1192+27	63	67	63-67	>67	**Moderate**

Source: HTA, 2024

Figure 6-12. Alternative 1: Rail Operations Noise Impacts – Magnolia Boulevard to Burbank Boulevard

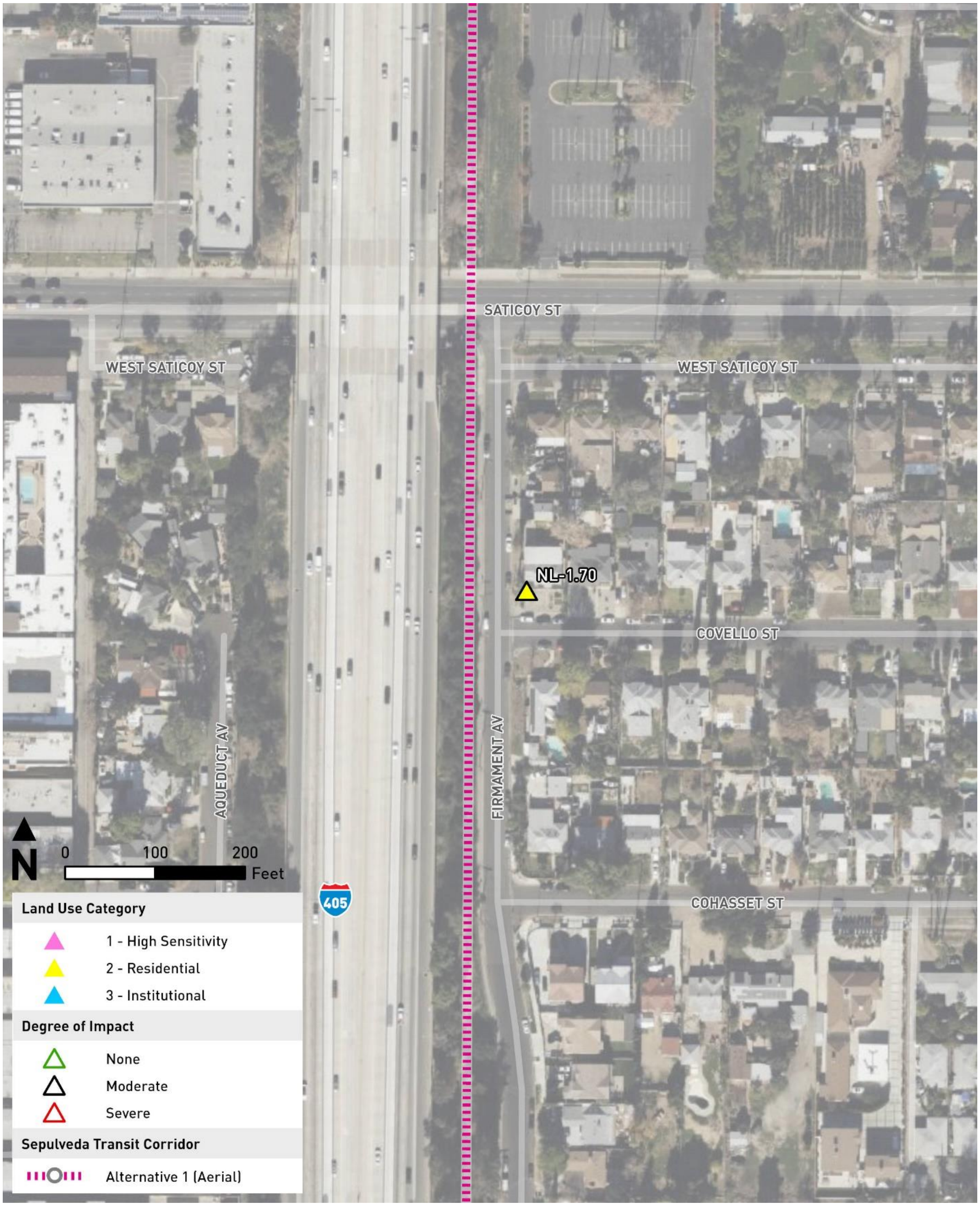


Source: HTA, 2024

Figure 6-13. Alternative 1: Rail Operations Noise Impacts – Victory Boulevard to Sherman Way

Source: HTA, 2024

Figure 6-14. Alternative 1: Rail Operations Noise Impacts – Sherman Way to Saticoy Street



Source: HTA, 2024

Electric Bus Operations Noise

The electric bus connecting the Wilshire Boulevard/Metro D Line Station, Westwood Village, and UCLA Gateway Plaza would be a battery electric, low-floor transit bus, either 40 or 60 feet in length. The buses would operate at the same headways as the monorail which would result in 30 buses in each direction during peak daytime hours. The electric bus service would operate in existing mixed-flow travel lanes on Wilshire Boulevard and Westwood Boulevard.

During peak daytime hours, electric bus service would result in an hourly L_{eq} of approximately 57 dBA hourly L_{eq} at the nearest locations within the Los Angeles National Cemetery located approximately 75 feet from the centerline of Wilshire Boulevard. Measured existing daytime hourly noise levels within the Los Angeles National Cemetery near Wilshire Boulevard are approximately 65 dBA L_{eq} (Receptor 12A in Table 6-6). Given this existing noise level, the FTA threshold of moderate impact would be 61 dBA L_{eq} at these locations. The electric bus noise level of 57 dBA L_{eq} would be below the FTA moderate impact threshold of 61 dBA L_{eq}. Therefore, electric bus operations under Alternative 1 would not result in significant noise impacts at outdoor Category 3 noise-sensitive receptors along Wilshire Boulevard.

Along the Westwood Boulevard segment, electric bus operations would generate 55 dBA L_{eq} at setbacks of educational and medical buildings along Westwood Boulevard. Existing measured daytime noise levels at such locations are near 58 dBA L_{eq} (noise measurement site 9 in Table 6-6). Therefore, daytime noise exposure from electric bus passbys would be below the FTA impact threshold of 57 dBA L_{eq}. At exterior areas of the Luskin Conference Center and medical buildings along Westwood Boulevard, which are considered to be noise Category 2 land uses, existing measured L_{dn} is 62 dBA (Receptor 10 in Table 6-5). Electric bus daily operations would result in a noise exposure of about 52 dBA L_{dn} at such locations, which is below the applicable FTA moderate impact threshold of 59 dBA L_{dn}. Therefore, Alternative 1 would result in a less than significant impact related to electric bus operations.

Ancillary Facilities (Traction Power Substation) Noise

Noise generated by ancillary facilities associated with Alternative 1 would be due to ventilation system fans at TPSS facilities along the Alternative 1 alignment. Eleven TPSS sites would be required and six would be located near noise-sensitive receptors. Table 6-2 provides the descriptions of TPSS sites associated with Alternative 1. shows a summary of Alternative 1 TPSS noise impact assessments. TPSS facilities would not result in noise impacts at sensitive receptors. This is primarily due to the fact that TPSS installations would be in noisy areas and located at sufficient distances from the nearest noise-sensitive land uses to allow for noise attenuation. Therefore, operation of Alternative 1 would result in a less than significant impact related to ancillary facilities noise.

Table 6-8. Alternative 1: Combined Rail and Ancillary Facility Noise Impacts by Traction Power Substation Site

TPSS Site	Nearest Noise-Sensitive Land Use	Distance (feet)	Existing Sound Level (dBA, L_{dn} or Hourly L_{eq})	TPSS Noise Level (dBA, L_{dn} or Hourly L_{eq})	Combined Rail and TPSS Operations Noise Level (dBA, L_{dn} or Hourly L_{eq})	Noise Impact Thresholds		Level of Impact
						Moderate	Severe	
1	2435 S Sepulveda Boulevard [a]	350	74	39	52	66-72	>72	**No Impact**
2	Veterans Hospital [a] 11301 Wilshire Boulevard	740	67	33	47	63-67	>67	**No Impact**
3	Nearest condos in Museum Heights[a] 171 North Church Lane, Los Angeles	350	72	39	53	66-71	>71	**No Impact**
4	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**
5	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**
6	Skirball Cultural Center[b] Ziegler Amphitheater	260	61	36	51	59-64	>64	**No Impact**
7	Alister Sherman Oaks[a] 4440 Sepulveda Boulevard, Sherman Oaks	300	76	41	49	66-74	>74	**No Impact**
8	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**
9	Helen Towers Apartments[a] 15549 Sherman Way	150	67	47	49	63-67	>67	**No Impact**
10	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**
11	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**

Source: HTA, 2024

[a]Noise levels at these locations are in terms of the day-night equivalent level (L_{dn}).

[b]Noise levels at these locations are in terms of hourly average level (L_{eq}).

NA = not applicable
SFR = single-family residential

MSF Noise

Noise levels from the MSF Base Design, MSF Design Option 1, and electric bus MSF were predicted based on the assumptions made in Section 3 Methodology of this report. Noise sources considered for the MSF noise analysis include train movements on lead tracks, washing and blowdown activities at the car wash, maintenance shop operations, and TPSS units within the MSF yard.

MSF Base Design Noise

MSF Base Design for Alternative 1 would be located on an 18-acre LADWP property east of the Van Nuys Metrolink Station. The MSF Base Design site would be designed to accommodate a fleet of 208 monorail vehicles. In the MSF Base Design, the MSF would be located on industrial property, abutting Orion Avenue, south of the LOSSAN Corridor. The MSF Base Design site would be approximately 26 acres and designed to accommodate a fleet of 224 monorail vehicles.

Table 6-9 shows the predicted noise levels from the MSF Base Design layout at representative noise-sensitive receptors. The MSF Base Design would not result in noise impacts at noise-sensitive receptors. Therefore, operation of Alternative 1 would result in a less than significant impact related to MSF Base Design noise.

Table 6-9. Alternative 1: Predicted Maintenance and Storage Facility Base Design Noise

Receptor ID	Location	Land Use	FTA Category	Existing Sound Level (dBA, L_{dn})	Predicted MSF Noise Level (dBA, L_{dn})	Noise Impact Thresholds		Level of Impact
						Moderate	Severe	
MSF-1.5	14347 Cohasset Street	SFR	2	53	39	55-60	>60	**No Impact**
MSF-1.6	14231 Cohasset Street	SFR	2	53	42	55-60	>60	**No Impact**
MSF-1.7	14019 Cohasset Street	SFR	2	53	41	55-60	>60	**No Impact**

Source: HTA, 2024

MSF Design Option 1 Noise

Table 6-10 shows the predicted noise levels from the MSF Design Option 1 layout. MSF Design Option 1 would not result in noise impacts at noise-sensitive receptors. Therefore, operation of Alternative 1 would result in a less than significant impact related to MSF Design Option 1 noise.

Table 6-10. Alternative 1: Predicted Maintenance and Storage Facility Design Option 1 Noise

Receptor ID	Location	Land Use	FTA Category	Existing Sound Level (dBA, L_{dn})	Predicted MSF Noise Level (dBA, L_{dn})	Noise Impact Thresholds		Level of Impact
						Moderate	Severe	
MSF-1.2	15524 Stagg Street	SFR	2	58	48	57-62	>62	**No Impact**
MSF-1.3	7826 Orion Avenue	SFR	2	58	48	57-62	>62	**No Impact**
MSF-1.4	7827 Zombar Avenue	SFR	2	58	41	57-62	>62	**No Impact**

Source: HTA, 2024

Electric Bus MSF Noise

The electric bus MSF is proposed to be located on an approximately 2-acre property located at the northwest corner of Pico Boulevard and Cotner Avenue in West Los Angeles. The MSF would be designed to accommodate 14 electric buses.

Table 6-11 shows the predicted noise levels from the Electric Bus MSF layout at the nearest noise-sensitive receptor south of Pico Boulevard. The Electric Bus MSF would not result in noise impacts at noise-sensitive receptors. In addition, assuming 12 electric bus trips in and out of the MSF per hour, the wayside noise levels from such trips would be 53 dBA L_{eq} per hour at 50 feet. This level is far below the existing noise levels from Pico Boulevard or Sepulveda Boulevard at similar distances from the roadways. For example, the existing measured hourly L_{eq} at measurement site 1 (south of the MSF) are between 62 to 71 dBA, well above the predicted noise from electric buses. Therefore, operation of Alternative 1 would result in a less than significant impact related to Electric Bus MSF noise.

Table 6-11. Alternative 1: Predicted E-Bus Maintenance and Storage Facility Noise

Receptor ID	Location	Land Use	FTA Category	Existing Sound Level (dBA, L_{dn})	Predicted MSF Noise Level (dBA, L_{dn})	Noise Impact Thresholds		Level of Impact
						Moderate	Severe	
MSF-1.1	2435 S Sepulveda Boulevard	SFR	2	69	44	64-69	>69	**No Impact**

Source: HTA, 2024

6.3.1.2 Construction Noise Impacts

Construction of Alternative 1 would include various phases that would involve the use of construction equipment at specific locations along the proposed alignment. Construction noise levels under Alternative 1 were estimated in terms of the equipment noise levels ($L_{eq.equip}$) for each phase of construction based upon the number and types of off-road construction equipment to be employed during the given phase. Attachment 4 shows the results of the construction noise estimations at a reference distance of 50 feet from construction activities.

The FTA has provided guidance for assessing construction noise associated with transit projects (FTA, 2018). For the purposes of this analysis, the FTA Detailed Analysis construction noise limit criteria of 8-hour $L_{eq.equip}$ have been applied. The criteria are based upon an 8-hour $L_{eq.equip}$, as shown in Table 2-4. For residential uses, the threshold is 80 dBA 8-hour $L_{eq.equip}$ for daytime construction and 70 dBA 8-hour $L_{eq.equip}$ for nighttime construction. Commercial and industrial uses are held to 85-dBA 8-hour $L_{eq.equip}$ and 90-dBA 8-hour $L_{eq.equip}$, respectively, for both daytime and nighttime construction noise thresholds.

Table 6-12 is a summary of expected construction noise levels at locations of nearest noise-sensitive receptors to each construction activity. Construction noise would range from 8-hour $L_{eq.equip}$ noise levels of approximately 79 to 101 dBA at the nearest sensitive receptors. As shown in Table 6-12, construction activities would result in equipment noise levels that exceed the FTA 80-dBA daytime and 70-dBA nighttime 8-hour $L_{eq.equip}$ thresholds for residential land uses.

Table 6-12. Alternative 1: Estimated Construction Noise Levels

Construction Phase	$L_{eq.equip}$ (dBA) at 50 feet	$L_{eq.equip\ (8hr)}$ (dBA) at Nearest Receptors	Exceeds 80-dBA $L_{eq.equip\ (8\text{-}hr)}$ Daytime Threshold?	Exceeds 70-dBA $L_{eq.equip\ (8\text{-}hr)}$ Nighttime Threshold?
Monorail Transit Segments 1-4 Construction				
Utility Relocations	87	92	Yes	Yes
Demolition/Site Preparation	87	92	Yes	Yes
Substructure Foundations (CIDH)[a]	87-96	92-101	Yes	Yes
Precast Superstructure Assembly	87	92	Yes	Yes
Finishing Work	85	90	Yes	Yes
Aerial Station Construction				
Utility Relocations	87	81	Yes	Yes
Demolition/Site Preparation	87	81	Yes	Yes
Substructure Foundations (CIDH)	87	81	Yes	Yes
Precast Superstructure Assembly	87	81	Yes	Yes
Finishing Work	85	79	No	Yes
Traction Power Substation Construction				
Utility Relocations	87	83	Yes	Yes
Demolition/Site Preparation	85	81	Yes	Yes
Excavation	87	83	Yes	Yes
Concrete Work	84	80	Yes	Yes
Utility Work	87	83	Yes	Yes
Paving	88	84	Yes	Yes
Maintenance and Storage Facility Construction				
Utility Relocation	87	85	Yes	Yes
Demolition/Site Preparation	87	85	Yes	Yes
Excavation	89	87	Yes	Yes
Concrete Work	86	84	Yes	Yes
Utility Work	87	85	Yes	Yes
Paving	88	86	Yes	Yes
Haynes Street Construction				
Utility Relocation	90	92	Yes	Yes
Missouri Avenue Construction				
Utility Relocation	90	92	Yes	Yes
La Grange Avenue Construction				
Utility Relocation	90	92	Yes	Yes
Mississippi Avenue Construction				
Utility Relocation	90	92	Yes	Yes
I-405 Improvements				
Utility Relocation	87	84	Yes	Yes
Demolition/Site Preparation	91	88	Yes	Yes
Grading/Excavation	94	91	Yes	Yes
Concrete Work	88	85	Yes	Yes
Precast Yard Construction				
Demolition/Site Preparation	87	85	Yes	Yes
Excavation	89	87	Yes	Yes
Concrete Work	90	88	Yes	Yes
Utility Work	87	85	Yes	Yes

Construction Phase	$L_{eq.equip}$ (dBA) at 50 feet	$L_{eq.equip\ (8hr)}$ (dBA) at Nearest Receptors	Exceeds 80-dBA $L_{eq.equip\ (8\text{-}hr)}$ Daytime Threshold?	Exceeds 70-dBA $L_{eq.equip\ (8\text{-}hr)}$ Nighttime Threshold?
Paving	88	86	Yes	Yes
Guideway Fabrication	86	84	Yes	Yes

Source: HTA, 2024

[a]Variation in noise levels for this phase are due to variation in number of equipment used for different segments.

CIDH = cast-in-drilled-hole
$L_{eq.equip\ (8\text{-}hr)}$ = equivalent noise level from construction equipment over 8-hour workday

6.3.2 Impact NOI-2: Would the project cause generation of excessive groundborne vibration or groundborne noise levels?

6.3.2.1 Operational Vibration Impacts

Rail Operations Vibration

GBV and groundborne noise (GBN) levels from train operations associated with Alternative 1 were evaluated using the general vibration assessment procedure in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018). Section 3.2 describes the operational vibration assessment methodology.

GBV and GBN levels were evaluated at a total of 52 receptor locations representing all the sensitive land uses along the Alternative 1 alignment within the vibration screening distance. Calculated GBV levels from rail operations are between 19 VdB and 50 VdB. The predicted GBV levels from Alternative 1 vehicle passbys are well below the FTA criteria of 72 VdB for Category 2 land uses and 75 VdB for Category 3 land uses. GBN levels are predicted to be up to 30 dBA, which is also below the GBN criterion of 35 dBA for residential uses.

Attachment 5 shows the details of the operational vibration impact assessment at the representative Category 2 and Category 3 receptors along the Alternative 1 alignment. Based on the results of the vibration analysis, there would be no GBV nor GBN impacts at sensitive receptors along the alignment. Therefore, operation of Alternative 1 would result in a less than significant impact related to GBV or GBN generated by rail operations.

Electric Bus Operations Vibration

Under Alternative 1 operations, the electric bus service connecting the Wilshire Boulevard/Metro D Line Station, Westwood Village, and UCLA Gateway Plaza would operate in existing mixed-flow travel lanes on Wilshire Boulevard and Westwood Boulevard. Additionally, there would be occasional electric bus movements between the electric bus MSF and Wilshire Boulevard/Metro D Line Station via Pico Boulevard and Sepulveda Boulevard. Electric bus operations along these routes would generate GBV and GBN at vibration-sensitive land uses located along the roadways.

GBV levels from electric bus operations would be 50 to 54 VdB at typical distances of 35 to 100 feet from the outside lanes of Wilshire Boulevard to the nearest vibration-sensitive buildings along Wilshire Boulevard. GBN levels at the nearest buildings along Wilshire Boulevard would reach up to 19 dBA. Therefore, electric bus operations under Alternative 1 would not result in significant noise impacts at Category 3 noise-sensitive receptors along Wilshire Boulevard.

Along the Westwood Boulevard segment, electric bus operations would generate GBV of up to 54 VdB at setbacks of the nearest educational and medical buildings. GBN levels at the nearest Category 1 and Category 3 buildings along Wilshire Boulevard would reach up to 19 dBA.

Electric bus movements along Sepulveda Boulevard and Pico Boulevard, between the Wilshire Boulevard/Metro D Line Station and the electric bus MSF, would result in GBV levels of 53 to 56 VdB at the nearest Category 1 and Category 3 buildings. GBN levels due to electric bus movements would reach 21 dBA at the nearest buildings along Sepulveda Boulevard and Pico Boulevard. All of the anticipated GBV and GBN levels associated with electric bus operations would be below the applicable FTA criteria. Therefore, Alternative 1 would result in a less than significant impact related to electric bus operations GBV and GBN.

Maintenance and Storage Facility Vibration

MSF Base Design

Under the MSF Base Design, monorail trains would access the site from the main alignment's northern tail tracks at the northwest corner of the site. Trains would travel parallel to the LOSSAN Corridor before curving southeast to maintenance facilities and storage tracks. The guideway would remain in an aerial configuration within the MSF Base Design, including within maintenance facilities. Rail tracks in this MSF would be located in an industrial area with the nearest sensitive structures nearly 700 feet south of the maintenance facilities tracks. The vibration level at 700 feet would be 36 VdB and would be below the 72 VdB criterion for residential uses. Therefore, operation of the MSF Base Design would result in a less than significant impact related to GBV or GBN.

MSF Design Option 1

Under MSF Design Option 1, monorail trains would access the site from the monorail guideway east of Sepulveda Boulevard. From the northeast corner of the site, trains would travel parallel to the LOSSAN Corridor before turning south to maintenance facilities and storage tracks parallel to I-405. The guideway would remain in an aerial configuration within the MSF Design Option 1, including within maintenance facilities. Distances from the elevated tracks to the nearest sensitive buildings would be nearly 400 feet to residences along Marson Street in Panorama City, 585 feet to 740 feet from the nearest residential structures southeast of the MSF. The nearest storage tracks would be located between 300 to 400 feet from the nearest residential buildings to the east and southeast of the MSF Design Option 1. At the nearest sensitive receptor located 300 feet away vibration levels from monorail movements within the MSF Design Option 1 would be 40 VdB and would be below 72 VdB criterion for residential uses. Vibration levels at sensitive receptors further away would also be below the 72 VdB criterion for residential uses. Therefore, operation of the MSF Design Option 1 would result in a less than significant impact related to GBV or GBN.

6.3.2.2 Construction Vibration Impacts

The primary concern related to vibration during construction is the potential to damage structures. Some construction activities, such as pile driving, use of drill rigs, pavement breaking, and the use of tracked vehicles (e.g., bulldozers) and hoe rams, could result in perceptible levels of GBV at sensitive buildings located in close proximity to construction sites. These activities would typically be limited in duration and their vibration levels are likely to be well below thresholds for minor cosmetic building damage.

Project construction would include a limited number of activities expected to generate vibration that approaches the lowest building damage limit of 0.12 in/sec PPV (criteria in Table 2-7). Table 6-13 shows the distances at which the 0.12 in/sec PPV, 0.2 in/sec PPV, and 0.3 in/sec PPV thresholds would not be exceeded. For example, use of a drilling rig, hoe ram, or large bulldozer would be safe at distances greater than 22 feet from Category IV buildings. A vibratory roller would be safe at distances greater than 22 feet from Category IV buildings and typical impact pile driver operation would be safe at distances of 79 feet or greater. Typical building construction in an urban setting consists of buildings that are Category II engineered concrete and masonry that have a 0.3 in/sec PPV threshold or Category III non-engineered timber and masonry buildings that have a 0.2 in/sec PPV threshold. Typical construction equipment, such as a large bulldozer, would not exceed the 0.2 in/sec PPV building damage criterion at distances of 18 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 13 feet or greater. A vibratory roller would not exceed the 0.2 in/sec PPV building damage criterion at distances of 32 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 23 feet or greater. An impact pile driver would not exceed the 0.2 in/sec PPV building damage criterion at distances of 67 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 47 feet or greater.

Table 6-13. Construction Equipment Vibration Damage Potential by Distance

Equipment	Reference Vibration Level PPV (inches/second)	Distance to not Exceed 0.12 PPV Damage (feet)	Distance to not Exceed 0.2 PPV Damage (feet)	Distance to not Exceed 0.3 PPV Damage (feet)
Drill (CIDH)	0.089	22	18	13
Impact Pile Driver	0.644 (typical vibration level)	79	67	47
	1.518 (upper range vibration level)	140	117	84
Large Bulldozer	0.089	22	18	13
Vibratory Pile Driver	0.17 (typical vibration level)	33	28	20
	0.734 (upper range vibration level)	87	73	52
Vibratory Roller	0.210	38	32	23

Source: HTA, 2024

PPV = peak particle velocity

Vibration annoyance is another concern during construction. In rare instances, when vibration-intensive construction activities occur close to sensitive structures (within 25 feet), such as residential buildings, or special use buildings like laboratories or recording studios, vibration could exceed the FTA vibration annoyance criteria shown in Table 2-5 and Table 2-6.

Construction occurring in the area south of the Santa Monica Mountains would be in the urban environment and would have higher potential for construction equipment to operate within 25 feet or less of adjacent buildings. In particular, between Exposition Boulevard and Wilshire Boulevard, construction equipment could operate in proximity to buildings that would potentially result in building vibration damage or vibration annoyance. Construction activity would typically occur at distances greater than 50 feet from sensitive buildings between Wilshire Boulevard, through the Santa Monica Mountains, and Green Leaf Street in the Valley as the alignment would be located in either the I-405 freeway ROW or in areas immediately adjacent to the freeway, where there are limited to no structures. North of Greenleaf Street, the alignment would travel along the east side of the I-405 freeway in a constrained area with buildings adjacent to the construction footprint. The FTA building damage criteria and vibration annoyance criteria could potentially be exceeded at buildings in these areas.

Maintenance and Storage Facility Construction Vibration

MSF Base Design

Vibration-sensitive structures located closest to the construction of the MSF Base Design are residential buildings located along the east side of Orion Avenue and north of Stagg Street. The nearest residential structure in this area would be approximately 90 feet from excavating/grading activities and 240 feet from structural foundation. At such distances, the anticipated vibration levels from construction would be 0.031 in/sec PPV from the use of vibratory rollers during paving, 0.013 in/sec PPV from a large bulldozer, and 0.003 in/sec PPV from caisson drilling. All these levels are below the construction vibration damage risk criteria for all building types (Table 2-7). Therefore, vibration impacts related to construction of the MSF Base Design would be less than significant. No mitigation measures would be required.

MSF Design Option 1

The nearest existing building to the construction of the MSF Design Option 1 is a light industrial building located at 7605 Hazeltine Avenue in Van Nuys. The closest façade of this building is adjacent to the southern property line of the proposed MSF site. The highest vibration levels from construction of the MSF Design Option 1 at the closest off-site building would be 0.83 in/sec PPV from the use of a vibratory roller during paving, and 0.35 in/sec PPV from a large bulldozer during the grading phase. Estimated vibration levels from caisson drilling would be 0.03 in/sec. The applicable damage risk criterion for the subject building type is 0.3 in/sec PPV (Building Type II in Table 2-7). Therefore, vibration impacts due to construction of the MSF Design Option 1 would be significant without mitigation. The minimum distance from the subject building at which large bulldozers and vibratory rollers must operate is 20 feet from the north façade of the building during the construction of the MSF Design Option 1. This mitigation measure would be a part of Mitigation Measure (MM) VIB-1.1 (Vibration Control Plan) for Alternative 1.

Electric Bus MSF

The nearest existing buildings to the construction of the Electric Bus MSF are light industrial buildings located along the east side of Cotner Avenue north of Pico Boulevard. The closest west façades of these buildings are between 60 to 65 feet from the proposed MSF site. The highest vibration levels from construction of the Electric Bus MSF Design to the closest off-site buildings would be 0.06 in/sec PPV from the use of a vibratory roller during paving, 0.02 in/sec from the use of a hoe ram during building demolitions, and 0.024 in/sec PPV from a large bulldozer during the grading phase. Estimated vibration levels from caisson drilling for new building foundations would be 0.02 in/sec. All these levels are below the construction vibration damage risk criteria for all building types (Table 2-7). Therefore, vibration impacts related to construction of the Electric Bus MSF would be less than significant. No mitigation measures would be required.

Construction Vibration Impacts on Historic Buildings

Construction under Alternative 1 would have the potential to damage buildings in close proximity to vibration-intensive construction activities. Using the reference levels in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018), vibration levels from project construction activities were estimated at historic buildings or structures eligible for the National Register of Historic Places along the Alternative 1 alignment. Such buildings are generally classified as extremely susceptible to vibration damage (Building Type IV in Table 2-7).

Findings of the construction vibration assessment at historic structures are as follows:

- Historic building located at 4511 Sepulveda Boulevard is very close to the Alternative 1 alignment. Most vibration-intensive construction activities at this location would result in levels exceeding the damage criterion of 0.12 in/sec PPV. Special consideration should be made for this building in MM VIB-1.1 (Vibration Control Plan) outlined in Section 6.4.
- Pile driving at locations along the alignment in the vicinity of the following historic properties would potentially result in GBV levels exceeding the damage criterion of 0.12 in/sec PPV. Therefore, these locations must be addressed in the Vibration Control Plan if pile driving is to occur within 150 feet of the buildings:
  - Photo Electronics Corp. Building, 1944 Cotner Avenue, Los Angeles
  - Dual Ultimate Pharmacy, 2020 Cotner Avenue, Los Angeles
  - Building at 2114 Cotner Avenue, Los Angeles
  - Rodeo Realty, 15300 Ventura Boulevard, Sherman Oaks
  - Historic building located at 14746 Raymer Street, Van Nuys

6.3.3 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 2 miles of a public airport or public use airport, would the project expose people residing or working in the Project Study Area to excessive noise levels?

The Santa Monica Airport and Van Nuys Airport are located within 2 miles of Alternative 1. However, Alternative 1 is a transit project that is not sensitive to noise. Transit riders would not dwell at one location for an extended period of time that would result in exposure to excessive airport noise. Construction workers working on Alternative 1 would utilize ear protection as required while working on Alternative 1 alignment. Therefore, no impacts related to airport noise would occur.

6.4 Mitigation Measures

6.4.1 Operational

The following mitigation measures would be needed to reduce operational noise impacts from train movements along the Alternative 1 alignment:

MM NOI-1.1: ***Soundwalls***:

- *Soundwalls of 3.5 feet in height shall be installed above the top of the guideway beams to reduce noise to below the Federal Transit Administration moderate-impact noise criteria. Soundwalls reduce noise levels at noise-sensitive receptors by breaking the direct line-of-sight between source and receptor with a solid wall. Aerial guideways typically do not require tall walls due to the height of the guideway over the receptor and a 3.5-foot wall height was the effective height determined to reduce noise level to below the FTA noise impact criteria. Locations shall be verified during final design as necessary to reduce noise to below the*

Federal Transit Administration moderate-impact noise criteria. Table 6-14 shows the soundwall locations.

Table 6-14. Alternative 1: MM NOI-1.1 – Soundwalls Locations

Location	Type	Civil Station Location	Track Side
Albers Apartments 15328 Albers Street; and Best Western Plus Carriage Inn 5525 Sepulveda Boulevard	3.5-foot-high soundwall above the guideway beams	1047+80 to 1053+00 East of tracks	Northbound
Granada Apartments15630 Vanowen Street	3.5-foot-high soundwall above guideway beams	1137+40 to 1142+00 East of tracks	Northbound
Single-family backyards east of I-405, between Vanowen Street and Lili Way	3.5-foot-high soundwall above guideway beams	1142+00 to 1160+30 East of tracks	Northbound
Single-family homes along the east side of Firmament Avenue, between Cohasset Street and Saticoy Street	3.5-foot-high soundwall above the guideway beams	1189+00 to 1195+00 East of tracks	Northbound

Source: HTA, 2024

6.4.2 Construction

The following mitigation measures would be needed to reduce construction noise and vibration levels to below the applicable limits:

MM NOI-1.2: **Noise Control Plan:**

- *Prior to the initiation of localized construction activities, the Project contractor shall develop a Noise Control Plan demonstrating how the Federal Transit Administration 8-hour $L_{eq.equip}$ (equivalent noise level of equipment) noise criteria would be achieved during construction. The Noise Control Plan shall be prepared by a board-certified acoustical engineer. The Federal Transit Administration 8-hour $L_{eq.equip}$ construction noise standards are as follows: Residential daytime standard of 80 dBA 8-hour $L_{eq.equip}$ and nighttime standard of 70 dBA 8-hour $L_{eq.equip}$, Commercial daytime and nighttime standard of 85 dBA 8-hour $L_{eq.equip}$, and Industrial daytime and nighttime standard of 90 dBA 8-hour $L_{eq.equip}$. The Noise Control Plan shall be designed to follow Metro requirements, and shall include measurements of existing noise, a list of the major pieces of construction equipment that would be used, predictions of the noise levels at the closest noise-sensitive receptors (residences, hotels, schools, religious facilities, and similar facilities), and noise mitigation measures to be implemented to achieve compliance with the Federal Transit Administration 8-hour $L_{eq.equip}$ construction noise standards to the degree feasible. The Noise Control Plan must be approved by Metro prior to initiating noise-generating construction activities. The Project contractor shall conduct continuous noise monitoring to demonstrate compliance with the Federal Transit Administration 8-hour $L_{eq.equip}$ noise limits. If the FTA 8-hour $L_{eq.equip}$ criteria are exceeded, the Project contractor shall implement measures to reduce construction noise as much as feasible. The Project contractor shall establish a public information and complaint system. The Project contractor shall respond to and provide corrective action for complaints within 24-hours. In addition, The Project shall comply with local noise ordinances when* *applicable, including by obtaining a variance(s) from the applicable local jurisdiction when nighttime work is required. Noise reducing methods that may be implemented by the Project contractor include:*

- *If nighttime construction is planned, a noise variance may be prepared by the Project contractor, if required by the jurisdiction, that demonstrates the implementation of control measures to maintain noise levels below the applicable Federal Transit Administration and local standards.*
- *Where nighttime construction would exceed the FTA nighttime criteria, avoid nighttime construction to the degree feasible.*
- *Utilize specialty equipment equipped with enclosed engines and/or high performance mufflers as feasible. The Project contractor shall locate equipment and staging areas as far from noise-sensitive receptors as possible.*
- *Limit unnecessary idling of equipment.*
- *Install temporary noise barriers as needed where feasible.*
- *Reroute construction related truck traffic away from residential streets to the extent permitted by the relevant municipality.*
- *Avoid impact pile driving where possible. Drilled piles or vibratory pile drivers would be required where feasible.*
- *Where Project construction cannot be performed in accordance with the requirements of the applicable noise limits, the Project contractor should be required to investigate alternative construction methods that would result in lower sound levels. Also, the Project contractor should be required to conduct noise monitoring to demonstrate compliance with noise limits outlined in the Noise Control Plan.*

MM VIB-1.1: ***Vibration Control Plan:***

- *Prior to construction, the Project contractor shall prepare a Vibration Control Plan demonstrating how the Federal Transit Administration building damage risk criteria and the Federal Transit Administration vibration annoyance criteria would be achieved. The Vibration Control Plan must be approved by Metro prior to initiating vibration-generating construction activities. The Vibration Control Plan would include a list of the major pieces of construction equipment that would be used, and the predictions of the vibration levels at the closest sensitive receivers. The Project contractor would conduct vibration monitoring to demonstrate compliance with the vibration limits during construction activity. Where the construction cannot be performed to meet the vibration criteria, the Project contractor would implement alternative means and methods of construction measures to reduce vibration levels as much as feasible. Vibration reducing methods that may be implemented by the Project contractor include:*
  - *When feasible, use construction equipment or less vibration intensive techniques near vibration sensitive locations.*

   - *Use as small an impact device (i.e., hoe ram, pile driver) as possible to accomplish necessary tasks.*
   - *Avoid impact pile driving where possible. Drilled piles or vibratory pile drivers would be required where feasible.*
   - *When feasible, in construction areas close to sensitive buildings, select non-impact demolition and construction methods such as saw or torch cutting and removal for off-site demolition, and use chemical splitting, or hydraulic jack splitting, instead of high impact methods.*

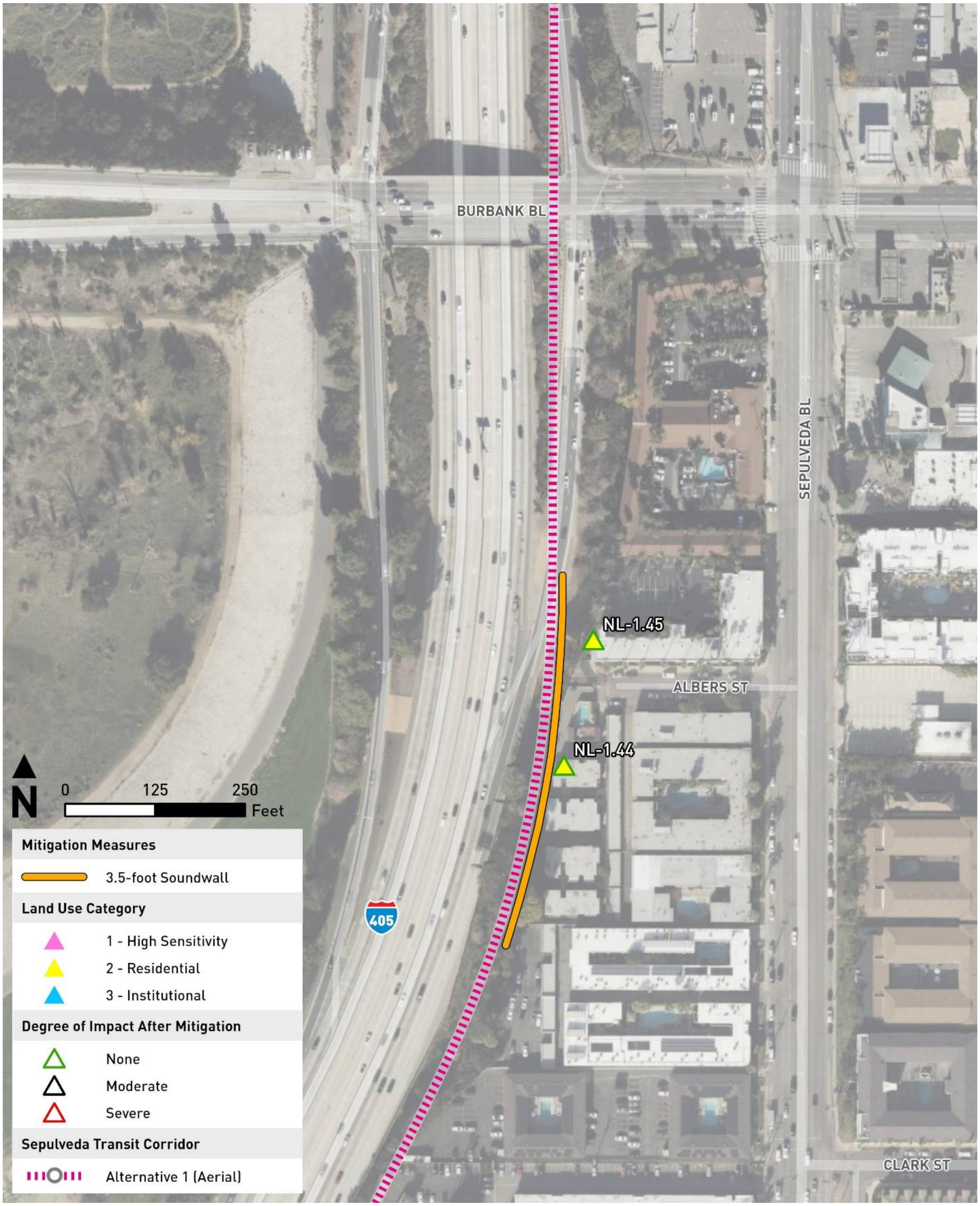
- *The Project contractor shall monitor construction vibration levels at structures identified as a "historic" resource within the meaning of CEQA Guidelines Section 15064.5(a) to ensure the vibration damage threshold of 0.12 in/sec PPV shall not be exceeded. The vibration monitoring shall be conducted by a qualified professional for real-time vibration monitoring for construction work at the Project construction site requiring heavy equipment or ground compaction devices. A pre-construction and post-construction survey of these buildings shall be conducted by a qualified structural engineer. Any damage shall be noted. All vibration monitors used for these measurements shall be equipped with an "alarm" feature to provide advanced notification that vibration impact criteria have been approached. Documented damage in the post-construction survey shall be repaired as required by the Secretary of the Interior's (SOI's) Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. The following historic resources shall be included in the Vibration Control Plan.*
   - *Historic building located at 4511 Sepulveda Boulevard*
   - *Photo Electronics Corp. Building, 1944 Cotner Avenue, Los Angeles*
   - *Dual Ultimate Pharmacy, 2020 Cotner Avenue, Los Angeles*
   - *Building at 2114 Cotner Avenue, Los Angeles*
   - *Rodeo Realty, 15300 Ventura Boulevard, Sherman Oaks*
   - *Historic building located at 14746 Raymer Street, Van Nuys*

6.4.3 Impacts After Mitigation

6.4.3.1 Operational

Alternative 1 operations would result in moderate noise impacts at five receptors representing 26 single-family dwelling units, five multi-family buildings, and a hotel. MM NOI-1.1 would require the installation of soundwalls along the east side of the northbound tracks. Rail operations noise impacts after implementation of mitigation MM NOI-1.1 are shown on Figure 6-15, Figure 6-16, and Figure 6-17.

Figure 6-15. Alternative 1: Mitigated Rail Operations Noise Impacts – Magnolia Blvd to Burbank Blvd

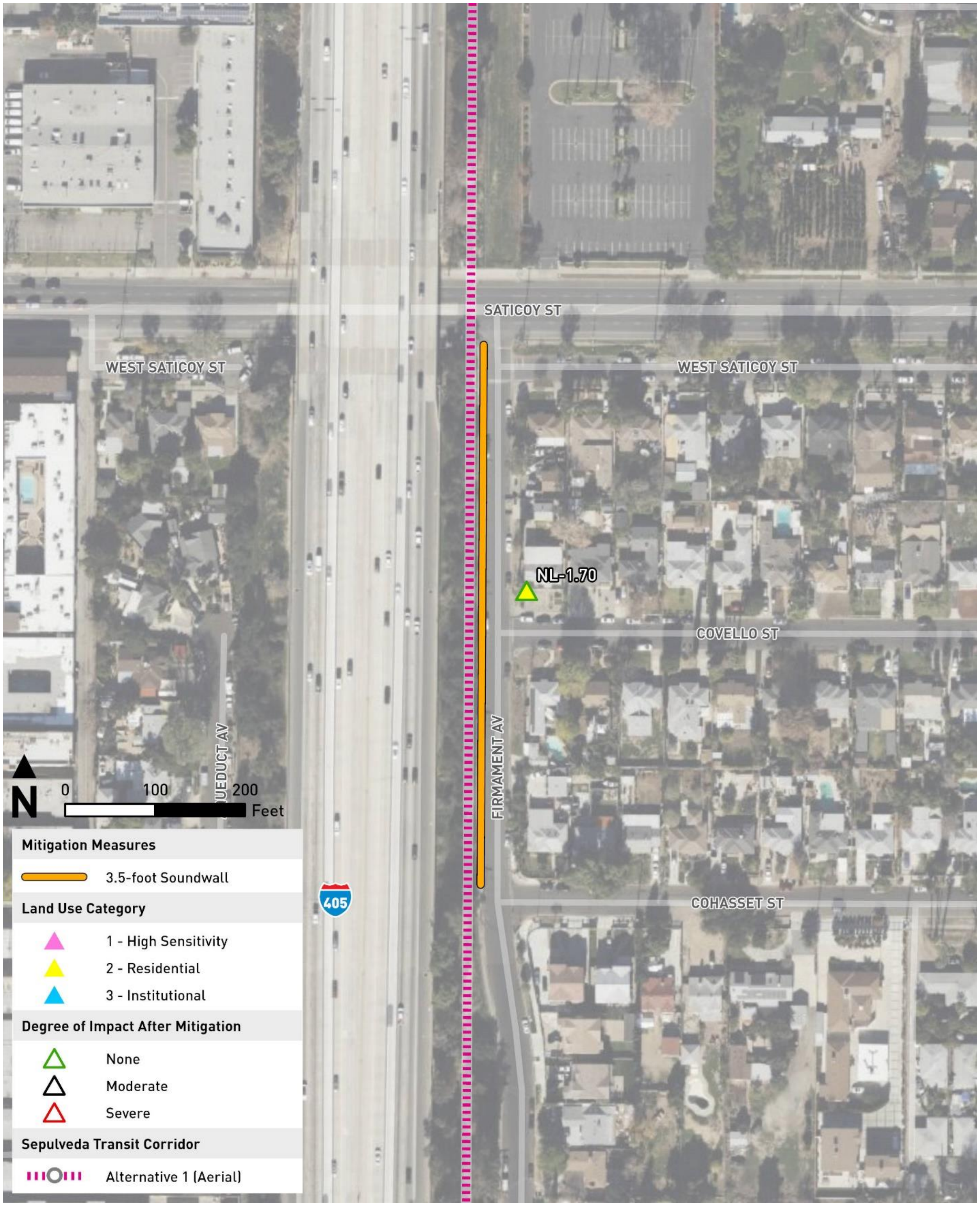


Source: HTA, 2024

Figure 6-16. Alternative 1: Mitigated Rail Operations Noise Impacts – Victory Blvd to Sherman Way

Source: HTA, 2024

Figure 6-17. Alternative 1: Mitigated Rail Operations Noise Impacts – Cohasset Street to Saticoy Street



Source: HTA, 2024

As shown in Table 6-15, soundwalls of heights of 3.5 feet above the guide beams would result in monorail noise levels below the FTA moderate impact threshold at the impacted receptors. Therefore, Alternative 1 would result in a less than significant impact with mitigation.

Table 6-15. Alternative 1: Summary of Noise Impacts and Mitigation Measures

Receptor ID	Location	Unmitigated Impact	Mitigation			
			Type	Civil Station Location	Project Noise Level (L_{dn}, dBA)	Impact Level
NL-1.44	Albers Apartments, 15328 Albers Street, Sherman Oaks	Moderate	3.5-foot-high soundwall above track beams	1047+80 to 1053+00 (northbound) east of tracks	57	**No Impact**
NL-1.45	Best Western Plus Carriage Inn-South 5525 Sepulveda Boulevard, Sherman Oaks	Moderate	3.5-foot-high soundwall above track beams	1047+80 to 1053+00 (northbound) east of tracks	56	**No Impact**
NL-1.59	Granada Apartments 15630 Vanowen Street, Van Nuys	Moderate	3.5-foot-high soundwall above track beams	1137+40 to 1142+00 (northbound) east of tracks	60	**No Impact**
NL-1.62	15623 Hart Street, Van Nuys	Moderate	3.5-foot-high soundwall above track beams	1142+00 to 1160+30 (northbound) east of tracks	56	**No Impact**
NL-1.70	15559 Covello Street, Van Nuys	Moderate	3.5-foot-high soundwall above tracks	1189+00 to 1195+00 (northbound) east of tracks	55	**No Impact**

Source: HTA, 2024

6.4.3.2 Construction

Noise

The proposed Alternative 1 alignment would result in temporary and periodic increases in ambient noise levels due to construction activity that would exceed FTA's criteria and, where applicable, the standards established by the local noise ordinances. While MM NOI-1.2 would be implemented, which would include noise-reducing measures, there may still be temporary or periodic increases in ambient noise levels that exceed FTA construction impact criteria. There are no feasible mitigation measures to completely eliminate all anticipated instances of construction noise levels above the FTA criteria. Therefore, impacts related to construction noise would be significant and unavoidable.

Vibration

The proposed Alternative 1 alignment would result in temporary and periodic increases in vibration levels due to construction activity that would exceed FTA's criteria. While MM VIB-1.1 would be implemented, which would include vibration-reducing measures, there may still be temporary or periodic increases in vibration levels that exceed FTA construction vibration impact criteria. Historic resources have been identified in MM VIB-1.1 that would require vibration monitoring and pre-construction and post-construction surveys. The mitigation would also require a pre-construction and post construction survey to be prepared, and any damage noted and restored per the requirements of SOI Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. Therefore, impacts related to construction vibration at historic resources would be less than significant with mitigation. Regarding construction vibration at non-historic structures, in some instances it may not be possible to reduce vibration by using less vibration intensive equipment due to geological conditions or physical constraints of the construction site. There are no feasible mitigation measures to completely eliminate all anticipated incidents of construction vibration levels exceeding the FTA criteria. Therefore, impacts related to construction vibration would be significant and unavoidable for both damage and annoyance.

7 ALTERNATIVE 3

7.1 Alternative Description

Alternative 3 is an aerial monorail alignment that would run along the Interstate 405 (I-405) corridor and would include seven aerial monorail transit (MRT) stations and an underground tunnel alignment between the Getty Center and Wilshire Boulevard, with two underground stations. This alternative would provide transfers to five high-frequency fixed guideway transit and commuter rail lines, including the Los Angeles County Metropolitan Transportation Authority's (Metro) E, Metro D, and Metro G Lines, the East San Fernando Valley Light Rail Transit Line, and the Metrolink Ventura County Line. The length of the alignment between the terminus stations would be approximately 16.1 miles, with 12.5 miles of aerial guideway and 3.6 miles of underground configuration.

The seven aerial and two underground MRT stations would be as follows:

1. Metro E Line Expo/Sepulveda Station (aerial)
2. Santa Monica Boulevard Station (aerial)
3. Wilshire Boulevard/Metro D Line Station (underground)
4. UCLA Gateway Plaza Station (underground)
5. Getty Center Station (aerial)
6. Ventura Boulevard/Sepulveda Boulevard Station (aerial)
7. Metro G Line Sepulveda Station (aerial)
8. Sherman Way Station (aerial)
9. Van Nuys Metrolink Station (aerial)

7.1.1 Operating Characteristics

7.1.1.1 Alignment

As shown on Figure 7-1, from its southern terminus at the Metro E Line Expo/Sepulveda Station, the alignment of Alternative 3 would generally follow I-405 to the Los Angeles-San Diego-San Luis Obispo (LOSSAN) rail corridor, except for an underground segment between Wilshire Boulevard and the Getty Center.

The proposed southern terminus station would be located west of the existing Metro E Line Expo/Sepulveda Station, east of I-405 between Pico Boulevard and Exposition Boulevard. Tail tracks would extend just south of the station adjacent to the eastbound Interstate 10 to northbound I-405 connector over Exposition Boulevard. North of the Metro E Line Expo/Sepulveda Station, a storage track would be located off of the main alignment north of Pico Boulevard between I-405 and Cotner Avenue. The alignment would continue north along the east side of I-405 until just south of Santa Monica Boulevard, where a proposed station would be located between the I-405 northbound travel lanes and Cotner Avenue. The alignment would cross over the northbound and southbound freeway lanes north of Santa Monica Boulevard and travel along the west side of I-405. Once adjacent to the U.S. Department of Veterans Affairs (VA) Hospital site, the alignment would cross back over the I-405 lanes and Sepulveda Boulevard, before entering an underground tunnel south of the Federal Building parking lot.

Figure 7-1. Alternative 3: Alignment

Source: LASRE, 2024; HTA, 2024

The alignment would proceed east underground and turn north under Veteran Avenue toward the proposed Wilshire Boulevard/Metro D Line Station located under the University of California, Los Angeles (UCLA) Lot 36 on the east side of Veteran Avenue north of Wilshire Boulevard. North of this station, the underground alignment would curve northeast parallel to Weyburn Avenue before curving north and traveling underneath Westwood Plaza at Le Conte Avenue. The alignment would follow Westwood Plaza until the underground UCLA Gateway Plaza Station in front of the Luskin Conference

Center. The alignment would then continue north under the UCLA campus until Sunset Boulevard, where the tunnel would curve northwest for approximately 2 miles to rejoin I-405.

The Alternative 3 alignment would transition from an underground configuration to an aerial guideway structure after exiting the tunnel portal located at the northern end of the Leo Baeck Temple parking lot. The alignment would cross over Sepulveda Boulevard and the I-405 lanes to the proposed Getty Center Station on the west side of I-405, just north of the Getty Center tram station. The alignment would return to the median for a short distance before curving back to the west side of I-405 south of the Sepulveda Boulevard undercrossing north of the Getty Center Drive interchange. After crossing over Bel Air Crest Road and Skirball Center Drive, the alignment would again return to the median and run under the Mulholland Drive Bridge, then continue north within the I-405 median to descend into the San Fernando Valley (Valley).

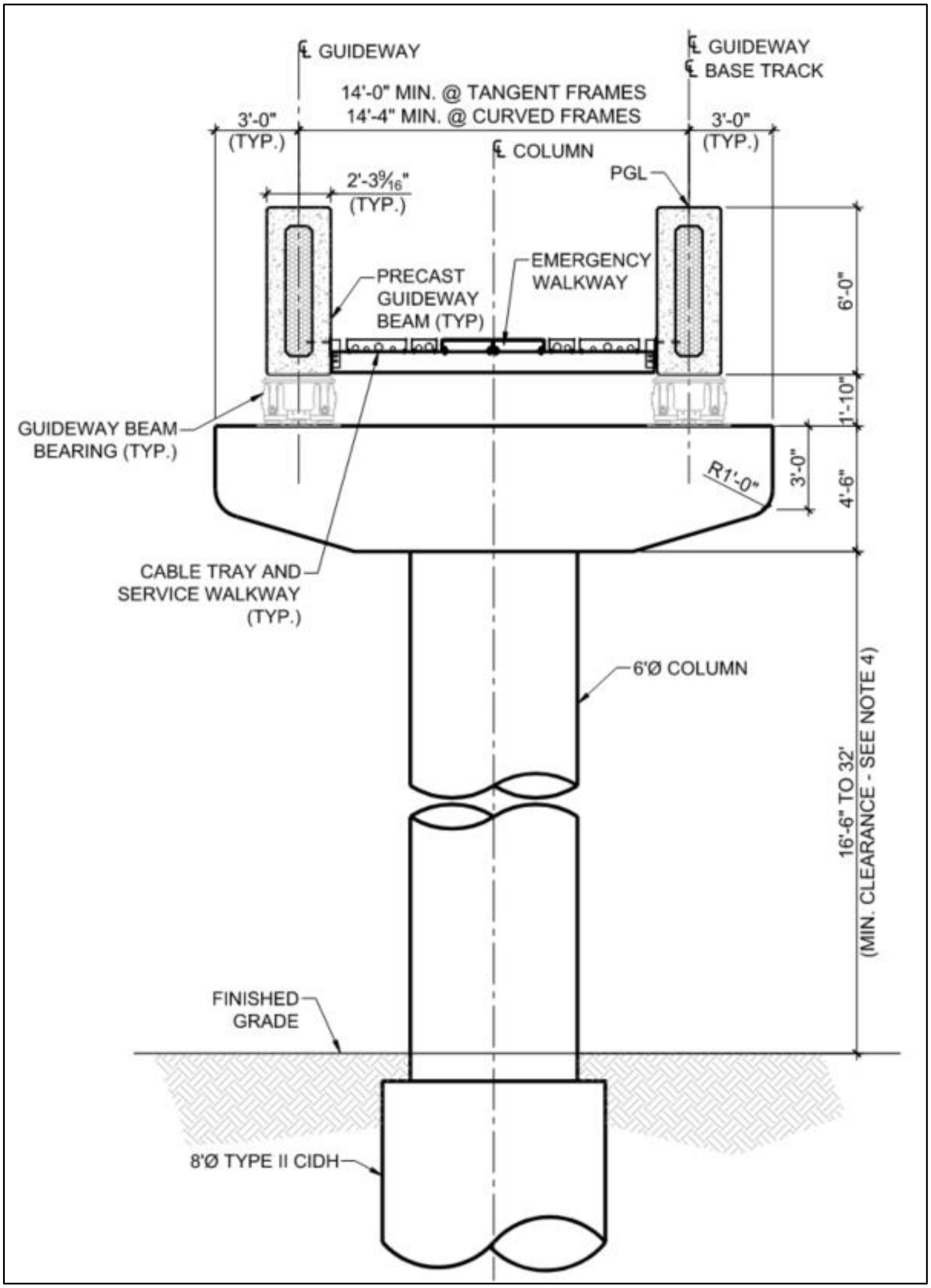
Near Greenleaf Street, the alignment would cross over the northbound freeway lanes and on-ramps toward the proposed Ventura Boulevard Station on the east side of I-405. This station would be located above a transit plaza and replace an existing segment of Dickens Street adjacent to I-405, just south of Ventura Boulevard. Immediately north of the Ventura Boulevard Station, the alignment would cross over the northbound I-405 to U.S. Highway 101 (US-101) connector and continue north between the connector and the I-405 northbound travel lanes. The alignment would continue north along the east side of I-405—crossing over US-101 and the Los Angeles River—to a proposed station on the east side of I-405 near the Metro G Line Busway. A new at-grade station on the Metro G Line would be constructed for Alternative 3 adjacent to the proposed station. These proposed stations are shown on the Metro G Line inset area on Figure 7-1.

The alignment would then continue north along the east side of I-405 to the proposed Sherman Way Station. The station would be located inside the I-405 northbound loop off-ramp to Sherman Way. North of the station, the alignment would continue along the eastern edge of I-405, then curve to the southeast parallel to the LOSSAN rail corridor. The alignment would run elevated along Raymer Street east of Sepulveda Boulevard and cross over Van Nuys Boulevard to the proposed terminus station adjacent to the Van Nuys Metrolink/Amtrak Station. Overhead utilities along Raymer Street would be undergrounded where they would conflict with the guideway or its supporting columns. Tail tracks would be located southeast of this terminus station.

7.1.1.2 Guideway Characteristics

Alternative 3 would utilize straddle-beam monorail technology, which allows the monorail vehicle to straddle a guide beam that both supports and guides the vehicle. Alternative 3 would operate on aerial and underground guideways with dual-beam configurations. Northbound and southbound trains would travel on parallel beams either in the same tunnel or supported by a single-column or straddle-bent aerial structure. Figure 7-2 shows a typical cross-section of the aerial monorail guideway.

Figure 7-2. Typical Aerial Monorail Guideway Cross-Section

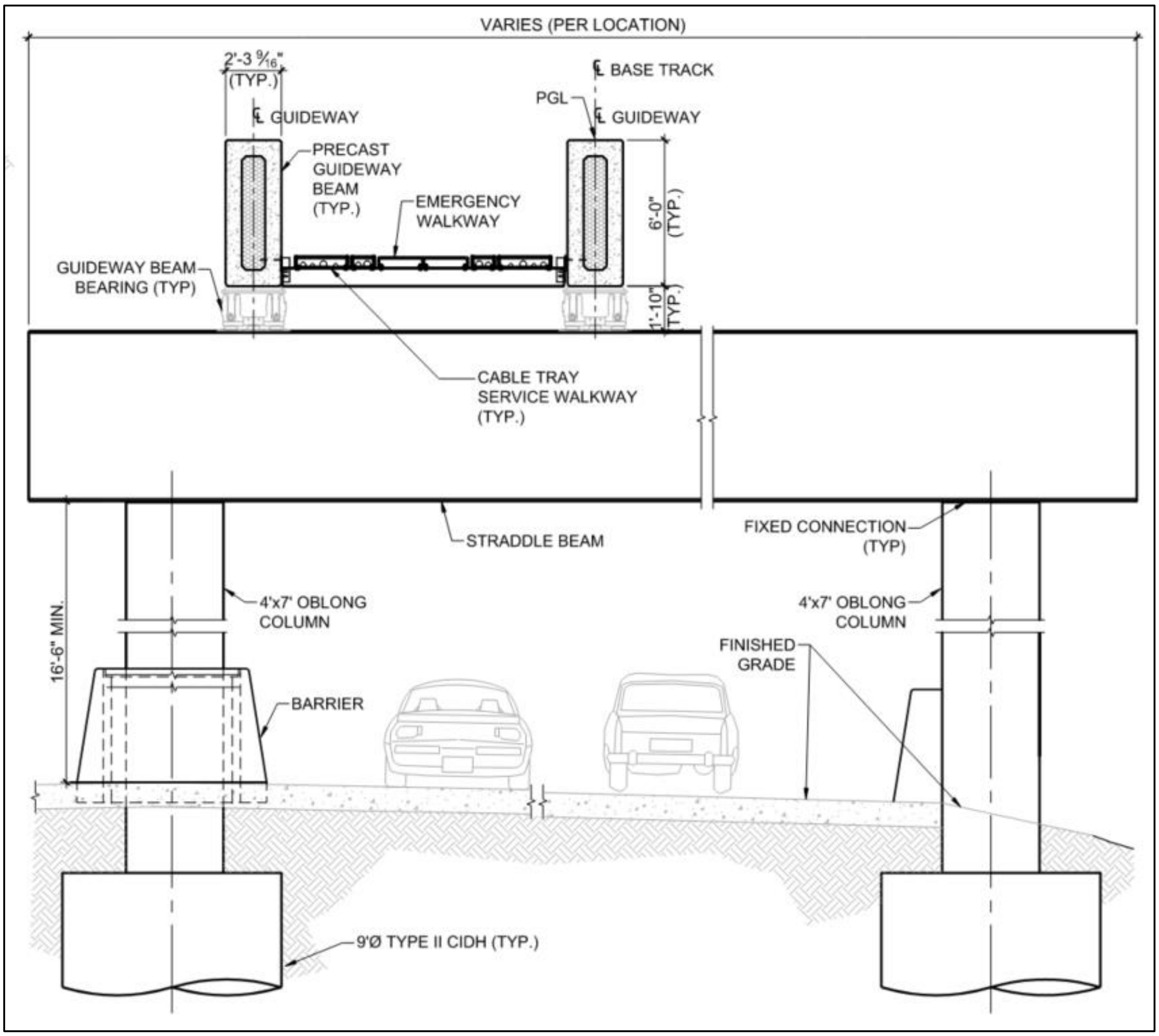


Source: LASRE, 2024

On a typical guideway section (i.e., not at a station), guide beams would rest on 20-foot-wide column caps (i.e., the structure connecting the columns and the guide beams), with typical spans (i.e., the distance between columns) ranging from 70 to 190 feet. The bottom of the column caps would typically be between 16.5 feet and 32 feet above ground level.

Over certain segments of roadway and freeway facilities, a straddle-bent configuration, as shown on Figure 7-3, consisting of two concrete columns constructed outside of the underlying roadway would be used to support the guide beams and column cap. Typical spans for these structures would range between 65 and 70 feet. A minimum 16.5-foot clearance would be maintained between the underlying roadway and the bottom of the column caps.

Figure 7-3. Typical Monorail Straddle-Bent Cross-Section

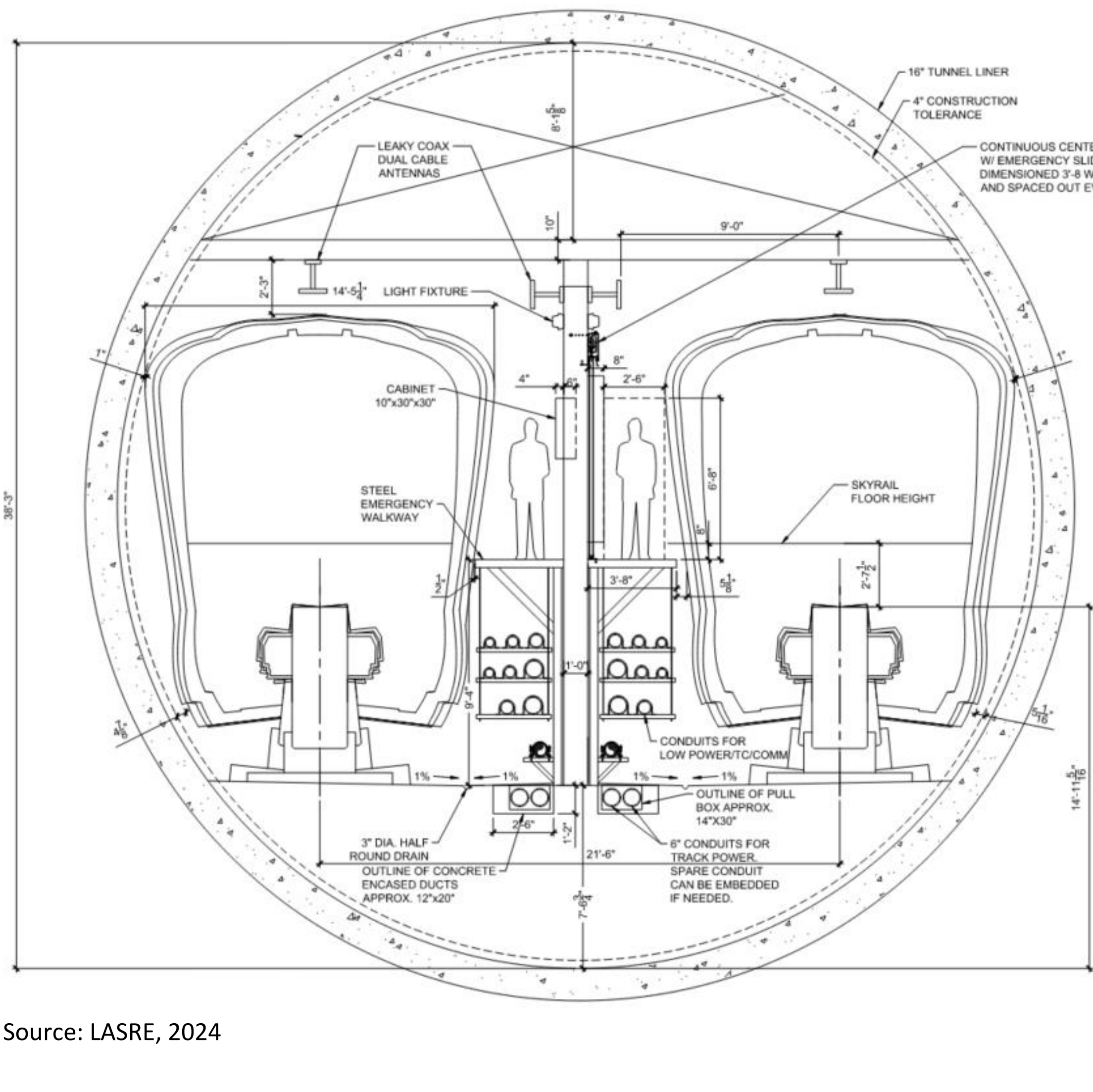


Source: LASRE, 2024

Structural support columns would vary in size and arrangement by alignment location. Columns would be 6 feet in diameter along main alignment segments adjacent to I-405 and be 4 feet wide by 6 feet long in the I-405 median. Straddle-bent columns would be 4 feet wide by 7 feet long. At stations, six rows of dual 5-foot by-8-foot columns would support the aerial guideway. Beam switch locations and long-span structures would also utilize different sized columns, with dual 5-foot columns supporting switch locations and either 9-foot or 10-foot-diameter columns supporting long-span structures. Crash protection barriers would be used to protect the columns. All columns would have a cast-in-drilled-hole (CIDH) pile foundation extending 1 foot in diameter beyond the column width with varying depths for appropriate geotechnical considerations and structural support.

For underground sections, a single 40-foot-diameter tunnel would be needed to accommodate dual-beam configuration. The tunnel would be divided by a 1-foot-thick center wall dividing two compartments with a 14.5-foot-wide space for trains and a 4-foot-wide emergency evacuation walkway. The center wall would include emergency sliding doors placed every 750 to 800 feet. A plenum within the crown of the tunnel, measuring 8 feet tall from the top of the tunnel, would allow for air circulation and ventilation. Figure 7-4 illustrates these components at a typical cross-section of the underground monorail guideway.

Figure 7-4. Typical Underground Monorail Guideway Cross-Section



Source: LASRE, 2024

7.1.1.3 Vehicle Technology

Alternative 3 would utilize straddle-beam monorail technology, which allows the monorail vehicle to straddle a guide beam that both supports and guides the vehicle. Rubber tires would sit both atop and on each side of the guide beam to provide traction and guide the train. Trains would be automated and powered by power rails mounted to the guide beam, with planned peak-period headways of 166 seconds and off-peak-period headways of 5 minutes. Monorail trains could consist of up to eight cars. Alternative 3 would have a maximum operating speed of 56 miles per hour; actual operating speeds would depend on the design of the guideway and distance between stations.

Monorail train cars would be 10.5 feet wide, with two double doors on each side. End cars would be 46.1 feet long with a design capacity of 97 passengers, and intermediate cars would be 35.8 feet long and have a design capacity of 90 passengers.

7.1.1.4 Stations

Alternative 3 would include seven aerial and two underground MRT stations with platforms approximately 320 feet long. Aerial stations would be elevated 50 feet to 75 feet above the ground level, and underground stations would be 80 feet to 110 feet underneath the existing ground level. The Metro E Line Expo/Sepulveda, Santa Monica Boulevard, Ventura Boulevard/Sepulveda Boulevard, Sherman Way, and Van Nuys Metrolink Stations would be center-platform stations where passengers would travel up to a shared platform that would serve both directions of travel. The Wilshire Boulevard/Metro D Line, UCLA Gateway Plaza, Getty Center, and Metro G Line Sepulveda Stations would be side-platform stations where passengers would select and travel up or down to station platforms depending on their direction of travel. Each station, regardless of whether it has side or center platforms, would include a concourse level prior to reaching the train platforms. Each station would have a minimum of two elevators, two escalators, and one stairway from ground level to the concourse.

Aerial station platforms would be approximately 320 feet long and would be supported by six rows of dual 5-foot by- 8-foot columns. The platforms would be covered, but not enclosed. Side-platform stations would be 61.5 feet wide to accommodate two 13-foot-wide station platforms with a 35.5-foot-wide intermediate gap for side-by-side trains. Center-platform stations would be 49 feet wide, with a 25-foot-wide center platform.

Underground side platforms would be 320 feet long and 26 feet wide, separated by a distance of 31.5 feet for side-by-side trains.

Monorail stations would include automatic, bi-parting fixed doors along the edges of station platforms. These doors would be integrated into the automatic train control system and would not open unless a train is stopped at the platform.

The following information describes each station, with relevant entrance, walkway, and transfer information. Bicycle parking would be provided at each station.

Metro E Line Expo/Sepulveda Station

- This aerial station would be located near the existing Metro E Line Expo/Sepulveda Station, just east of I-405 between Pico Boulevard and Exposition Boulevard.
- A transit plaza and station entrance would be located on the east side of the station.
- An off-street passenger pick-up/drop-off loop would be located south of Pico Boulevard west of Cotner Avenue.

- An elevated pedestrian walkway would connect the concourse level of the proposed station to the Metro E Line Expo/Sepulveda Station within the fare paid zone.
- Passengers would be able to park at the existing Metro E Line Expo/Sepulveda Station parking facility, which provides 260 parking spaces. No additional automobile parking would be provided at the proposed station.

Santa Monica Boulevard Station

- This aerial station would be located just south of Santa Monica Boulevard, between the I-405 northbound travel lanes and Cotner Avenue.
- Station entrances would be located on the southeast and southwest corners of Santa Monica Boulevard and Cotner Avenue. The entrance on the southeast corner of the intersection would be connected to the station concourse level via an elevated pedestrian walkway spanning Cotner Avenue.
- No dedicated station parking would be provided at this station.

Wilshire Boulevard/Metro D Line Station

- This underground station would be located under UCLA Lot 36 on the east side of Veteran Avenue north of Wilshire Boulevard.
- A station entrance would be located on the northeast corner of the intersection of Veteran Avenue and Wilshire Boulevard.
- An underground pedestrian walkway would connect the concourse level of the proposed station to the Metro D Line Westwood/UCLA Station using a knock-out panel provided in the Metro D Line Station box. This connection would occur within the fare paid zone.
- No dedicated station parking would be provided at this station.

UCLA Gateway Plaza Station

- This underground station would be located beneath Gateway Plaza.
- Station entrances would be located on the northern end and southeastern end of the plaza.
- No dedicated station parking would be provided at this station.

Getty Center Station

- This aerial station would be located on the west side of I-405 near the Getty Center, approximately 1,000 feet north of the Getty Center tram station.
- An elevated pedestrian walkway would connect the proposed station’s concourse level with the Getty Center tram station. The proposed connection would occur outside the fare paid zone.
- An entrance to the walkway above the Getty Center’s parking lot would be the proposed station’s only entrance.
- No dedicated station parking would be provided at this station.

Ventura Boulevard/Sepulveda Boulevard Station

- This aerial station would be located east of I-405, just south of Ventura Boulevard.

- A transit plaza, including two station entrances, would be located on the east side of the station. The plaza would require the closure of a 0.1-mile segment of Dickens Street between Sepulveda Boulevard and Ventura Boulevard, with a passenger pick-up/drop-off loop and bus stops provided south of the station, off Sepulveda Boulevard.
- No dedicated station parking would be provided at this station.

Metro G Line Sepulveda Station

- This aerial station would be located near the Metro G Line Sepulveda Station, between I-405 and the Metro G Line Busway.
- Entrances to the MRT station would be located on both sides of the new proposed Metro G Line bus rapid transit (BRT) station.
- An elevated pedestrian walkway would connect the concourse level of the proposed station to the proposed new Metro G Line BRT station outside of the fare paid zone.
- Passengers would be able to park at the existing Metro G Line Sepulveda Station parking facility, which has a capacity of 1,205 parking spaces. Currently, only 260 parking spaces are used for transit parking. No additional automobile parking would be provided at the proposed station.

Sherman Way Station

- This aerial station would be located inside the I-405 northbound loop off-ramp to Sherman Way.
- A station entrance would be located on the north side of Sherman Way, directly across the street from the I-405 northbound off-ramp to Sherman Way East.
- An on-street passenger pick-up/drop-off area would be provided on the north side of Sherman Way west of Firmament Avenue.
- No dedicated station parking would be provided at this station.

Van Nuys Metrolink Station

- This aerial station would be located on the east side of Van Nuys Boulevard, just south of the LOSSAN rail corridor, incorporating the site of the current Amtrak ticket office.
- A station entrance would be located on the east side of Van Nuys Boulevard just south of the LOSSAN rail corridor. A second entrance would be located to the north of the LOSSAN rail corridor with an elevated pedestrian walkway connecting to both the concourse level of the proposed station and the platform of the Van Nuys Metrolink/Amtrak Station.
- Existing Metrolink Station parking would be reconfigured, maintaining approximately the same number of spaces, but 180 parking spaces would be relocated north of the LOSSAN rail corridor. Metrolink parking would not be available to Metro transit riders.

7.1.1.5 Station-to-Station Travel Times

Table 7-1 presents the station-to-station distance and travel times for Alternative 3. The travel times includes both running time and dwelling time. The travel times differ between northbound and southbound trips because of grade differentials and operational considerations at end-of-line stations.

Table 7-1. Alternative 3: Station-to-Station Travel Times and Station Dwell Times

From Station	To Station	Distance (miles)	Northbound Station-to-Station Travel Time (seconds)	Southbound Station-to-Station Travel Time (seconds)	Dwell Time (seconds)
Metro E Line Station					*30*
Metro E Line	Santa Monica Boulevard	0.9	123	97	—
Santa Monica Boulevard Station					*30*
Santa Monica Boulevard	Wilshire/Metro D Line	1.1	192	194	—
Wilshire/Metro D Line Station					*30*
Wilshire/Metro D Line	UCLA Gateway Plaza	0.9	138	133	—
UCLA Gateway Plaza Station					*30*
UCLA Gateway Plaza	Getty Center	2.6	295	284	—
Getty Center Station					*30*
Getty Center	Ventura Boulevard	4.7	414	424	—
Ventura Boulevard Station					*30*
Ventura Boulevard	Metro G Line	2.0	179	187	—
Metro G Line Station					*30*
Metro G Line	Sherman Way	1.5	134	133	—
Sherman Way Station					*30*
Sherman Way	Van Nuys Metrolink	2.4	284	279	—
Van Nuys Metrolink Station					*30*

Source: LASRE, 2024

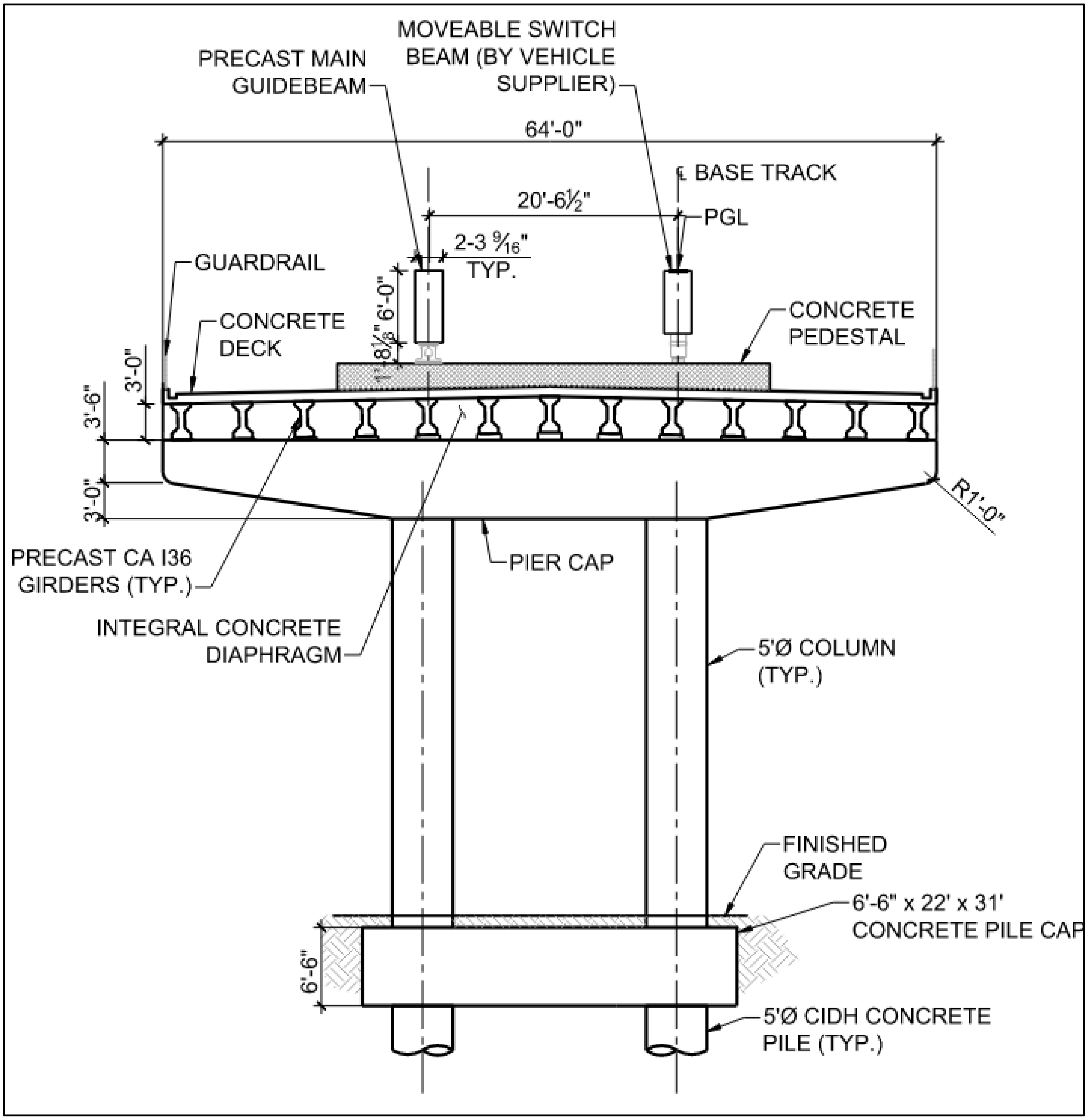
— = no data

7.1.1.6 Special Trackwork

Alternative 3 would include five pairs of beam switches to enable trains to cross over and reverse direction on the opposite beam. All beam switches would be located on aerial portions of the alignment of Alternative 3. From south to north, the first pair of beam switches would be located just north of the Metro E Line Expo/Sepulveda Station. A second pair of beam switches would be located on the west side of I-405, directly adjacent to the VA Hospital site, south of the Wilshire Boulevard/Metro D Line Station. A third pair of beam switches would be located in the Sepulveda Pass just south of Mountaingate Drive and Sepulveda Boulevard. A fourth pair of beam switches would be located south of the Metro G Line Station between the I-405 northbound lanes and the Metro G Line Busway. The final pair would be located near the Van Nuys Metrolink Station.

At beam switch locations, the typical cross-section of the guideway would increase in column and column cap width. The column cap width at these locations would be 64 feet, with dual 5-foot-diameter columns. Underground pile caps for additional structural support would also be required at these locations. Figure 7-5 shows a typical cross-section of the monorail beam switch.

Figure 7-5. Typical Monorail Beam Switch Cross-Section



Source: LASRE, 2024

7.1.1.7 Maintenance and Storage Facility

MSF Base Design

In the maintenance and storage facility (MSF) Base Design for Alternative 3, the MSF would be located on City of Los Angeles Department of Water and Power (LADWP) property east of the Van Nuys Metrolink Station. The MSF Base Design site would be approximately 18 acres and would be designed to accommodate a fleet of 208 monorail vehicles. The site would be bounded by the LOSSAN rail corridor to the north, Saticoy Street to the south, and property lines extending north of Tyrone and Hazeltine Avenues to the east and west, respectively.

Monorail trains would access the site from the main alignment's northern tail tracks at the northwest corner of the site. Trains would travel parallel to the LOSSAN rail corridor before curving southeast to maintenance facilities and storage tracks. The guideway would remain in an aerial configuration within the MSF Base Design, including within maintenance facilities.

The site would include the following facilities:

- Primary entrance with guard shack
- Primary maintenance building that would include administrative offices, an operations control center, and a maintenance shop and office
- Train car wash building
- Emergency generator
- Traction power substation (TPSS)
- Maintenance-of-way (MOW) building
- Parking area for employees

MSF Design Option 1

In the MSF Design Option 1, the MSF would be located on industrial property, abutting Orion Avenue, south of the LOSSAN rail corridor. The MSF Design Option 1 site would be approximately 26 acres and would be designed to accommodate a fleet of 224 monorail vehicles. The site would be bounded by I-405 to the west, Stagg Street to the south, the LOSSAN rail corridor to the north, and Orion Avenue and Raymer Street to the east. The monorail guideway would travel along the northern edge of the site.

Monorail trains would access the site from the monorail guideway east of Sepulveda Boulevard, requiring additional property east of Sepulveda Boulevard and north of Raymer Street. From the northeast corner of the site, trains would travel parallel to the LOSSAN rail corridor before turning south to maintenance facilities and storage tracks parallel to I-405. The guideway would remain in an aerial configuration within the MSF Design Option 1, including within maintenance facilities.

The site would include the following facilities:

- Primary entrance with guard shack
- Primary maintenance building that would include administrative offices, an operations control center, and a maintenance shop and office
- Train car wash building
- Emergency generator
- TPSS
- MOW building
- Parking area for employees

Figure 7-6 shows the locations of the MSF Base Design and MSF Design Option 1 for Alternative 3.

Figure 7-6. Alternative 3: Maintenance and Storage Facility Options

Source: LASRE, 2024; HTA, 2024

7.1.1.8 Traction Power Substations

TPSSs transform and convert high voltage alternating current supplied from power utility feeders into direct current suitable for transit operation. A TPSS on a site of approximately 8,000 square feet would be located approximately every 1 mile along the alignment. Table 7-2 lists the TPSS locations proposed for Alternative 3.

Table 7-2. Alternative 3: Traction Power Substation Locations

TPSS No.	TPSS Location Description	Configuration
1	TPSS 1 would be located east of I-405, just south of Exposition Boulevard and the monorail guideway tail tracks.	At-grade
2	TPSS 2 would be located east of I-405 and Sepulveda Boulevard, just north of the Getty Center Station.	At-grade
3	TPSS 3 would be located west of I-405, just east of the intersection between Promontory Road and Sepulveda Boulevard.	At-grade
4	TPSS 4 would be located between I-405 and Sepulveda Boulevard, just north of the Skirball Center Drive Overpass.	At-grade
5	TPSS 5 would be located east of I-405, just south of Ventura Boulevard Station, between Sepulveda Boulevard and Dickens Street.	At-grade
6	TPSS 6 would be located east of I-405, just south of the Metro G Line Sepulveda Station.	At-grade

TPSS No.	TPSS Location Description	Configuration
7	TPSS 7 would be located east of I-405, just east of the Sherman Way Station, inside the I-405 Northbound Loop Off-Ramp to Sherman Way westbound.	At-grade
8	TPSS 8 would be located east of I-405, at the southeast quadrant of the I-405 overcrossing with the LOSSAN rail corridor.	At-grade
9	TPSS 9 would be located east of I-405, at the southeast quadrant of the I-405 overcrossing with the LOSSAN rail corridor.	At-grade (within MSF Design Option)
10	TPSS 10 would be located between Van Nuys Boulevard and Raymer Street, south of the LOSSAN rail corridor.	At-grade
11	TPSS 11 would be located south of the LOSSAN rail corridor, between Tyrone Avenue and Hazeltine Avenue.	At-grade (within MSF Base Design)
12	TPSS 12 would be located southwest of Veteran Avenue at Wellworth Avenue.	Underground
13	TPSS 13 would be located within the Wilshire Boulevard/Metro D Line Station.	Underground (adjacent to station)
14	TPSS 14 would be located underneath UCLA Gateway Plaza.	Underground (adjacent to station)

Source: LASRE, 2024; HTA, 2024

Figure 7-7 shows the TPSS locations along the Alternative 3 alignment.

Figure 7-7. Alternative 3: Traction Power Substation Locations

Source: LASRE, 2024; HTA, 2024

7.1.1.9 Roadway Configuration Changes

Table 7-3 lists the roadway changes necessary to accommodate the guideway of Alternative 3. Figure 7-8 shows the location of these roadway changes in the Sepulveda Transit Corridor Project (Project) Study Area, except for the I-405 configuration changes, which occur throughout the corridor.

Table 7-3. Alternative 3: Roadway Changes

Location	From	To	Description of Change
Cotner Avenue	Nebraska Avenue	Santa Monica Boulevard	Roadway realignment to accommodate aerial guideway columns
Beloit Avenue	Massachusetts Avenue	Ohio Avenue	Roadway narrowing to accommodate aerial guideway columns
Sepulveda Boulevard	Getty Center Drive	Not Applicable	Southbound right turn lane to Getty Center Drive shortened to accommodate aerial guideway columns
I-405 Northbound On-Ramp and Off-Ramp at Sepulveda Boulevard near I-405 Exit 59	Sepulveda Boulevard near I-405 Northbound Exit 59	Sepulveda Boulevard/I-405 Undercrossing (near Getty Center)	Ramp realignment to accommodate aerial guideway columns and I-405 widening
Sepulveda Boulevard	I-405 Southbound Skirball Center Drive Ramps (north of Mountaingate Drive)	Skirball Center Drive	Roadway realignment into existing hillside to accommodate aerial guideway columns and I-405 widening
I-405 Northbound On-Ramp at Mulholland Drive	Mulholland Drive	Not Applicable	Roadway realignment into the existing hillside between the Mulholland Drive Bridge pier and abutment to accommodate aerial guideway columns and I-405 widening
Dickens Street	Sepulveda Boulevard	Ventura Boulevard	Permanent removal of street for Ventura Boulevard Station construction Pick-up/drop-off area would be provided along Sepulveda Boulevard at the truncated Dickens Street
Sherman Way	Haskell Avenue	Firmament Avenue	Median improvements, passenger drop-off and pick-up areas, and bus pads within existing travel lanes
Raymer Street	Sepulveda Boulevard	Van Nuys Boulevard	Curb extensions and narrowing of roadway width to accommodate aerial guideway columns
I-405	Sepulveda Boulevard Northbound Off-Ramp (Getty Center Drive interchange)	Sepulveda Boulevard Northbound On-Ramp (Getty Center Drive interchange)	I-405 widening to accommodate aerial guideway columns in the median
I-405	Skirball Center Drive	U.S. Highway 101	I-405 widening to accommodate aerial guideway columns in the median

Source: LASRE, 2024; HTA, 2024

Figure 7-8. Alternative 3: Roadway Changes

Source: LASRE, 2024; HTA, 2024

In addition to the changes made to accommodate the guideway, as listed in Table 7-3, roadways and sidewalks near stations would be reconstructed, which would result in modifications to curb ramps and driveways.

7.1.1.10 Ventilation Facilities

For ventilation of the monorail's underground portion, a plenum within the crown of the tunnel would provide a separate compartment for air circulation and allow multiple trains to operate between stations. Vents would be located at the southern portal near the Federal Building parking lot, Wilshire/Metro D Line Station, UCLA Gateway Plaza Station, and at the northern portal near the Leo Baeck Temple parking lot. Emergency ventilation fans would be located at the UCLA Gateway Plaza Station and at the northern and southern tunnel portals.

7.1.1.11 Fire/Life Safety – Emergency Egress

Continuous emergency evacuation walkways would be provided along the guideway. Walkways along the alignment's aerial portions would typically consist of structural steel frames anchored to the guideway beams to support non-slip walkway panels. The walkways would be located between the two guideway beams for most of the aerial alignment; however, where the beams split apart, such as entering center-platform stations, short portions of the walkway would be located on the outside of the beams. For the underground portion of Alternative 3, 3.5-foot-wide emergency evacuation walkways would be located on both sides of the beams. Access to tunnel segments for first responders would be through stations.

7.1.2 Construction Activities

Construction activities for Alternative 3 would include constructing the aerial guideway and stations, underground tunnel and stations, and ancillary facilities, and widening I-405. Construction of the transit facilities through substantial completion is expected to have a duration of 8 ½ years. Early works, such as site preparation, demolition, and utility relocation, could start in advance of construction of the transit facilities.

Aerial guideway construction would begin at the southern and northern ends of the alignment and connect in the middle. Constructing the guideway would require a combination of freeway and local street lane closures throughout the working limits to provide sufficient work area. The first stage of I-405 widening would include a narrowing of adjacent freeway lanes to a minimum width of 11 feet (which would eliminate shoulders) and placing K-rail on the outside edge of the travel lanes to create outside work areas. Within these outside work zones, retaining walls, drainage, and outer pavement widenings would be constructed to allow for I-405 widening. The reconstruction of on- and off-ramps would be the final stage of I-405 widening.

A median work zone along I-405 for the length of the alignment would be required for erection of the guideway structure. In the median work zone, demolition of existing median and drainage infrastructure would be followed by the installation of new K-rails and installation of guideway structural components, which would include full directional freeway closures when guideway beams must be transported into the median work areas during late-night hours. Additional night and weekend directional closures would be required for installation of long-span structures over I-405 travel lanes where the guideway would transition from the median.

Aerial station construction is anticipated to last the duration of construction activities for Alternative 3 and would include the following general sequence of construction:

- Site clearing
- Utility relocation
- Construction fencing and rough grading
- CIDH pile drilling and installation
- Elevator pit excavation
- Soil and material removal

- Pile cap and pier column construction
- Concourse level and platform level falsework and cast-in-place structural concrete
- Guideway beam installation
- Elevator and escalator installation
- Completion of remaining concrete elements such as pedestrian bridges
- Architectural finishes and mechanical, electrical, and plumbing installation

Underground stations, including the Wilshire Boulevard/Metro D Line Station and the UCLA Gateway Plaza Station, would use a “cut-and-cover” construction method whereby the station structure would be constructed within a trench excavated from the surface that is covered by a temporary deck and backfilled during the later stages of station construction. Traffic and pedestrian detours would be necessary during underground station excavation until decking is in place and the appropriate safety measures are taken to resume cross traffic.

A tunnel boring machine (TBM) would be used to construct the underground segment of the guideway. The TBM would be launched from a staging area on Veteran Avenue south of Wilshire Boulevard, and head north toward an exit portal location north of Leo Baeck Temple. The southern portion of the tunnel between Wilshire Boulevard and the Bel Air Country Club would be at a depth between 80 to 110 feet from the surface to the top of the tunnel. The UCLA Gateway Plaza Station would be constructed using cut-and-cover methods. Through the Santa Monica Mountains, the tunnel would range between 30 to 300 feet deep.

Alternative 3 would require construction of a concrete casting facility for columns and beams associated with the elevated guideway. A specific site has not been identified; however, it is expected that the facility would be located on industrially zoned land adjacent to a truck route in either the Antelope Valley or Riverside County. When a site is identified, the contractor would obtain all permits and approvals necessary from the relevant jurisdiction, the appropriate air quality management entity, and other regulatory entities.

TPSS construction would require additional lane closures. Large equipment, including transformers, rectifiers, and switchgears would be delivered and installed through prefabricated modules where possible in at-grade TPSSs. The installation of transformers would require temporary lane closures on Exposition Boulevard, Beloit Avenue, and the I-405 northbound on-ramp at Burbank Boulevard.

Table 7-4 and Figure 7-9 show the potential construction staging areas for Alternative 3. Staging areas would provide the necessary space for the following activities:

- Contractors’ equipment
- Receiving deliveries
- Storing materials
- Site offices
- Work zone for excavation
- Other construction activities (including parking and change facilities for workers, location of construction office trailers, storage, staging and delivery of construction materials and permanent plant equipment, and maintenance of construction equipment)

Table 7-4. Alternative 3: Construction Staging Locations

No.	Location Description
1	Public Storage between Pico Boulevard and Exposition Boulevard, east of I-405
2	South of Dowlen Drive and east of Greater LA Fisher House
3	Federal Building Parking Lot
4	Kinross Recreation Center and UCLA Lot 36
5	North end of the Leo Baeck Temple Parking Lot (tunnel boring machine retrieval)
6	At 1400 N Sepulveda Boulevard
7	At 1760 N Sepulveda Boulevard
8	East of I-405 and north of Mulholland Drive Bridge
9	Inside of I-405 Northbound to US-101 Northbound Loop Connector, south of US-101
10	ElectroRent Building south of G Line Busway, east of I-405
11	Inside the I-405 Northbound Loop Off-Ramp at Victory Boulevard
12	Along Cabrito Road east of Van Nuys Boulevard

Source: LASRE, 2024; HTA, 2024

Figure 7-9. Alternative 3: Construction Staging Locations

Source: LASRE, 2024; HTA, 2024

7.2 Existing Conditions

7.2.1 Noise

The noise environment in the Project Study Area is dominated by traffic noise, including freeways and arterial roads such as I-405, Interstate 10 (I-10), US-101, and Sepulveda Boulevard. Aircraft flyovers are also contributors to the existing noise environment in most areas along the Alternative 3 alignment. Land uses found along the alignment include single- and multi-family residential uses, educational facilities, public facilities, public and commercial office buildings, various types of commercial uses, institutional uses, surface parking facilities, and parking structures.

Noise-sensitive land uses were identified using geographic information systems (GIS), assessor's parcel maps, aerial photographs, and field surveys. Land use data was obtained from the Southern California Association of Governments (SCAG) 2019 regional land use data set for Los Angeles County (SCAG, 2019). Sensitive land uses were classified into one of the three Federal Transit Administration (FTA) sensitive land use categories (FTA, 2018). Refer to Table 2-1 for a detailed description of each category.

- Category 1 noise-sensitive land uses identified along the Alternative 3 alignment include some of the laboratories and medical facilities in the vicinity of UCLA campus along Westwood Boulevard.
- Category 2 noise-sensitive land uses include single- and multi-family residential and lodging land uses located throughout the Alternative 3 alignment. Category 2 noise-sensitive land uses are more sparsely located in the mountainous segment of the Alternative 3 alignment.
- Category 3 noise-sensitive land uses along the Alternative 3 alignment include, but are not limited to: Westwood Park, KT Rehearsal Studios, Leo Baeck Temple and its affiliated facilities, The Getty Center, Skirball Cultural Center, Milken Community School, Ivy Bound Academy, Emek Hebrew Academy, and the Church of Jesus Christ of Latter Day Saints on Saticoy Street in Van Nuys.

Some uses in the UCLA area include multiple noise-sensitive land use categories. For instance, UCLA dorms and medical bedding are Category 2 noise-sensitive land uses, while classrooms are Category 3.

The existing noise conditions in the vicinity of the Alternative 3 alignment were documented through noise monitoring performed at representative noise-sensitive locations along the proposed alignment. This section provides a summary of the noise measurement results.

Representative noise-sensitive locations were identified by using preliminary alignment maps, aerial photographs, visual surveys, and proximity to aboveground noise sources associated with each of the project alternatives. Long-term (24-hour) noise measurements were conducted at a total of 20 locations representing Category 2 land uses. Short-term noise measurements (two 1-hour measurements) were obtained at 14 locations representing exterior areas of Category 3 land uses. Figure 7-10 and Figure 7-11 show the locations of noise monitoring sites along Alternative 3. Refer to Attachment 1 and Attachment 2 of this report for detailed results of 24-hour and short-term measurements, respectively. The appendix material also depicts photographic exhibits of the measurement locations.

Table 7-5 presents a summary of long-term (24-hour) noise measurements taken at Category 2 locations that are representative of the residential and lodging land uses and hospitals along the Alternative 3 alignment. The noise monitors were programmed to continuously collect data for a minimum of 24 hours. The microphones were generally placed on tripods approximately 5 feet above the ground at locations near the setback of habitable buildings, between the buildings and the proposed Alternative 3 alignment.

Table 7-5. Alternative 3: Summary of Existing 24-hour Noise Measurements at Category 2 Land Uses

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{dn} (dBA)
			Date	Time	
1	2435 S. Sepulveda Boulevard	I-405 traffic	6/28/2023	11:00am	73.9
4	1521 Beloit Avenue	I-405 and Santa Monica Boulevard	7/12/2023	10:00am	66.7
5	LA Fisher House	I-405 traffic	7/25/2023	10:00am	69.5
10	UCLA Luskin Conference Center	Local traffic	5/25/2023	3:00pm	62.2
26	1399 Casiano Road	I-405 traffic	5/17/2023	3:00pm	76.0
38	15460 Briarwood Drive	I-405 traffic	6/20/2023	9:00am	74.1
39	15515 Woodcrest Drive	I-405 traffic	5/30/2023	1:00pm	63.3
41	15371 Del Gado Drive	I-405 traffic	6/29/2023	10:00am	72.5
42	15350 Sutton Street	I-405 traffic	6/8/2023	9:00am	72.4
43	4440 Sepulveda Boulevard	I-405, Sepulveda Boulevard	3/25/2024	12:00pm	76.5
50	15353 Weddington	I-405 traffic	7/18/2023	9:00am	67.2
52	6200 Blucher Avenue	I-405, G-Line, local traffic	3/25/2024	1:00pm	62.9
53	6201 Blucher Avenue	I-405, G-Line, local traffic	3/25/2024	1:00pm	62.9
57	6546 Aqueduct Avenue	I-405 traffic	5/24/2023	12:00pm	69.1
60	6841 Firmament Avenue	I-405 traffic	6/6/2023	9:00am	65.3
61	13917 Cohasset Street	LOSSAN Corridor, distant traffic	6/13/2023	10:00am	52.8
64	15550 Wyandotte Street	I-405 traffic	5/30/203	11:00am	66.5
65	15559 Covello Street	I-405 traffic	6/27/2023	9:00am	66.7
66	15018 Marson Street	LOSSAN Corridor	5/24/2023	11:00am	60.5
67	7824 Zombar Avenue	Local traffic, distant aircraft	6/20/2023	9:00am	58.0

Source: HTA, 2024

dBA = A-weighted decibel
L_{dn} = day-night noise level

Short-term noise measurements for two 1-hour periods were also taken at Category 1 and Category 3 (institutional) land uses, including schools, religious facilities, museums, and amphitheaters, along the Alternative 3 alignment segments with aboveground noise sources. The general locations of the short-term measurement sites are shown on Figure 7-10 and Figure 7-11. Table 7-6 provides the summarized results of each individual short-term measurement. Details of short-term measurements are included in Attachment 2.

Figure 7-10. Alternative 3: Noise Monitoring Sites - South

Source: HTA, 2024

Figure 7-11. Alternative 3: Noise Monitoring Sites - North

Source: HTA, 2024

Table 7-6. Alternative 3: Summary of Existing Short-Term (1-Hour) Noise Measurements at Category 1 and Category 3 Land Uses

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{eq} (dBA)
			Date	Time	
6	Westwood Park, north of soccer field on lawn near parking lot	I-405 traffic, local traffic	4/12/2023	9:17am	54.2
			4/13/2023	10:23am	59.0
8	UCLA Williams Institute, southwest corner of building	Local traffic, fire station activities	5/26/2023	9:29am	63.9
			5/30/2023	1:41pm	61.3
9	UCLA Computer Science/ Engineering IV building	Local traffic, students' chatter	5/25/2023	1:04pm	57.9
			5/26/2023	3:36pm	58.8
12a	LA National Cemetery, north of Wilshire Boulevard	Wilshire Boulevard and I-405 traffic	5/25/2023	11:48am	65.4
			5/26/2023	10:48am	65.0
27	Leo Baeck Temple, west of building, facing I-405	I-405 traffic, Sepulveda Boulevard	6/14/2023	12:19pm	67.1
			6/15/2023	10:40am	67.4
28	The Getty Tram Station, in lawn area north of the Station	I-405 traffic	5/17/2023	11:54am	59.4
			5/18/2023	11:25am	60.9
29	Future Oak parking lot at The Getty, in currently unpaved lot	I-405 traffic	5/17/2023	11:54am	66.9
			5/18/2023	11:25am	68.2
33	Skirball Cultural Center, Ziegler Amphitheater, east façade	I-405 traffic, Sepulveda Boulevard	5/17/2023	7:53am	60.9
			5/18/2023	7:45am	61.7
34	Skirball Cultural Center, Ziegler Amphitheater, at bleachers	I-405 traffic, Sepulveda Boulevard	5/17/2023	7:53am	56.6
			5/18/2023	7:45am	57.1
35	Milken Community School, first floor facing I-405	I-405 traffic, student chatter	5/17/2023	9:40am	70.9
			5/18/2023	9:20am	72.2
36	Milken Community School, second floor facing I-405	I-405 traffic, student chatter	5/17/2023	9:40am	70.6
			5/18/2023	9:20am	71.3
40	15347 Del Gado Drive, at south end of vacant lot[a]	I-405 traffic	6/30/2023	8:42am	57.8
46	Ivy Bound Academy, basketball courts near US-101 to I-405 ramp	I-405 mainline and ramp traffic	5/25/2023	7:10am	67.9
			5/26/2023	6:57am	68.8
68	La Iglesia de Jesucristo de los Santos de los Últimos Días	I-405 traffic, distant aircraft	4/13/2023	1:27pm	62.5
			5/11/2023	10:17am	64.5

Source: HTA, 2024

[a]This short-term measurement location was used to estimate noise levels at residential locations farther east of I-405 than the 24-hour site located at 15371 Del Gado Drive.

7.2.2 Vibration

The Alternative 3 alignment is located in an urban environment. Primary existing sources of groundborne vibration (GBV) include trucks traveling along roadways and construction sites using heavy equipment. According to FTA guidance, the background vibration decibels (VdB) levels are expected to range from 50 to 65 (FTA, 2018). Ambient vibration levels were not measured during this stage of Alternative 3. However, measurement of vibration levels is not necessary to complete the general assessment procedure for vibration analysis. The FTA vibration impact assessment is based on FTA vibration impact criteria. These criteria were used to identify vibration-sensitive receivers along the Alternative 3 alignment where potential impacts may occur, based on existing land use activities.

Vibration-sensitive land uses were identified using GIS, assessor's parcel maps, aerial photographs, and field surveys. Vibration-sensitive land uses in the Project Study Area include residences, hotel/motels, medical facilities, religious facilities, schools, and museums.

Sensitive land uses were classified as one of the three following FTA vibration-sensitive land use categories (Table 2-5 presents the details of the criteria pertaining to each category):

- Category 1 – Buildings where vibration would interfere with interior operations
- Category 2 – Residences and buildings where people normally sleep
- Category 3 – Institutional land uses with primarily daytime use

Category 1 vibration-sensitive land uses identified along the Alternative 3 alignment include buildings along Westwood Boulevard, including medical facilities and scientific/research laboratories on the UCLA campus.

Category 2 vibration-sensitive land uses include single- and multi-family residences and hotels/motels, which are located throughout the Alternative 3 alignment. Category 2 vibration-sensitive land uses are more sparsely located in the mountainous segment of the Alternative 3 alignment.

Examples of Category 3 vibration-sensitive land uses found along the Alternative 3 alignment include the same schools, religious facilities, and cultural centers identified as Category 3 noise-sensitive land uses.

7.3 Impact Evaluation

7.3.1 Impact NOI-1: Would the project cause 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?

7.3.1.1 Operational Noise Impacts

Rail Operations Noise

Noise exposure from the train movements was evaluated using the detailed noise assessment procedure in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018). The rail operations noise analysis includes noise generated by vehicle passbys, consisting of motor noise, tire-guideway noise, aerodynamic noise, and noise from air conditioning, and other auxiliary equipment on the vehicles. Other factors such as crossover noise and attenuation effects of intervening buildings and existing soundwalls are also included in the analysis. Section 3.1.1 provides the details of the train noise analysis methodology. The 24-hour day-night noise level (L_{dn}) for Category 2 noise-sensitive receptors and the hourly equivalent noise level (L_{eq}) during peak headways for Category 3 noise-sensitive receptors was predicted based on the anticipated rail operations.

Based on operations reports prepared for Alternative 3 (Metro, 2023), noise modeling for this project alternative assumes a six-car monorail train with 2-minute headways during peak hours (6:00am to 10:00am and 3:00pm to 7:00pm), 5-minute headways during mid-day and evening hours (10:00am to 3:00pm and 7:00pm to 10:00pm), and 10-minute headways during the remaining nighttime hours (4:00am to 6:00am and 10:00pm to 2:00am). Total daily directional train operations would be 372 six-car trains, consisting of 306 daytime and 66 nighttime train movements in each direction of travel. Train speeds assumed in the noise model were obtained from travel speed profiles provided by the Alternative 3 engineering team.

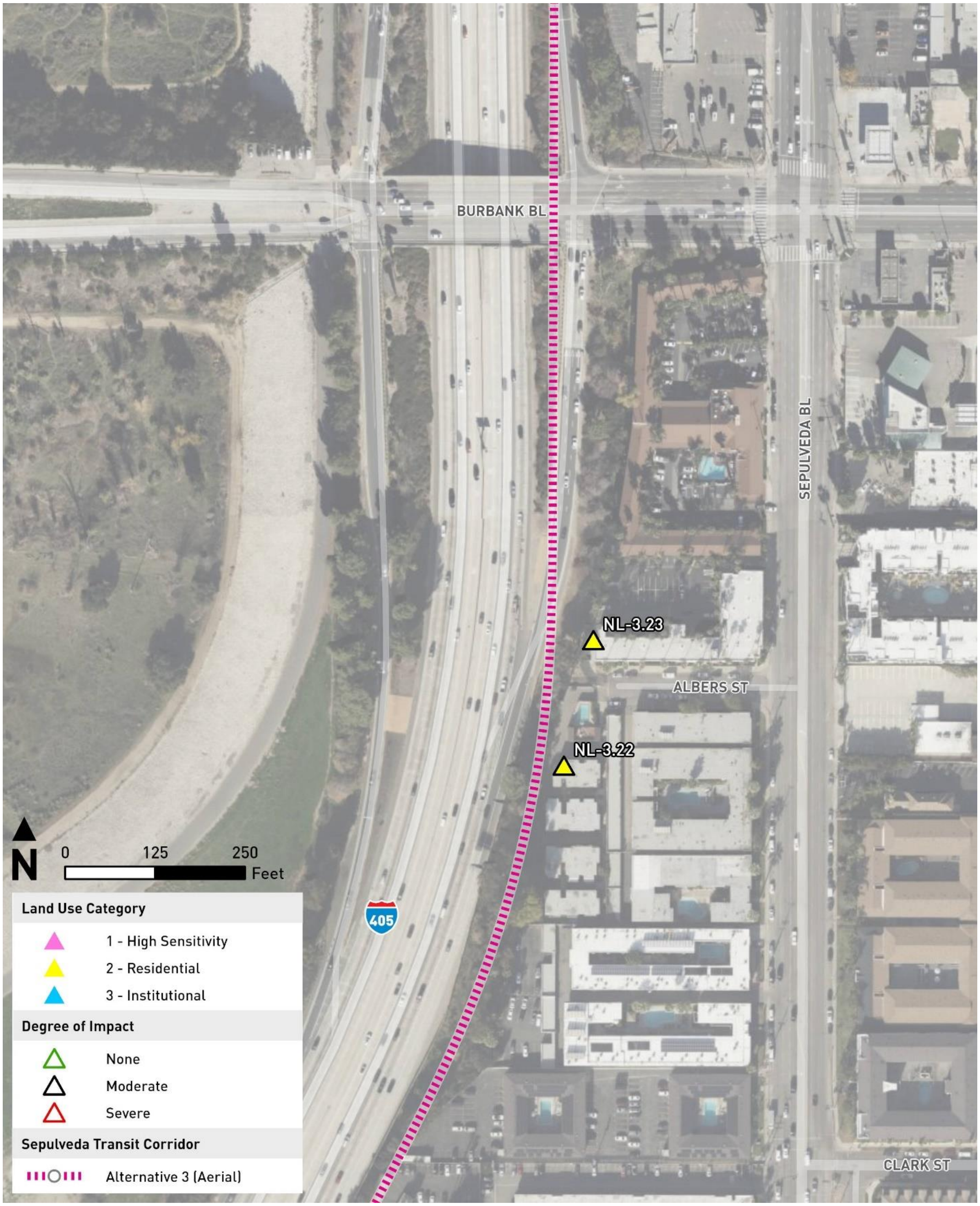
Attachment 6 of this report shows the details of operations noise impact assessments at the representative noise-sensitive receptors and assumed daily and hourly train operations developed from Alternative 3 Operations Report (Metro, 2023). Table 7-7 is a summary of noise-sensitive receptors where operational noise impacts would occur. Impacted receptors are shown on Figure 7-12, Figure 7-13, and Figure 7-14. Alternative 3 would result in five moderate impacts at Category 2 receptors, representing 26 single-family units, five multi-family buildings, and one hotel. No impacts would occur at Category 1 or Category 3 receptors. These noise impacts are considered potentially significant impacts. Other noise-sensitive receptors would not be exposed to noise levels in excess of the FTA noise impact criteria because they are located farther from the tracks, train speeds may be slower in their vicinity resulting in decreased noise levels, or the presence of intervening building rows between the alignment and the noise-sensitive receptor. Therefore, operation of Alternative 3 would result in a significant impact related to rail operations noise.

Table 7-7. Alternative 3: Summary of Rail Operations Noise Impacts

Receptor ID	Location	Near Track Direction	Northbound Track Station	Calculated (L_{dn}, dBA)	Baseline (L_{dn}, dBA)	Noise Impact Limits (L_{dn}, dBA)		Impact
						Moderate	Severe	
NL-3.22	Albers Apartments, 15328 Albers Street, Sherman Oaks	Northbound	1049+83	67	70	65-69	>69	Moderate
NL-3.23	Best Western Plus Carriage Inn-South 5525 Sepulveda Boulevard, Sherman Oaks	Northbound	1051+98	63	67	63-67	>67	Moderate
NL-3.37	Granada Apartments, 15630 Vanowen Street, Van Nuys	Northbound	1140+53	67	71	66-70	>70	Moderate
NL-3.40	15623 Hart Street, Van Nuys	Northbound	1156+33	65	67	63-67	>67	Moderate
NL-3.48	15559 Covello Street, Van Nuys	Northbound	1192+27	63	67	63-67	>67	Moderate

Source: HTA, 2024

Figure 7-12. Alternative 3: Rail Operations Noise Impacts – Magnolia Boulevard to Burbank Boulevard

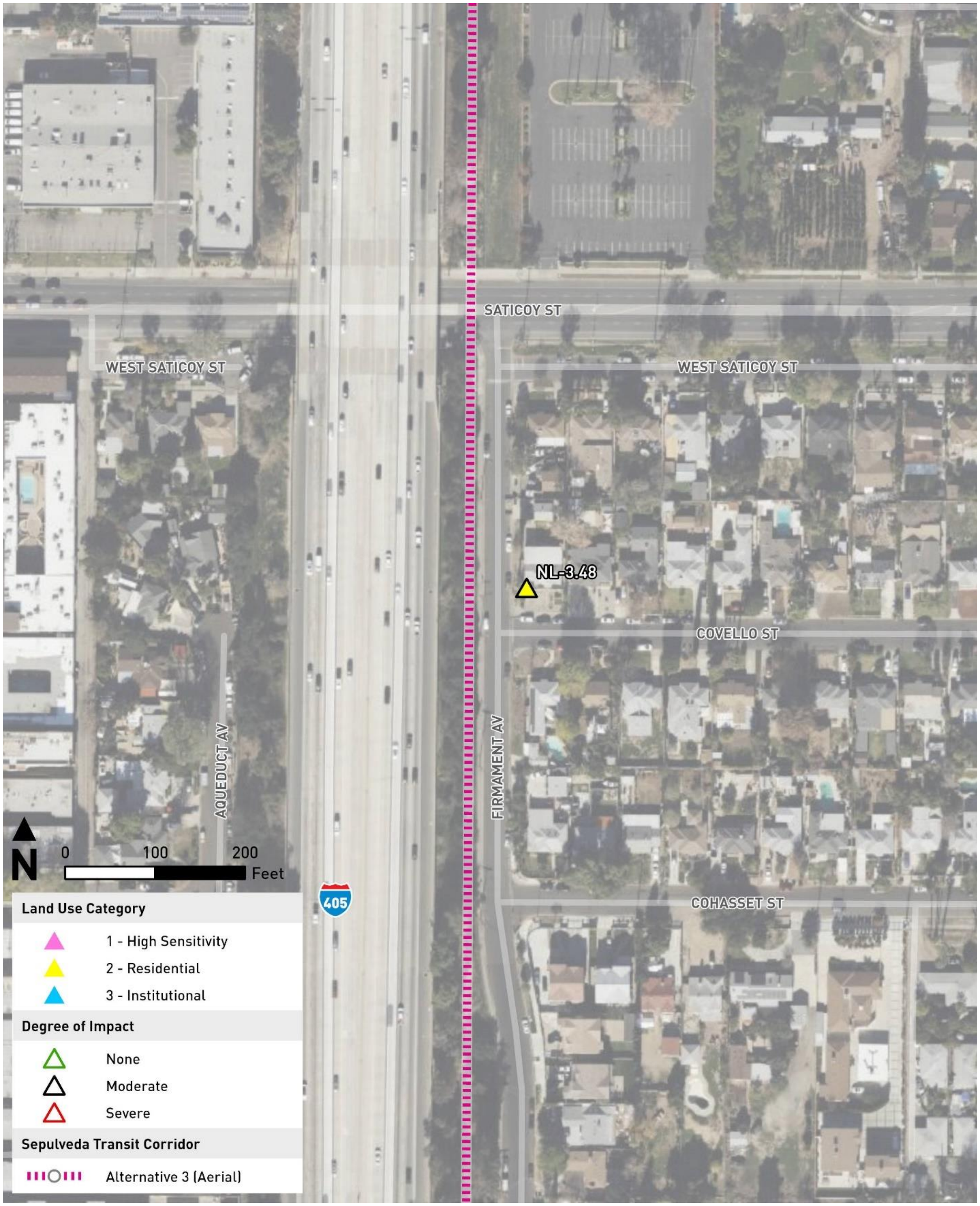


Source: HTA, 2024

Figure 7-13. Alternative 3: Rail Operations Noise Impacts – Victory Blvd to Sherman Way

Source: HTA, 2024

Figure 7-14. Alternative 3: Rail Operations Noise Impacts – Cohasset Street to Saticoy Street



Source: HTA, 2024

Ancillary Facilities Noise

Noise generated by ancillary facilities associated with Alternative 3 would be due to ventilation system fans at TPSS facilities along the Alternative 3 alignment. Fourteen TPSS sites would be required and four would be located near noise-sensitive receptors. Table 7-2 provides descriptions of TPSS sites associated with Alternative 3. Table 7-8 shows a summary of Alternative 3 TPSS noise impact assessments. TPSS facilities would not result in noise impacts at sensitive receptors. This is primarily due to the fact that TPSS installations would be in noisy areas and located at sufficient distances from the nearest noise-sensitive land uses to allow for noise attenuation. Therefore, operation of Alternative 3 would result in a less than significant impact related to ancillary facilities noise.

Table 7-8. Alternative 3: Combined Rail and Ancillary Facility Noise Impacts by Traction Power Substation Site

TPSS Site	Nearest Noise-Sensitive Land Use	Distance (feet)	Existing Sound Level (dBA, L_{dn} or Hourly L_{eq})	TPSS Noise Level (dBA, L_{dn} or Hourly L_{eq})	Combined Rail and TPSS Operations Noise Level (dBA, L_{dn} or Hourly L_{eq})	Noise Impact Thresholds		Level of Impact
						Moderate	Severe	
1	2435 S Sepulveda Boulevard[a]	350	74	39	52	66-72	>72	**No Impact**
2	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**
3	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**
4	Skirball Cultural Center[b] Ziegler Amphitheater	260	61	36	51	59-64	>64	**No Impact**
5	Alister Sherman Oaks[a] 4440 Sepulveda Boulevard, Sherman Oaks	300	76	41	49	66-74	>74	**No Impact**
6	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**
7	Helen Towers Apartments[a] 15549 Sherman Way	150	67	47	49	63-67	>67	**No Impact**
8	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**
9	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**
10	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**
11	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**

Source: HTA, 2024

[a]Noise levels at these locations are in terms of the day-night equivalent level (L_{dn}).
[b]Noise levels at these locations are in terms of hourly average level (L_{eq}).

L_{eq} = equivalent noise level
NA = not applicable
SFR = single-family residential

Note: Under Alternative 3, TPSS Sites 12, 13, and 14 would be located underground.

Other ancillary facilities under Alternative 3 would include vents located at the southern tunnel portal near the Federal Building parking lot, Wilshire/Metro D Line Station, UCLA Gateway Plaza Station, and at the northern portal near the Leo Baeck Temple parking lot. Estimated ventilation noise at the nearest multi-family residential buildings along the east side of Veteran Avenue would be near 36 dBA L_{eq}, which is well below the background noise levels in this area (Site 6 in Table 7-6). At Category 3 land uses in the vicinity of the Wilshire/Metro D Line Station and the UCLA Gateway Plaza Station, ventilation noise would be in the range of 52 dBA to 54 dBA L_{eq}. Such levels would be below impact thresholds at short-term measurement locations representing these areas (Site 9 in Table 7-6). The closest noise-sensitive receptor to the ventilation at the north tunnel portal is the Leo Baeck Temple. Ventilation noise on the north side of the Temple facing the tunnel portal would be about 41 dBA L_{eq}, which is far below background daytime noise level of 67 dBA L_{eq} at this location (Site 27 in Table 7-6). Therefore, noise from tunnel ventilation facilities would be less than a significant impact at all of the nearest noise-sensitive receptors.

Maintenance and Storage Facility Noise

Alternative 3 MSF options would include the same MSF Base Design and MSF Design Option 1 associated with Alternative 1. Noise levels from the MSF Base Design and MSF Design Option 1 were predicted based on the assumptions outlined in the Methodology section of this report. Noise sources considered for the MSF noise analysis include train movements on lead tracks, washing and blowdown activities at the car wash, maintenance shop operations, and TPSS units within the MSF yard.

MSF Base Design Noise

Table 7-9 shows the predicted noise levels from the MSF Base Design layout at representative noise-sensitive receptors. The MSF Base Design would not result in noise impacts at noise-sensitive receptors. Therefore, operation of Alternative 3 would result in a less than significant impact related to MSF Base Design noise.

Table 7-9. Alternative 3: Predicted Maintenance and Storage Facility Base Design Noise

Receptor ID	Location	Land Use	FTA Category	Existing Sound Level (dBA, L_{dn})	Predicted MSF Noise Level (dBA, L_{dn})	Noise Impact Thresholds		Level of Impact
						Moderate	Severe	
MSF-3-4	14347 Cohasset Street	SFR	2	53	38	55-60	>60	**No Impact**
MSF-3-5	14347 Cohasset Street	SFR	2	53	41	55-60	>60	**No Impact**
MSF-3-6	14019 Cohasset Street	SFR	2	53	41	55-60	>60	**No Impact**

Source: HTA, 2024

MSF Design Option 1 Noise

Table 7-10 shows the predicted noise levels from the MSF Design Option 1 layout. MSF Design Option 1 would not result in noise impacts at noise-sensitive receptors. Therefore, operation of Alternative 3 would result in a less than significant impact related to MSF Design Option 1 noise.

Table 7-10. Alternative 3: Predicted Maintenance and Storage Facility Design Option 1 Noise

Receptor ID	Location	Land Use	FTA Category	Existing Sound Level (dBA, L_{dn})	Predicted MSF Noise Level (dBA, L_{dn})	Noise Impact Thresholds		Level of Impact
						Moderate	Severe	
MSF-3-1	15524 Stagg Street	SFR	2	58	48	57-62	>62	**No Impact**
MSF-3-2	7826 Orion Avenue	SFR	2	58	48	57-62	>62	**No Impact**
MSF-3-3	7827 Zombar Avenue	SFR	2	58	41	57-62	>62	**No Impact**

Source: HTA, 2024

7.3.1.2 Construction Noise Impacts

Construction of Alternative 3 would include various phases that would involve the use of construction equipment at specific locations along the proposed alignment. Construction noise levels from Alternative 3 were estimated in terms of the equipment noise levels ($L_{eq.equip}$) for each phase of construction based upon the number and types of off-road construction equipment to be employed during the given phase. Attachment 7 of this report shows the results of the construction noise estimations at a reference distance of 50 feet from construction activities.

The FTA has provided guidance for assessing construction noise associated with transit projects (FTA, 2018). For the purposes of this analysis, the FTA Detailed Analysis construction noise limit criteria of 8-hour $L_{eq.equip}$ have been applied. The criteria are based upon an 8-hour $L_{eq.equip}$, as shown in Table 2-4. For residential uses, the threshold is 80 dBA for daytime construction and 70 dBA for nighttime construction. Commercial and industrial uses are held to 85-dBA and 90-dBA, respectively, for both daytime and nighttime construction noise thresholds.

Table 7-11 is a summary of expected construction noise levels at a reference distance of 50 feet from construction activities and at locations of nearest noise-sensitive receptors to each construction activity. Construction noise would range from 8-hour $L_{eq.equip}$ noise levels of approximately 79 to 101 dBA at the nearest sensitive receptors. As shown in Table 7-11, construction activities would result in levels that exceed the FTA 80-dBA daytime and 70-dBA nighttime 8-hour $L_{eq.equip}$ thresholds for residential land uses.

Table 7-11. Alternative 3: Estimated Construction Noise Levels

Construction Phase	$L_{eq.equip}$ (dBA) at 50 feet	$L_{eq.equip\ (8\text{-}hr)}$ (dBA) at Nearest Receptors	Exceeds 80-dBA $L_{eq.equip\ (8\text{-}hr)}$ Daytime Threshold?	Exceeds 70-dBA $L_{eq.equip\ (8\text{-}hr)}$ Nighttime Threshold?
Monorail Transit Segments 1-4 Construction				
Utility Relocations	87	92	Yes	Yes
Demolition/Site Preparation	87	92	Yes	Yes
Substructure Foundations (CIDH)[a]	87-96	92-101	Yes	Yes
Launch Box (Segment 6)	88	80	Yes	Yes
Precast Superstructure Assembly	87	92	Yes	Yes
Finishing Work	85	90	Yes	Yes
Station Construction				
Utility Relocations	87	81	Yes	Yes

Construction Phase	$L_{eq.equip}$ (dBA) at 50 feet	$L_{eq.equip\ (8\text{-}hr)}$ (dBA) at Nearest Receptors	Exceeds 80-dBA $L_{eq.equip\ (8\text{-}hr)}$ Daytime Threshold?	Exceeds 70-dBA $L_{eq.equip\ (8\text{-}hr)}$ Nighttime Threshold?
Demolition/Site Preparation	87	81	Yes	Yes
Substructure Foundations	87	81	Yes	Yes
Precast Superstructure Assembly	87	81	Yes	Yes
SOE Excavation (UCLA and Wilshire)	87	85-92	Yes	Yes
Station Construction (UCLA and Wilshire)	87	85-92	Yes	Yes
Finishing Work	85	79	No	Yes
Traction Power Substation Construction				
Utility Relocations	87	83	Yes	Yes
Demolition/Site Preparation	85	81	Yes	Yes
Excavation	87	83	Yes	Yes
Concrete Work	83	79	No	Yes
Utility Work	87	83	Yes	Yes
Paving	88	84	Yes	Yes
Maintenance and Storage Facility Construction				
Utility Relocation	87	85	Yes	Yes
Demolition/Site Preparation	87	85	Yes	Yes
Excavation	89	87	Yes	Yes
Concrete Work	86	84	Yes	Yes
Utility Work	87	85	Yes	Yes
Paving	88	86	Yes	Yes
Haynes Street Construction				
Utility Relocation	90	92	Yes	Yes
Missouri Avenue Construction				
Utility Relocation	90	92	Yes	Yes
La Grange Avenue Construction				
Utility Relocation	90	92	Yes	Yes
Mississippi Avenue Construction				
Utility Relocation	90	92	Yes	Yes
I-405 Improvements				
Utility Relocation	87	84	Yes	Yes
Demolition/Site Preparation	91	88	Yes	Yes
Grading/Excavation	94	91	Yes	Yes
Concrete Work	88	85	Yes	Yes
Precast Yard Construction				
Demolition/Site Preparation	87	85	Yes	Yes
Excavation	89	87	Yes	Yes
Concrete Work	90	88	Yes	Yes
Utility Work	87	85	Yes	Yes
Paving	88	86	Yes	Yes
Guideway Fabrication	86	84	Yes	Yes

Source: HTA, 2024

[a]Variation in noise levels for this phase are due to variation in number of equipment used for different segments.

CIDH = cast-in-drilled-hole

$L_{eq.equip\ (8\text{-}hr)}$ = equivalent noise level from construction equipment over 8-hour workday

7.3.2 Impact NOI-2: Would the project cause generation of excessive groundborne vibration or groundborne noise levels?

7.3.2.1 Operational Vibration Impacts

Rail Operations Vibration

GBV and noise levels from train operations associated with Alternative 3 were evaluated using the general vibration assessment procedure in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018). Section 3.2 describes the operations vibration assessment methodology.

GBV and groundborne noise (GBN) levels were evaluated at a total of 102 receptor locations representing all the sensitive land uses along the Alternative 3 aerial and underground alignments. Predicted GBV levels from rail operations at Category 1 receptors above the underground segment of Alternative 3 in the UCLA area are between 39 VdB to 49 VdB, below the FTA criterion of 65 VdB. The highest predicted GBN levels at these receptors are up to 19 dBA, which is below the criterion of 25 dBA.

The predicted GBV levels from Alternative 1 vehicle passbys at Category 2 land uses, including residential and lodging facilities, are between 22 VdB to 44 VdB along the aerial segments. GBN noise levels at such locations are predicted to be up to 30 dBA, which is also below the GBN criterion of 35 dBA for residential uses. At residential structures above the Alternative 3 underground segment, predicted GBV and GBN levels are up to 51 VdB and 31 dBA, respectively. These levels are also below the applicable FTA criteria.

At the nearest Category 3 receptors, including educational, cultural, and religious facilities, along the Alternative 3 alignment, the predicted GBV levels are between 36 VdB to 48 VdB. Such levels are below the FTA GBV criterion of 75 VdB. The highest GBN levels from Alternative 3 rail operations at Category 3 land uses are predicted to be 28 dBA, which is well below the criterion of 40 dBA.

Attachment 8 of this report shows the details of the operational vibration impact assessment at the representative Category 1, 2, and 3 receptors along the Alternative 3 alignment. Based on the results of the vibration analysis, there would be no GBV impacts nor GBN impacts at sensitive receptors along the alignment. Therefore, operation of Alternative 3 would result in a less than significant impact related to rail operations GBV or GBN.

Maintenance and Storage Facility Vibration

MSF Base Design

Under the MSF Base Design, monorail trains would access the site from the main alignment’s northern tail tracks at the northwest corner of the site. Trains would travel parallel to the LOSSAN rail corridor before curving southeast to maintenance facilities and storage tracks. The guideway would remain in an aerial configuration within the MSF Base Design, including within maintenance facilities. Rail tracks in this MSF would be located in an industrial area with the nearest sensitive structures nearly 700 feet south of the maintenance facilities tracks. The vibration level at 700 feet would be 36 VdB and would be below the 72 VdB criterion for residential uses. Therefore, operation of the MSF Base Design would result in a less than significant impact related to GBV or GBN.

MSF Design Option 1

Under MSF Design Option 1, monorail trains would access the site from the monorail guideway east of Sepulveda Boulevard. From the northeast corner of the site, trains would travel parallel to the LOSSAN rail corridor before turning south to maintenance facilities and storage tracks parallel to I-405. The guideway would remain in an aerial configuration within the MSF Design Option 1, including within maintenance facilities. Distances from the elevated tracks to the nearest sensitive buildings would be nearly 400 feet to residences along Marson Street in Panorama City, 585 feet to 740 feet from the nearest residential structures southeast of the MSF. The nearest storage tracks would be located between 300 to 400 feet from the nearest residential buildings to the east and southeast of the MSF. At the nearest sensitive receptor located 300 feet away vibration levels from monorail movements within the MSF would be 40 VdB and would be below 72 VdB criterion for residential uses. Vibration levels at sensitive receptors farther away would also be below the 72 VdB criterion for residential uses. Therefore, operation of the MSF Design Option 1 would result in a less than significant impact related to GBV or GBN.

7.3.2.2 Construction Vibration Impacts

The primary concern related to vibration during construction is the potential to damage structures. Some construction activities, such as pile driving, use of drill rigs, pavement breaking, and the use of tracked vehicles (e.g., bulldozers) and hoe rams, could result in perceptible levels of GBV at sensitive buildings located in close proximity to construction sites. These activities would typically be limited in duration and their vibration levels are likely to be well below thresholds for minor cosmetic building damage. Alternative 3 would also include the use of a TBM to construct the underground alignment.

Project construction would include a limited number of activities expected to generate vibration that approaches the lowest building damage limit of 0.12 inch per second (in/sec) peak particle velocity (PPV) (refer to Table 2-7). Table 7-12 shows the distances at which the 0.12 in/sec PPV, 0.2 in/sec PPV, and 0.3 in/sec PPV thresholds would not be exceeded. For example, use of a drilling rig, hoe ram, or large bulldozer would be safe at distances greater than 22 feet from Category IV buildings. A vibratory roller would be safe at distances greater than 22 feet from Category IV buildings and typical impact pile driver operation would be safe at distances of 79 feet or greater. Typical building construction in an urban setting consists of buildings that are Category II engineered concrete and masonry that have a 0.3 in/sec PPV threshold or Category III non-engineered timber and masonry buildings that have a 0.2 in/sec PPV threshold. Typical construction equipment, such as a large bulldozer, would not exceed the 0.2 in/sec PPV building damage criterion at distances of 18 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 13 feet or greater. A vibratory roller would not exceed the 0.2 in/sec PPV building damage criterion at distances of 32 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 23 feet or greater. An impact pile driver would not exceed the 0.2 in/sec PPV building damage criterion at distances of 67 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 47 feet or greater.

Table 7-12. Construction Equipment Vibration Damage Potential by Distance

Equipment	Reference Vibration Level PPV (inches/second)	Distance to not Exceed 0.12 PPV Damage (feet)	Distance to not Exceed 0.2 PPV Damage (feet)	Distance to not Exceed 0.3 PPV Damage (feet)
Drill (CIDH)	0.089	22	18	13
	0.644 (typical vibration level)	79	67	47

Equipment	Reference Vibration Level PPV (inches/second)	Distance to not Exceed 0.12 PPV Damage (feet)	Distance to not Exceed 0.2 PPV Damage (feet)	Distance to not Exceed 0.3 PPV Damage (feet)
Impact Pile Driver	1.518 (upper range vibration level)	140	117	84
Large Bulldozer	0.089	22	18	13
Vibratory Pile Driver	0.17 (typical vibration level)	33	28	20
	0.734 (upper range vibration level)	87	73	52
Vibratory Roller	0.210	38	32	23

Source: HTA, 2024

PPV = peak particle velocity

Vibration annoyance is another concern during construction. In rare instances, when vibration-intensive construction activities occur close to sensitive structures (within 25 feet), such as residential buildings, or special use buildings like laboratories or recording studios, vibration could exceed the FTA vibration annoyance criteria shown in Table 2-5 and Table 2-6. Along the underground alignment of Alternative 3, the TBM and other tunnel construction activities would be potential sources of GBVs. However, the TBM is slow moving and causes very little vibration and related GBN to the surrounding area when operating at full tunnel depths. The Alternative 3 underground tunnel would be at depths of less than 20 feet to nearly 400 feet from the aboveground buildings along the tunnel alignment. In residential buildings closest to the north tunnel portal, GBV from the TBM may be felt for a short period (about two days) while the machine passes under the receptor locations. Throughout the rest of the tunnel alignment, GBV from the TBM would not be perceptible or just barely perceptible to some building occupants. Expected TBM vibration levels, however, would be well below the strictest building damage threshold of 0.12 in/sec. Construction of Wilshire/Metro D Line station along the underground alignment would likely be cut-and-cover construction which could result in aboveground vibration. However, buildings would typically be located more than 50 feet away from station construction and appear to be constructed of engineered concrete and masonry (0.3 in/sec threshold), resulting in limited potential for excessive vibration damage and annoyance.

The alignment would surface in the Santa Monica Mountains near the Getty Center Parking. Construction activity would typically occur at distances greater than 50 feet from sensitive buildings in the Santa Monica Mountains between Getty Center and Green Leaf Street in the Valley as the alignment would be located in either the I-405 freeway ROW or areas immediately adjacent to the freeway, where there are limited to no structures. The potential for vibration damage and annoyance would be limited in this area. North of Greenleaf Street, the alignment would travel along the east side of the I-405 freeway in a constrained area with buildings adjacent to the construction footprint. The FTA building damage criteria and vibration annoyance criteria could potentially be exceeded at buildings in these areas.

Significant GBV could occur when certain construction activities would occur at close distances to sensitive receptors. Therefore, Alternative 3 would result in a significant impact related to construction vibration.

Maintenance and Storage Facility Construction Vibration

MSF Base Design

Vibration-sensitive structures located closest to the construction of the MSF Base Design are residential buildings located along the east side of Orion Avenue and north of Stagg Street. The nearest residential structure in this area would be approximately 90 feet from excavating/grading activities and 240 feet from structural foundation. At such distances, the anticipated vibration levels from construction would be 0.031 in/sec PPV from the use of vibratory rollers during paving, 0.013 in/sec PPV from a large bulldozer, and 0.003 in/sec PPV from caisson drilling. All these levels are below the construction vibration damage risk criteria for all building types (Table 2-7). Therefore, vibration impacts related to construction of the MSF Base Design would be less than significant. No mitigation measures would be required.

MSF Design Option 1

The nearest existing building to the construction of the MSF Design Option 1 is a light industrial building located at 7605 Hazeltine Avenue in Van Nuys. The closest façade of this building is adjacent to the southern property line of the proposed MSF site. The highest vibration levels from construction of the MSF Design Option 1 at the closest off-site building would be 0.83 in/sec PPV from the use of a vibratory roller during paving, and 0.35 in/sec PPV from a large bulldozer during the grading phase. Estimated vibration levels from caisson drilling would be 0.03 in/sec. The applicable damage risk criterion for the subject building type is 0.3 in/sec PPV (Building Type II in Table 2-7). Therefore, vibration impacts due to construction of the MSF Design Option 1 would be significant without mitigation. The minimum distance from the subject building at which large bulldozers and vibratory rollers must operate is 20 feet from the north façade of the building during the construction of the MSF Design Option 1. This mitigation measure would be a part of Mitigation Measure (MM) VIB-3.1 (Vibration Control Plan) for Alternative 3.

Construction Vibration Impacts on Historic Buildings

Construction under Alternative 3 would have the potential to damage buildings in close proximity to vibration-intensive construction activities. Using the reference levels in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018), vibration levels from project construction activities were estimated at historic buildings or structures eligible for the National Register of Historic Places along the Alternative 3alignment. Such buildings are generally classified as extremely susceptible to vibration damage (Building Type IV in Table 2-7).

Findings of the construction vibration assessment at historic structures are as follows:

- Historic building located at 4511 Sepulveda Boulevard is very close to the Alternative 3alignment. Most vibration-intensive construction activities at this location would result in levels exceeding the damage criterion of 0.12 in/sec PPV. Special consideration should be made for this building in MM VIB-3.1 outlined in Section 7.4.
- Pile driving at locations along the alignment in the vicinity of the following historic properties would potentially result in GBV levels exceeding the damage criterion of 0.12 in/sec PPV. Therefore, these locations must be addressed in the Vibration Control Plan if pile driving is to occur within 150 feet of the buildings:
  - Photo Electronics Corp. Building, 1944 Cotner Avenue, Los Angeles
  - Dual Ultimate Pharmacy, 2020 Cotner Avenue, Los Angeles
  - Building at 2114 Cotner Avenue, Los Angeles
  - UCLA Ackerman Hall, 308 Westwood Plaza, Los Angeles

- Rodeo Realty, 15300 Ventura Boulevard, Sherman Oaks
- Historic building located at 14746 Raymer Street, Van Nuys

7.3.3 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 2 miles of a public airport or public use airport, would the project expose people residing or working in the Project Study Area to excessive noise levels?

The Santa Monica Airport and Van Nuys Airport are located within 2 miles of Alternative 3. However, Alternative 3 is a transit project that is not sensitive to noise. Transit riders would not dwell at one location for an extended period of time that would result in exposure to excessive airport noise. Construction workers working on Alternative 3 would utilize ear protection as required while working on Alternative 3. Therefore, no impacts related to airport noise would occur.

7.4 Mitigation Measures

7.4.1 Operational

The following mitigation measures would be needed to reduce operational noise impacts from train movements along the Alternative 3 alignment:

MM NOI-3.1: ***Soundwalls***:

- *Soundwalls of 3.5 feet in height shall be installed above the top of the guideway beams to reduce noise to below the Federal Transit Administration moderate-impact noise criteria. Soundwalls reduce noise levels at noise-sensitive receptors by breaking the direct line-of-sight between source and receptor with a solid wall. Aerial guideways typically do not require tall walls due to the height of the guideway over the receptor and a 3.5-foot wall height was the effective height determined to reduce noise level to below the FTA noise impact criteria. Locations shall be verified during final design as necessary to reduce noise to below the Federal Transit Administration moderate-impact noise criteria. Table 7-13 shows the soundwall locations.*

Table 7-13. Alternative 3: MM NOI-3.1 – Soundwalls Locations

Location	Type	Civil Station Location	Track Side
Albers Apartments, 15328 Albers Street; and Best Western Plus Carriage Inn, 5525 Sepulveda Boulevard	3.5-foot-high soundwall above the guideway beams	1047+80 to 1053+00 East of tracks	Northbound
Granada Apartments 15630 Vanowen Street	3.5-foot-high soundwall above the guideway beams	1137+40 to 1142+00 East of tracks	Northbound
Single-family backyards east of I-405, between Vanowen Street and Lili Way	3.5-foot-high soundwall above the guideway beams	1142+00 to 1160+30 East of tracks	Northbound
Single-family homes along the east side of Firmament Avenue, between Cohasset Street and Saticoy Street	3.5-foot-high soundwall above the guideway beams	1189+00 to 1195+00 East of tracks	Northbound

Source: HTA, 2024

7.4.2 Construction

The following mitigation measures would be needed to reduce construction noise and vibration levels to below the applicable limits:

MM NOI-3.2: ***No*****ise Control Plan:**

- *Prior to the initiation of localized construction activities, the Project contractor shall develop a Noise Control Plan demonstrating how the Federal Transit Administration 8-hour $L_{eq.equip}$ (equivalent noise level of equipment) noise criteria would be achieved during construction. The Noise Control Plan shall be prepared by a board-certified acoustical engineer. The Federal Transit Administration 8-hour $L_{eq.equip}$ construction noise standards are as follows: Residential daytime standard of 80 dBA 8-hour $L_{eq.equip}$ and nighttime standard of 70 dBA 8-hour $L_{eq.equip}$, Commercial daytime and nighttime standard of 85 dBA 8-hour $L_{eq.equip}$, and Industrial daytime and nighttime standard of 90 dBA 8-hour $L_{eq.equip}$. The Noise Control Plan shall be designed to follow Metro requirements, and shall include measurements of existing noise, a list of the major pieces of construction equipment that would be used, predictions of the noise levels at the closest noise-sensitive receptors (residences, hotels, schools, religious facilities, and similar facilities), and noise mitigation measures to be implemented to achieve compliance with the Federal Transit Administration 8-hour $L_{eq.equip}$ construction noise standards to the degree feasible. The Noise Control Plan must be approved by Metro prior to initiating noise-generating construction activities. The Project contractor shall conduct continuous noise monitoring to demonstrate compliance with the Federal Transit Administration 8-hour $L_{eq.equip}$ noise limits. If the Federal Transit Administration 8-hour $L_{eq.equip}$ criteria are exceeded, the Project contractor shall implement measures to reduce construction noise as much as feasible. The Project contractor shall establish a public information and complaint system. The Project contractor shall respond to and provide corrective action for complaints within 24-hours. In addition, the Project shall comply with local noise ordinances when applicable, including by obtaining a variance(s) from the applicable local jurisdiction when nighttime work is required. Noise reducing methods that may be implemented by the Project contractor include:*
  - *If nighttime construction is planned, a noise variance may be prepared by the Project contractor, if required by the jurisdiction, that demonstrates the implementation of control measures to maintain noise levels below the applicable Federal Transit Administration and local standards.*
  - *Where nighttime construction would exceed the FTA nighttime criteria, avoid nighttime construction to the degree feasible.*
  - *Utilize specialty equipment equipped with enclosed engines and/or high performance mufflers as feasible. The Project contractor shall locate equipment and staging areas as far from noise-sensitive receptors as possible.*
  - *Limit unnecessary idling of equipment.*

- *Install temporary noise barriers as needed where feasible.*
- *Reroute construction related truck traffic away from residential streets to the extent permitted by the relevant municipality.*
- *Avoid impact pile driving where possible. Drilled piles or vibratory pile drivers would be required where feasible.*
- *Where Project construction cannot be performed in accordance with the requirements of the applicable noise limits, the Project contractor should be required to investigate alternative construction methods that would result in lower sound levels. Also, the Project contractor should be required to conduct noise monitoring to demonstrate compliance with noise limits outlined in the Noise Control Plan.*

MM VIB-3.1: ***Vibration Control Plan:***

- *Prior to construction, the Project contractor shall prepare a Vibration Control Plan demonstrating how the Federal Transit Administration building damage risk criteria and the Federal Transit Administration vibration annoyance criteria would be achieved. The Vibration Control Plan must be approved by Metro prior to initiating vibration-generating construction activities. The Vibration Control Plan would include a list of the major pieces of construction equipment that would be used, and the predictions of the vibration levels at the closest sensitive receivers. The Project contractor would conduct vibration monitoring to demonstrate compliance with the vibration limits during construction activity. Where the construction cannot be performed to meet the vibration criteria, the Project contractor shall implement alternative means and methods of construction measures to reduce vibration levels as much as feasible. Vibration reducing methods that may be implemented by the Project contractor include:*
  - *When feasible, use construction equipment or less vibration intensive techniques near vibration sensitive locations.*
  - *Use as small an impact device (i.e., hoe ram, pile driver) as possible to accomplish necessary tasks.*
  - *Avoid impact pile driving where possible. Drilled piles or vibratory pile drivers would be required where feasible.*
  - *When feasible, in construction areas close to sensitive buildings, select non-impact demolition and construction methods such as saw or torch cutting and removal for off-site demolition, and use chemical splitting, or hydraulic jack splitting, instead of high impact methods.*
- *The Project contractor shall monitor construction vibration levels at structures identified as a “historic” resource within the meaning of CEQA Guidelines Section 15064.5(a) to ensure the vibration damage threshold of 0.12 in/sec PPV shall not be exceeded. The vibration monitoring shall be conducted by a qualified professional for real-time vibration monitoring for construction work at the Project construction site requiring heavy equipment or ground compaction devices. A pre-construction and post-construction survey of these buildings shall*

be conducted by a qualified structural engineer. Any damage shall be noted. All vibration monitors used for these measurements shall be equipped with an "alarm" feature to provide advanced notification that vibration impact criteria have been approached. Documented damage in the post-construction survey shall be repaired as required by the Secretary of the Interior's (SOI's) Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. The following historic resources shall be included in the Vibration Control Plan.

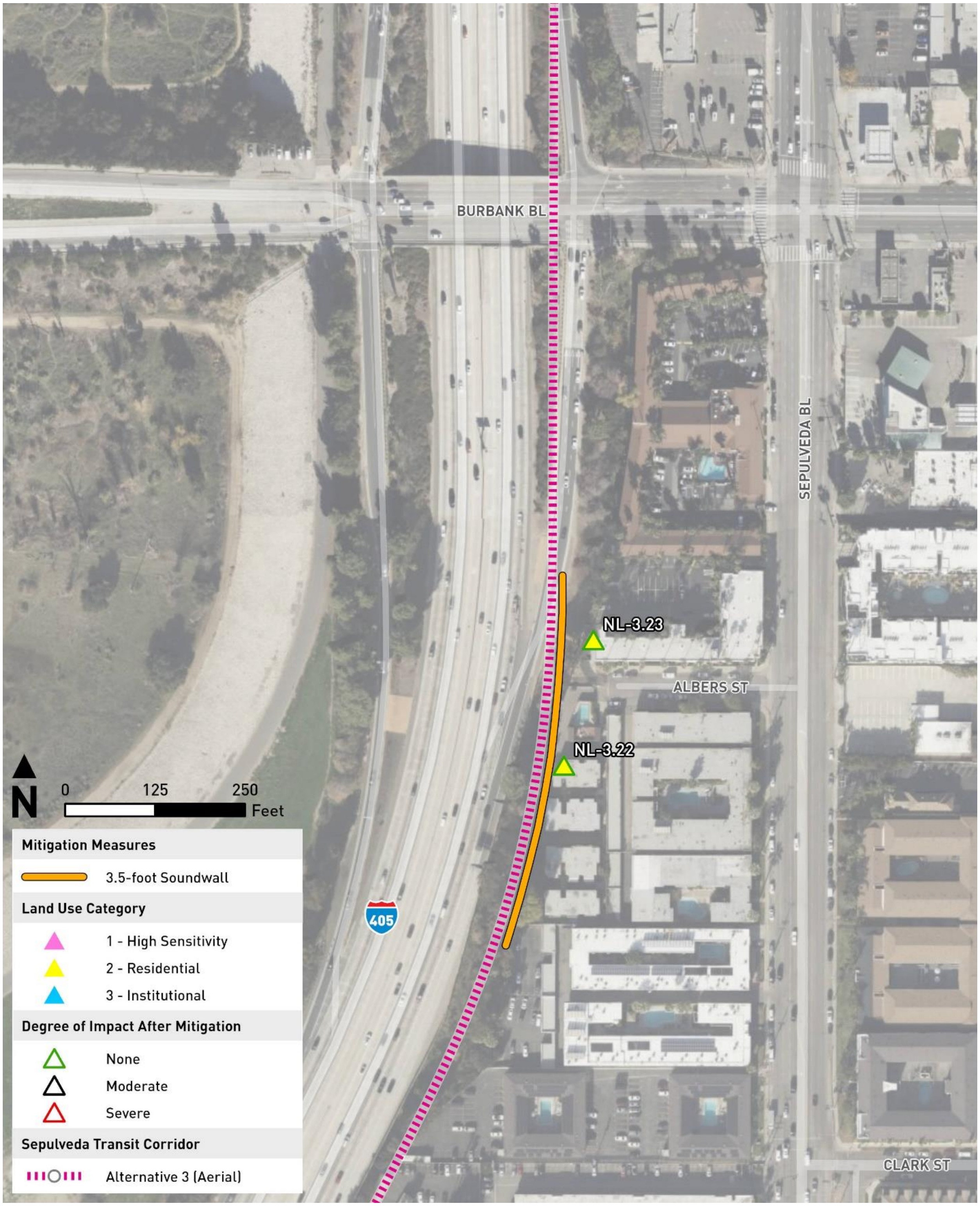
- *Historic building located at 4511 Sepulveda Boulevard*
- *Photo Electronics Corp. Building, 1944 Cotner Avenue, Los Angeles*
- *Dual Ultimate Pharmacy, 2020 Cotner Avenue, Los Angeles*
- *Building at 2114 Cotner Avenue, Los Angeles*
- *UCLA Ackerman Hall, 308 Westwood Plaza, Los Angeles*
- *Rodeo Realty, 15300 Ventura Boulevard, Sherman Oaks*
- *Historic building located at 14746 Raymer Street, Van Nuys*

7.4.3 Impacts After Mitigation

7.4.3.1 Operational

Alternative 3 operations would result in moderate noise impacts at five receptors representing 26 single-family dwelling units, five multi-family buildings, and a hotel. MM NOI-3.1 would require the installation of soundwalls along the east side of the northbound tracks. Rail operations noise impacts after implementation of mitigation are shown on Figure 7-15, Figure 7-16, and Figure 7-17.

Figure 7-15. Alternative 3: Mitigated Rail Operations Noise Impacts – Magnolia Boulevard to Burbank Boulevard

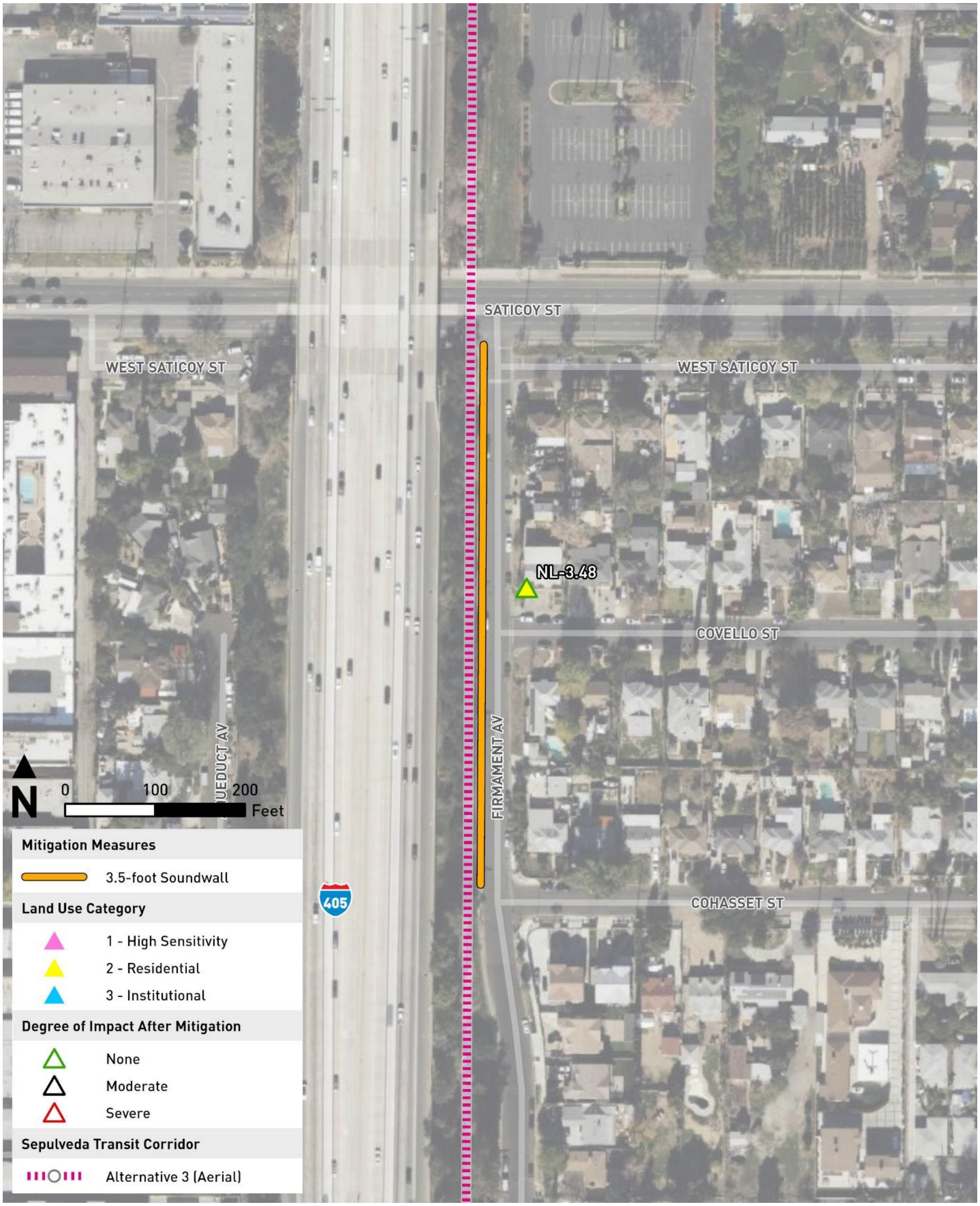


Source: HTA, 2024

Figure 7-16. Alternative 3: Mitigated Rail Operations Noise Impacts – Victory Boulevard to Sherman Way

Source: HTA, 2024

Figure 7-17. Alternative 3: Mitigated Rail Operations Noise Impacts – Cohasset Street to Saticoy Street



Source: HTA, 2024

As shown in Table 7-14, soundwalls of heights of 3.5 feet above the guide beams would reduce monorail noise levels to below the FTA moderate impact threshold at the impacted receptors. Therefore, Alternative 3 would result in a less than significant impact with mitigation.

Table 7-14. Alternative 3: Summary of Noise Impacts and Mitigation Measures

Receptor ID	Location	Unmitigated Impact	Mitigation			
			Type	Location(s)	Project Noise Level (L_{dn}, dBA)	Impact Level
NL-3.22	Alber's Apartments, 15328 Albers Street, Sherman Oaks	Moderate	3.5-foot-high soundwall above track beams	1047+80 to 1053+00 (northbound) east of tracks	57	**No Impact**
NL-3.23	Best Western Plus Carriage Inn-South 5525 Sepulveda Boulevard, Sherman Oaks	Moderate	3.5-foot-high soundwall above track beams	1047+80 to 1053+00 (northbound) east of tracks	56	**No Impact**
NL-3.37	Granada Apartments 15630 Vanowen Street, Van Nuys	Moderate	3.5-foot-high soundwall above track beams	1137+40 to 1142+00 (northbound) east of tracks	60	**No Impact**
NL-3.40	15623 Hart Street, Van Nuys	Moderate	3.5-foot-high soundwall above track beams	1142+00 to 1160+30 (northbound) east of tracks	56	**No Impact**
NL-3.48	15559 Covello Street, Van Nuys	Moderate	3.5-foot-high soundwall above track beams	1189+00 to 1195+00 (northbound) east of tracks	55	**No Impact**

Source: HTA, 2024

7.4.3.2 Construction

Noise

The proposed Alternative 3 alignment would result in temporary and periodic increases in ambient noise levels due to construction activity that would exceed FTA's criteria, and, where applicable, the standards established by the local noise ordinances. While MM NOI-3.2 would be implemented, which would include noise-reducing measures, there may still be temporary or periodic increases in ambient noise levels that exceed FTA construction impact criteria. There are no feasible mitigation measures to completely eliminate all anticipated instances of construction noise levels above the FTA criteria. Therefore, impacts related to construction noise would be significant and unavoidable.

Vibration

The proposed Alternative 3 alignment would result in temporary and periodic increases in vibration levels due to construction activity that would exceed FTA's criteria. While MM VIB-3.1 would be implemented, which would include vibration-reducing measures, there may still be temporary or periodic increases in vibration levels that exceed FTA construction vibration impact criteria. Historic resources have been identified in MM VIB-3.1 that would require vibration monitoring and pre-construction and post-construction surveys. The mitigation would also require a pre-construction and post construction survey to be prepared, and any damage noted and restored per the requirements of SOI Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. Therefore, impacts related to construction vibration at historic resources would be less than significant with mitigation. Regarding construction vibration at non-historic structures, in some instances it may not be possible to reduce vibration by using less vibration intensive equipment due to geological conditions or physical constraints of the construction site. There are no feasible mitigation measures to completely eliminate all anticipated incidents of construction vibration levels exceeding the FTA criteria. Therefore, impacts related to construction vibration would be significant and unavoidable for both damage and annoyance.

8 ALTERNATIVE 4

8.1 Alternative Description

Alternative 4 is a heavy rail transit (HRT) system with a hybrid underground and aerial guideway track configuration that would include four underground stations and four aerial stations. This alternative would provide transfers to five high-frequency fixed guideway transit and commuter rail lines, including the Los Angeles County Metropolitan Transportation Authority's (Metro) E, Metro D, and Metro G Lines, the East San Fernando Valley Light Rail Transit Line, and the Metrolink Ventura County Line. The length of the alignment between the terminus stations would be approximately 13.9 miles, with 5.7 miles of aerial guideway and 8.2 miles of underground configuration.

The four underground and four aerial HRT stations would be as follows:

1. Metro E Line Expo/Sepulveda Station (underground)
2. Santa Monica Boulevard Station (underground)
3. Wilshire Boulevard/Metro D Line Station (underground)
4. UCLA Gateway Plaza Station (underground)
5. Ventura Boulevard/Sepulveda Boulevard Station (aerial)
6. Metro G Line Sepulveda Station (aerial)
7. Sherman Way Station (aerial)
8. Van Nuys Metrolink Station (aerial)

8.1.1 Operating Characteristics

8.1.1.1 Alignment

As shown on Figure 8-1, from its southern terminus station at the Metro E Line Expo/Sepulveda Station, the alignment of Alternative 4 would run underground north through the Westside of Los Angeles (Westside) and the Santa Monica Mountains to a tunnel portal south of Ventura Boulevard in the San Fernando Valley (Valley). At the tunnel portal, the alignment would transition to an aerial guideway that would generally run above Sepulveda Boulevard before curving eastward along the south side of the Los Angeles-San Diego-San Luis Obispo (LOSSAN) rail corridor to the northern terminus station adjacent to the Van Nuys Metrolink/Amtrak Station.

The proposed southern terminus station would be located underground east of Sepulveda Boulevard between the existing elevated Metro E Line tracks and Pico Boulevard. Tail tracks for vehicle storage would extend underground south of National Boulevard east of Sepulveda Boulevard. The alignment would continue north beneath Bentley Avenue before curving northwest to an underground station at the southeast corner of Santa Monica Boulevard and Sepulveda Boulevard. From the Santa Monica Boulevard Station, the alignment would continue and curve eastward toward the Wilshire Boulevard/Metro D Line Station beneath the Metro D Line Westwood/UCLA Station, which is currently under construction as part of the Metro D Line Extension Project. From there, the underground alignment would curve slightly to the northeast and continue beneath Westwood Boulevard before reaching the UCLA Gateway Plaza Station.

Figure 8-1. Alternative 4: Alignment

Source: STCP, 2024; HTA, 2024

From the UCLA Gateway Plaza Station, the alignment would turn to the northwest beneath the Santa Monica Mountains to the east of Interstate 405 (I-405). South of Mulholland Drive, the alignment would curve to the north to reach a tunnel portal at Del Gado Drive, just east of I-405 and south of Sepulveda Boulevard.

The alignment would transition from an underground configuration to an aerial guideway structure after exiting the tunnel portal and would continue northeast to the Ventura Boulevard/Sepulveda Boulevard

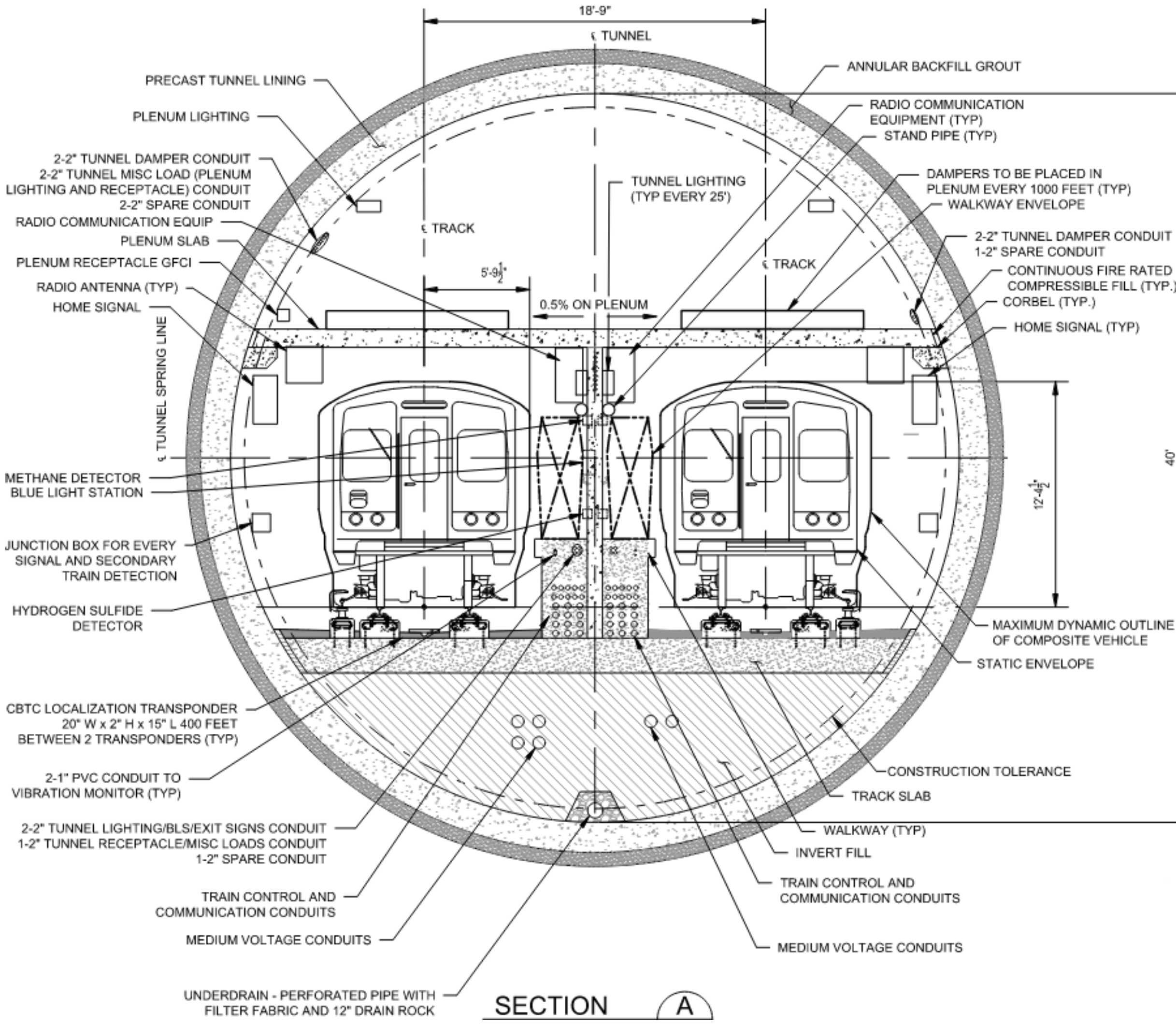
Station located over Dickens Street, immediately west of the Sepulveda Boulevard and Dickens Street intersection. North of the station, the aerial guideway would transition to the center median of Sepulveda Boulevard. The aerial guideway would continue north on Sepulveda Boulevard and cross over U.S. Highway 101 (US-101) and the Los Angeles River before continuing to the Metro G Line Sepulveda Station, immediately south of the Metro G Line Busway. Overhead utilities along Sepulveda Boulevard in the Valley would be undergrounded where they would conflict with the guideway or its supporting columns.

The aerial guideway would continue north above Sepulveda Boulevard where it would reach the Sherman Way Station just south of Sherman Way. After leaving the Sherman Way Station, the alignment would continue north before curving to the southeast to parallel the LOSSAN rail corridor on the south side of the existing tracks. Parallel to the LOSSAN rail corridor, the guideway would conflict with the existing Willis Avenue Pedestrian Bridge, which would be demolished. The alignment would follow the LOSSAN rail corridor before reaching the proposed northern terminus Van Nuys Metrolink Station located adjacent to the existing Metrolink/Amtrak Station. Tail tracks and yard lead tracks would descend to a proposed at-grade maintenance and storage facility (MSF) east of the northern terminus station. Modifications to the existing pedestrian underpass to the Metrolink platforms to accommodate these tracks would result in reconfiguration of an existing rail spur serving City of Los Angeles Department of Water and Power (LADWP) property.

8.1.1.2 Guideway Characteristics

Alternative 4 would utilize a single-bore tunnel configuration for underground tunnel sections, with an outside diameter of approximately 43.5 feet. The tunnel would include two parallel tracks with 18.75-foot track spacing in tangent sections separated by a continuous central dividing wall throughout the tunnel. Inner walkways would be constructed adjacent to the two tracks. Inner and outer walkways would be constructed within tunnel sections near the track crossovers. At the crown of tunnel, a dedicated air plenum would be provided by constructing a concrete slab above the railway corridor. The air plenum would allow for ventilation throughout the underground portion of the alignment. Figure 8-2 illustrates these components at a typical cross-section of the underground guideway.

Figure 8-2. Typical Underground Guideway Cross-Section

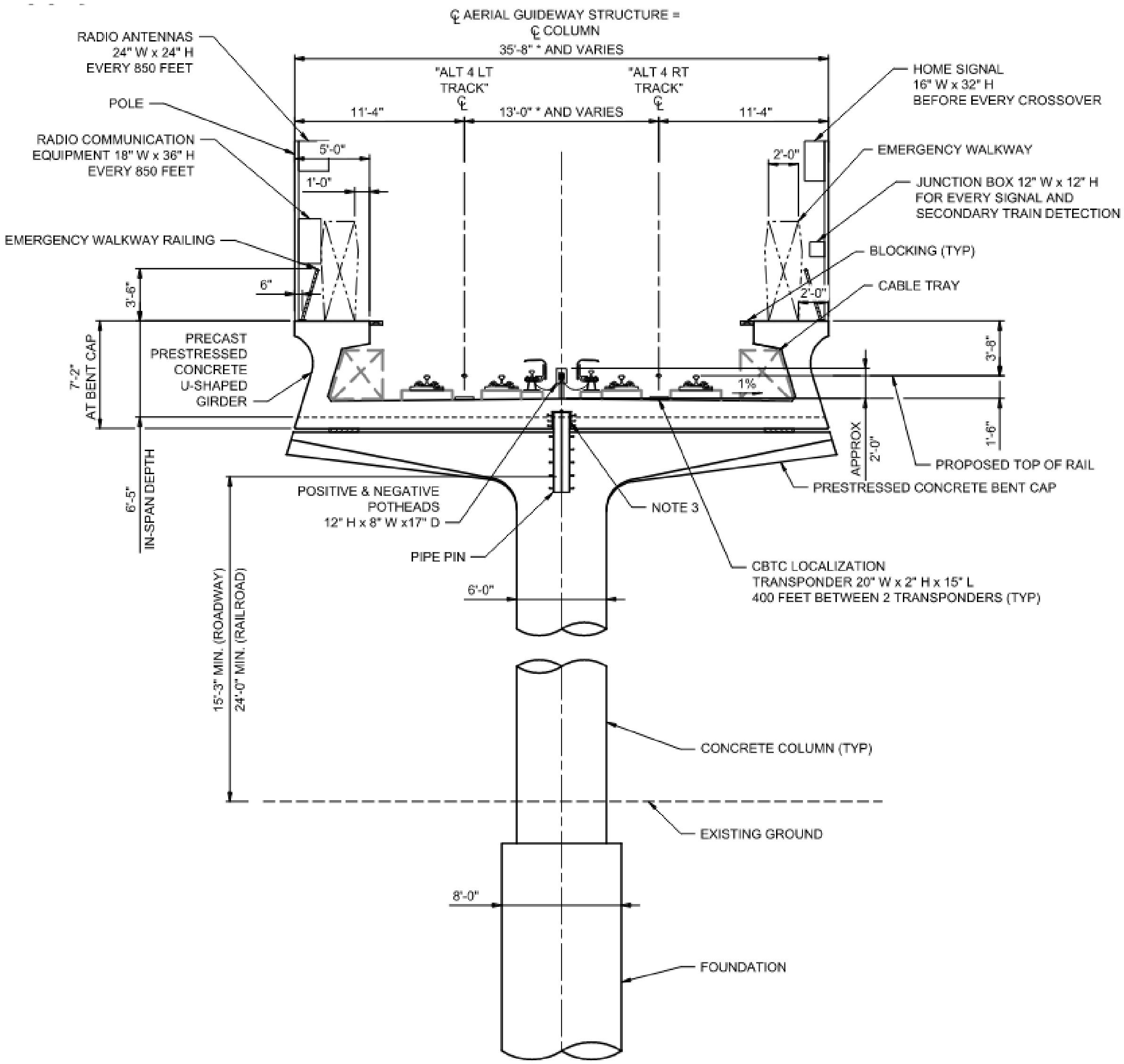


Source: STCP, 2024

In aerial sections, the guideway would be supported by either single columns or straddle-bents. Both types of structures would support a U-shaped concrete girder and the HRT track. The aerial guideway would be approximately 36 feet wide. The track would be constructed on the concrete girders with direct fixation and would maintain a minimum of 13 feet between the centerlines of the two tracks. On the outer side of the tracks, emergency walkways would be constructed with a minimum width of 2 feet.

The single-column pier would be the primary aerial structure throughout the aerial portion of the alignment. Crash protection barriers would be used to protect columns located in the median of Sepulveda Boulevard in the Valley. Figure 8-3 shows a typical cross-section of the single-column aerial guideway.

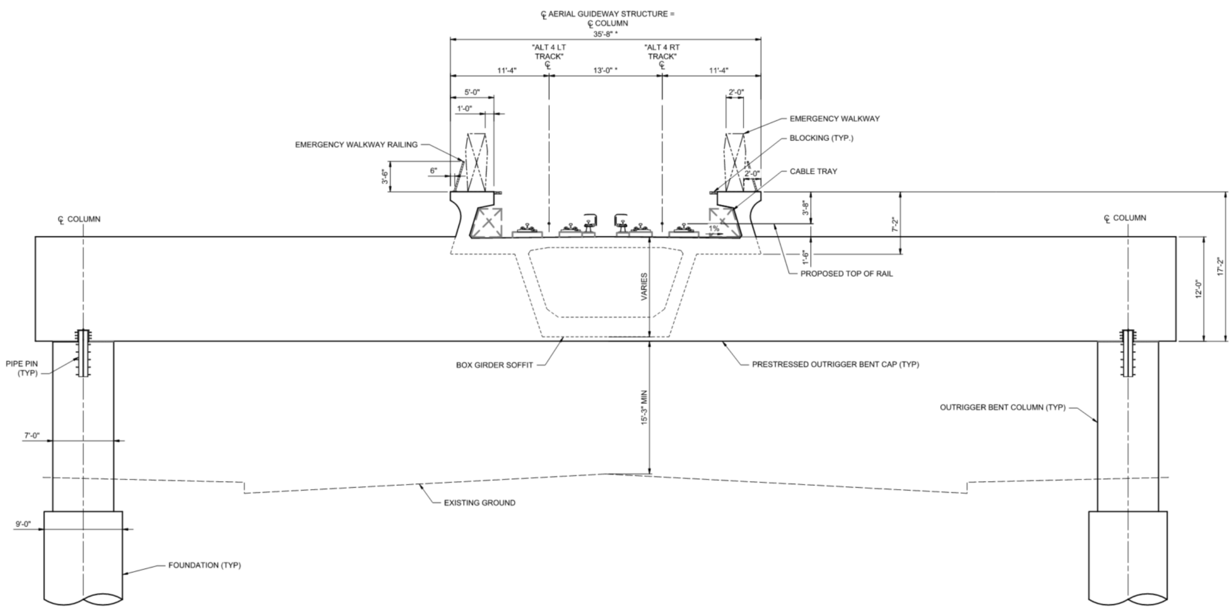
Figure 8-3. Typical Aerial Guideway Cross-Section



Source: STCP, 2024

In order to span intersections and maintain existing turn movements, sections of the aerial guideway would be supported by straddle bents, a concrete straddle-beam placed atop two concrete columns constructed outside of the underlying roadway. Figure 8-4 illustrates a typical straddle-bent configuration.

Figure 8-4. Typical Aerial Straddle-Bent Cross-Section



Source: STCP, 2024

8.1.1.3 Vehicle Technology

Alternative 4 would utilize steel-wheel HRT trains, with automated train operations and planned peak-period headways of 2.5 minutes and off-peak-period headways ranging from 4 to 6 minutes. Each train could consist of three or four cars with open gangways between cars. The HRT vehicle would have a maximum operating speed of 70 miles per hour; actual operating speeds would depend on the design of the guideway and distance between stations. Train cars would be approximately 10 feet wide with three double doors on each side. Each car would be approximately 72 feet long with capacity for 170 passengers. Trains would be powered by a third rail.

8.1.1.4 Stations

Alternative 4 would include four underground stations and four aerial stations with station platforms measuring 280 feet long for both station configurations. The aerial stations would be constructed a minimum of 15.25 feet above ground level, supported by rows of dual columns with 8-foot diameters. The southern terminus station would be adjacent to the Metro E Line Expo/Sepulveda Station, and the northern terminus station would be adjacent to the Van Nuys Metrolink/Amtrak Station.

All stations would be side-platform stations where passengers would select and travel to station platforms depending on their direction of travel. All stations would include 20-foot-wide side platforms separated by 30 feet for side-by-side trains. Aerial station platforms would be covered, but not enclosed. Each underground station would include an upper and lower concourse level prior to reaching the train platforms. Each aerial station, except for the Sherman Way Station, would include a mezzanine level prior to reaching the station platforms. At the Sherman Way Station, separate entrances on opposite sides of the street would provide access to either the northbound or southbound platform with an overhead pedestrian walkway providing additional connectivity across platforms. Each station would have a minimum of two elevators, two escalators, and one stairway from the ground level to the concourse or mezzanine.

Stations would include automatic, bi-parting fixed doors along the edges of station platforms. These platform screen doors would be integrated into the automatic train control system and would not open unless a train is stopped at the platform.

The following information describes each station, with relevant entrance, walkway, and transfer information. Bicycle parking would be provided at each station.

Metro E Line Expo/Sepulveda Station

- This underground station would be located just north of the existing Metro E Line Expo/Sepulveda Station, on the east side of Sepulveda Boulevard.
- A station entrance would be located on the east side of Sepulveda Boulevard north of the Metro E Line.
- A walkway to transfer to the Metro E Line would be provided at street level within the fare paid zone.
- A 126-space parking lot would be located immediately north of the station entrance, east of Sepulveda Boulevard. Passengers would also be able to park at the existing Metro E Line Expo/Sepulveda Station parking facility, which provides 260 parking spaces.

Santa Monica Boulevard Station

- This underground station would be located under the southeast corner of Santa Monica Boulevard and Sepulveda Boulevard.
- The station entrance would be located on the south side of Santa Monica Boulevard between Sepulveda Boulevard and Bentley Avenue.
- No dedicated station parking would be provided at this station.

Wilshire Boulevard/Metro D Line Station

- This underground station would be located beneath the Metro D Line tracks and platform under Gayley Avenue between Wilshire Boulevard and Lindbrook Drive.
- Station entrances would be provided on the northeast corner of Wilshire Boulevard and Gayley Avenue and on the northeast corner of Lindbrook Drive and Gayley Avenue. Passengers would also be able to use the Metro D Line Westwood/UCLA Station entrances to access the station platform.
- A direct internal station transfer to the Metro D Line would be provided at the south end of the station.
- No dedicated station parking would be provided at this station.

UCLA Gateway Plaza Station

- This underground station would be located underneath Gateway Plaza on the University of California, Los Angeles (UCLA) campus.
- Station entrances would be provided on the north side of Gateway Plaza and on the east side of Westwood Boulevard across from Strathmore Place.
- No dedicated station parking would be provided at this station.

Ventura Boulevard/Sepulveda Boulevard Station

- This aerial station would be located west of Sepulveda Boulevard spanning over Dickens Street.

- A station entrance would be provided on the west side of Sepulveda Boulevard south of Dickens Street.
- A 52-space parking lot would be located adjacent to the station entrance on the southwest corner of the Sepulveda Boulevard and Dickens Street intersection, and an additional 40-space parking lot would be located on the northwest corner of the same intersection.

Metro G Line Sepulveda Station

- This aerial station would be located over Sepulveda Boulevard immediately south of the Metro G Line Busway.
- A station entrance would be provided on the west side of Sepulveda Boulevard south of the Metro G Line Busway.
- An elevated pedestrian walkway would connect the platform level of the proposed station to the planned aerial Metro G Line Busway platforms within the fare paid zone.
- Passengers would be able to park at the existing Metro G Line Sepulveda Station parking facility, which has a capacity of 1,205 parking spaces. Currently, only 260 parking spaces are used for transit parking. No additional automobile parking would be provided at the proposed station.

Sherman Way Station

- This aerial station would be located over Sepulveda Boulevard between Sherman Way and Gault Street.
- Station entrances would be provided on either side of Sepulveda Boulevard south of Sherman Way.
- A 46-space parking lot would be located on the northwest corner of the Sepulveda Boulevard and Gault Street intersection, and an additional 76-space parking lot would be located west of the station along Sherman Way.

Van Nuys Metrolink Station

- This aerial station would span Van Nuys Boulevard, just south of the LOSSAN rail corridor.
- The primary station entrance would be located on the east side of Van Nuys Boulevard just south of the LOSSAN rail corridor. A secondary station entrance would be located between Raymer Street and Van Nuys Boulevard.
- An underground pedestrian walkway would connect the station plaza to the existing pedestrian underpass to the Metrolink/Amtrak platform outside the fare paid zone.
- Existing Metrolink Station parking would be reconfigured, maintaining approximately the same number of spaces, but 66 parking spaces would be relocated west of Van Nuys Boulevard. Metrolink parking would not be available to Metro transit riders.

8.1.1.5 Station-to-Station Travel Times

Table 8-1 presents the station-to-station distance and travel times at peak period for Alternative 4. The travel times include both run time and dwell time. Dwell time is 30 seconds for transfer stations and 20 seconds for other stations. Northbound and southbound travel times vary slightly because of grade differentials and operational considerations at end-of-line stations.

Table 8-1. Alternative 4: Station-to-Station Travel Times and Station Dwell Times

From Station	To Station	Distance (miles)	Northbound Station-to-Station Travel Time (seconds)	Southbound Station-to-Station Travel Time (seconds)	Dwell Time (seconds)
Metro E Line Station					*30*
Metro E Line	Santa Monica Boulevard	0.9	89	86	—
Santa Monica Boulevard Station					*20*
Santa Monica Boulevard	Wilshire/Metro D Line	0.9	91	92	—
Wilshire/Metro D Line Station					*30*
Wilshire/Metro D Line	UCLA Gateway Plaza	0.7	75	68	—
UCLA Gateway Plaza Station					*20*
UCLA Gateway Plaza	Ventura Boulevard	6.1	376	366	—
Ventura Boulevard Station					*20*
Ventura Boulevard	Metro G Line	1.9	149	149	—
Metro G Line Station					*30*
Metro G Line	Sherman Way	1.4	110	109	—
Sherman Way Station					*20*
Sherman Way	Van Nuys Metrolink	1.9	182	180	—
Van Nuys Metrolink Station					*30*

Source: STCP, 2024

— = no data

8.1.1.6 Special Trackwork

Alternative 4 would include 10 double crossovers throughout the alignment, enabling trains to cross over to the parallel track. Each terminus station would include a double crossover immediately north and south of the station. Except for the Santa Monica Boulevard Station, each station would have a double crossover immediately south of the station. The remaining crossovers would be located along the alignment midway between the UCLA Gateway Plaza Station and the Ventura Boulevard Station.

8.1.1.7 Maintenance and Storage Facility

The MSF for Alternative 4 would be located east of the Van Nuys Metrolink Station and would encompass approximately 46 acres. The MSF would be designed to accommodate 184 rail cars and would be bounded by single-family residences to the south, the LOSSAN rail corridor to the north, Woodman Avenue on the east, and Hazeltine Avenue and industrial manufacturing enterprises to the west. Trains would access the site from the fixed guideway's tail tracks at the northwest corner of the site. Trains would then travel southeast to maintenance facilities and storage tracks.

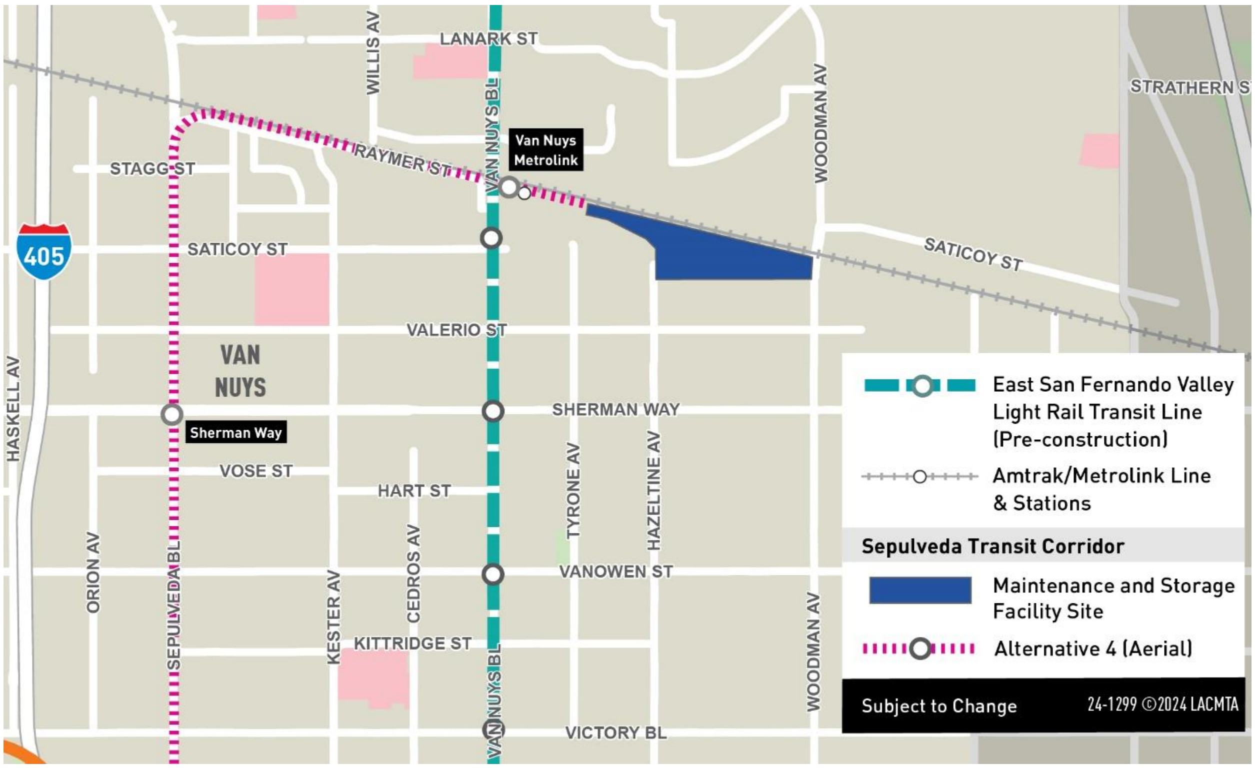
The site would include the following facilities:

- Two entrance gates with guard shacks
- Main shop building
- Maintenance-of-way building
- Storage tracks
- Carwash building
- Cleaning and inspections platforms
- Material storage building
- Hazmat storage locker

- Traction power substation (TPSS) located on the west end of the MSF to serve the mainline
- TPSS located on the east end of the MSF to serve the yard and shops
- Parking area for employees
- Grade separated access roadway (over the HRT tracks at the east end of the facility, and necessary drainage)

Figure 8-5 shows the location of the MSF site for Alternative 4.

Figure 8-5. Alternative 4: Maintenance and Storage Facility Site



Source: STCP, 2024; HTA, 2024

8.1.1.8 Traction Power Substations

TPSSs transform and convert high voltage alternating current supplied from power utility feeders into direct current suitable for transit operation. Twelve TPSS facilities would be located along the alignment and would be spaced approximately 0.5 to 2.5 miles apart. TPSS facilities would generally be located within the stations, adjacent to the tunnel through the Santa Monica Mountains, or within the MSF. TPSSs would be approximately 2,000 to 3,000 square feet. Table 8-2 lists the TPSS locations for Alternative 4.

Figure 8-6 shows the TPSS locations along the Alternative 4 alignment.

Table 8-2. Alternative 4: Traction Power Substation Locations

TPSS No.	Location Description	Configuration
1	TPSS 1 would be located east of Sepulveda Boulevard and north of the Metro E Line.	Underground (within station)
2	TPSS 2 would be located south of Santa Monica Boulevard between Sepulveda Boulevard and Bentley Avenue.	Underground (within station)
3	TPSS 3 would be located at the southeast corner of UCLA Gateway Plaza.	Underground (within station)
4	TPSS 4 would be located south of Bellagio Road and west of Stone Canyon Road.	Underground (adjacent to tunnel)
5	TPSS 5 would be located west of Roscomare Road between Donella Circle and Linda Flora Drive.	Underground (adjacent to tunnel)
6	TPSS 6 would be located east of Loom Place between Longbow Drive and Vista Haven Road.	Underground (adjacent to tunnel)
7	TPSS 7 would be located west of Sepulveda Boulevard between the I-405 Northbound On-Ramp and Dickens Street.	At-grade (within station)
8	TPSS 8 would be located west of Sepulveda Boulevard between the Metro G Line Busway and Oxnard Street.	At-grade (within station)
9	TPSS 9 would be located at the southwest corner of Sepulveda Boulevard and Sherman Way.	At-grade (within station)
10	TPSS 10 would be located south of the LOSSAN rail corridor and north of Raymer Street and Kester Avenue.	At-grade
11	TPSS 11 would be located south of the LOSSAN rail corridor and east of the Van Nuys Metrolink Station.	At-grade (within MSF)
12	TPSS 12 would be located south of the LOSSAN rail corridor and east of Hazeltine Avenue.	At-grade (within MSF)

Source: STCP, 2024; HTA, 2024

Figure 8-6. Alternative 4: Traction Power Substation Locations

Source: STCP, 2024; HTA, 2024

8.1.1.9 Roadway Configuration Changes

Table 8-3 lists the roadway changes necessary to accommodate the guideway of Alternative 4. Figure 8-7 shows the location of roadway changes in the Sepulveda Transit Corridor Project (Project) Study Area, and Figure 8-8 shows detail of the street vacation at Del Gado Drive.

In addition to the changes made to accommodate the guideway, as listed in Table 8-3, roadways and sidewalks near stations would be reconstructed, resulting in modifications to curb ramps and driveways.

Table 8-3. Alternative 4: Roadway Changes

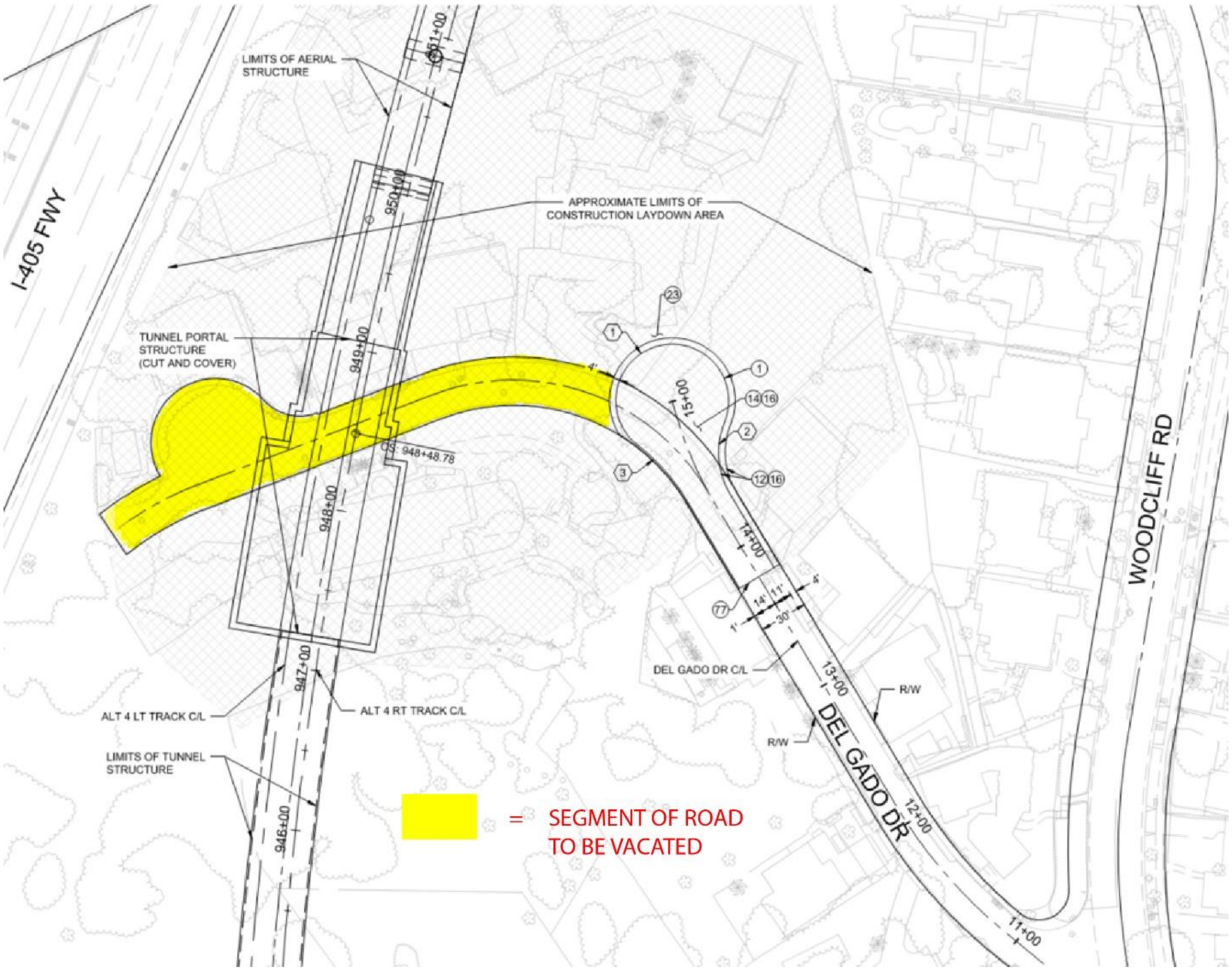
Location	From	To	Description of Change
Del Gado Drive	Woodcliff Road	Not Applicable	Vacation of approximately 325 feet of Del Gado Drive east of I-405 to accommodate tunnel portal
Sepulveda Boulevard	Ventura Boulevard	Raymer Street	Construction of raised median and removal of all on-street parking on the southbound side of the street and some on-street parking on the northbound side of the street to accommodate aerial guideway columns
Sepulveda Boulevard	La Maida Street	Not Applicable	Prohibition of left turns to accommodate aerial guideway columns
Sepulveda Boulevard	Valleyheart Drive South, Hesby Street, Hartsook Street, Archwood Street, Hart Street, Leadwell Street, Covello Street	Not Applicable	Prohibition of left turns to accommodate aerial guideway columns
Raymer Street	Kester Avenue	Keswick Street	Reconstruction resulting in narrowing of width and removal of parking on the westbound side of the street to accommodate aerial guideway columns

Source: STCP, 2024; HTA, 2024

Figure 8-7. Alternative 4: Roadway Changes

Source: STCP, 2024; HTA, 2024

Figure 8-8. Alternative 4: Street Vacation at Del Gado Drive



Source: STCP, 2024; HTA, 2024

8.1.1.10 Ventilation Facilities

For ventilation of the alignment's underground portion, a plenum within the crown of the tunnel would provide a separate compartment for air circulation and allow multiple trains to operate between stations. Each underground station would include a fan room with additional ventilation facilities. Alternative 4 would also include a stand-alone ventilation facility at the tunnel portal on the northern end of the tunnel segment, located east of I-405 and south of Del Gado Drive. Within this facility, ventilation fan rooms would provide both emergency ventilation, in case of a tunnel fire, and regular ventilation, during non-revenue hours. The facility would also house sump pump rooms to collect water from various sources, including storm water; wash water (from tunnel cleaning); and water from a fire-fighting incident, system testing, or pipe leaks.

8.1.1.11 Fire/Life Safety – Emergency Egress

Within the tunnel segment, emergency walkways would be provided between the center dividing wall and each track. Sliding doors would be located in the central dividing wall at required intervals to connect the two sides of the railway with a continuous walkway to allow for safe egress to a point of safety (typically at a station) during an emergency. Similarly, the aerial guideway would include two emergency walkways with safety railing located on the outer side of the tracks. Access to tunnel segments for first responders would be through stations and the portal.

8.1.2 Construction Activities

Temporary construction activities for Alternative 4 would occur within project work zones at permanent facility locations, construction staging and laydown areas, and construction office areas. Construction of the transit facilities through substantial completion is expected to have a duration of 8 ¼ years. Early works, such as site preparation, demolition, and utility relocation, could start in advance of construction of the transit facilities.

For the guideway, Alternative 4 would consist of a single-bore tunnel through the Westside and Santa Monica Mountains. The tunnel would be comprised of two separate segments, one running north from the southern terminus to the UCLA Gateway Plaza Station (Westside segment), and the other running south from the portal in the San Fernando Valley to the UCLA Gateway Plaza Station (Santa Monica Mountains segment). Two tunnel boring machines (TBM) with approximately 45-foot-diameter cutting faces would be used to construct the two tunnel segments underground. For the Westside segment, the TBM would be launched from Staging Area No. 1 in Table 8-4 at Sepulveda Boulevard and National Boulevard. For the Santa Monica Mountains segment, the TBM would be launched from Staging Area No. 4 in the San Fernando Valley. Both TBMs would be extracted from the UCLA Gateway Plaza Station Staging Area No. 3 in Table 8-4. Figure 8-9 shows the location of construction staging locations along the Alternative 4 alignment.

Table 8-4. Alternative 4: On-Site Construction Staging Locations

No.	Location Description
1	Commercial properties on southeast corner of Sepulveda Boulevard and National Boulevard
2	North side of Wilshire Boulevard between Veteran Avenue and Gayley Avenue
3	UCLA Gateway Plaza
4	Residential properties on both sides of Del Gado Drive and south side of Sepulveda Boulevard adjacent to I-405
5	West of Sepulveda Boulevard between Valley Vista Boulevard and Sutton Street
6	West of Sepulveda Boulevard between US-101 and Sherman Oaks Castle Park
7	Lot behind Los Angeles Fire Department Station 88
8	Commercial property on southeast corner of Sepulveda Boulevard and Raymer Street
9	South of the LOSSAN rail corridor east of Van Nuys Metrolink Station, west of Woodman Avenue

Source: STCP, 2024; HTA, 2024

Figure 8-9. Alternative 4: On-Site Construction Staging Locations

Source: STCP, 2024; HTA, 2024

The distance from the surface to the top of the tunnel for the Westside tunnel segment would vary from approximately 40 feet to 90 feet depending on the depth needed to construct the underground stations. The depth of the Santa Monica Mountains tunnel segment would vary from approximately 470 feet as it passes under the Santa Monica Mountains to 50 feet near UCLA. The tunnel segment through the Westside would be excavated in soft ground, while the tunnel through the Santa Monica Mountains would be excavated primarily in hard ground or rock as geotechnical conditions transition from soft to hard ground near the UCLA Gateway Plaza Station.

The aerial guideway viaduct would be primarily situated in the center of Sepulveda Boulevard in the San Fernando Valley, with guideway columns located in both the center and outside of the right-of-way of Sepulveda Boulevard. This would result in a linear work zone spanning the full width of Sepulveda Boulevard along the length of the aerial guideway. Three to five main phases would be required to construct the aerial guideway. A phased approach would allow travel lanes along Sepulveda Boulevard to remain open as construction individually occupies either the center, left, or right side of the roadway via the use of lateral lane shifts. Additional lane closures on side streets may be required along with appropriate detour routing.

The aerial guideway would comprise a mix of simple spans and longer balanced cantilever spans ranging from 80 to 250 feet in length. The repetitive simple spans would be utilized when guideway bent is located within the center median of Sepulveda Boulevard and would be constructed using Accelerated Bridge Construction (ABC) segmental span-by-span technology. Longer balanced cantilever spans would be provided at locations such as freeways, arterials, or street crossings, and would be constructed using ABC segmental balance cantilever technology. Foundations would consist of cast-in-drilled-hole (CIDH) shafts with both precast and cast-in-place structural elements. During construction of the aerial guideway, multiple crews would work on components of the guideway simultaneously.

Construction work zones would also be co-located with future MSF and station locations. All work zones would comprise the permanent facility footprint with additional temporary construction easements from adjoining properties.

The Metro E Line, Santa Monica Boulevard, Wilshire Boulevard/Metro D Line, and UCLA Gateway Plaza Stations would be constructed using a “cut-and-cover” method whereby the station structure would be constructed within a trench excavated from the surface with a portion or all being covered by a temporary deck and backfilled during the later stages of station construction. Traffic and pedestrian detours would be necessary during underground station excavation until decking is in place and the appropriate safety measures are taken to resume cross traffic. Constructing the Ventura Boulevard/Sepulveda Boulevard, Metro G Line Sepulveda, Sherman Way, and Van Nuys Metrolink Stations would include construction of CIDH elevated viaduct with two parallel side platforms supported by outrigger bents.

In addition to work zones, Alternative 4 would require construction staging and laydown areas at multiple locations along the alignment as well as off-site staging areas. Construction staging areas would provide the necessary space for the following activities:

- Contractors’ equipment
- Receiving deliveries
- Testing of soils for minerals or hazards
- Storing materials
- Site offices
- Work zone for excavation
- Other construction activities (including parking and change facilities for workers, location of construction office trailers, storage, staging and delivery of construction materials and permanent plant equipment, and maintenance of construction equipment)

A larger, off-site staging area would be used for temporary storage of excavated material from both tunneling and station cut-and-cover excavation activities. Table 8-4 and Figure 8-9 present potential construction staging areas along the alignment for Alternative 4. Table 8-5 and Figure 8-10 present candidate sites for off-site staging and laydown areas.

Table 8-5. Alternative 4: Potential Off-Site Construction Staging Locations

No.	Location Description
S1	East of Santa Monica Airport Runway
S2	Ralph’s Parking Lot in Westwood Village
N1	West of Sepulveda Basin Sports Complex, south of the Los Angeles River
N2	West of Sepulveda Basin Sports Complex, north of the Los Angeles River
N3	Metro G Line Sepulveda Station park & ride lot
N4	North of Roscoe Boulevard and Hayvenhurst Avenue
N5	LADWP property south of the LOSSAN rail corridor, east of Van Nuys Metrolink Station

Source: STCP, 2024; HTA, 2024

Figure 8-10. Alternative 4: Potential Off-Site Construction Staging Locations

Source: STCP, 2024; HTA, 2024

Construction of the HRT guideway between the Van Nuys Metrolink Station and the MSF would require reconfiguration of an existing rail spur serving LADWP property. The new location of the rail spur would require modification to the existing pedestrian undercrossing at the Van Nuys Metrolink Station.

Alternative 4 would require construction of a concrete casting facility for tunnel lining segments because no existing commercial fabricator capable of producing tunnel lining segments for a large-diameter tunnel exists within a practical distance of the Project Study Area. The site of the MSF would initially be used for this casting facility. The casting facility would include casting beds and associated casting equipment, storage areas for cement and aggregate, and a field quality control facility, which would need to be constructed on-site. When a more detailed design of the facility is completed, the contractor would obtain all permits and approvals necessary from the City of Los Angeles, the South Coast Air Quality Management District, and other regulatory entities.

As areas of the MSF site begin to become available following completion of pre-casting operations, construction of permanent facilities for the MSF would begin, including construction of surface buildings such as maintenance shops, administrative offices, train control, traction power and systems facilities. Some of the yard storage track would also be constructed at this time to allow delivery and inspection of passenger vehicles that would be fabricated elsewhere. Additional activities occurring at the MSF during the final phase of construction would include staging of trackwork and welding of guideway rail.

8.2 Existing Conditions

8.2.1 Noise

The noise environment in the Project Study Area is dominated by traffic noise, including freeways and arterial roads, such as I-405, I-10, US-101, and Sepulveda Boulevard. Aircraft flyovers are also contributors to the existing noise environment in most areas along the Alternative 4 alignment. Land uses found along the alignment include single- and multi-family residential uses, hotels/motels, religious facilities, educational facilities, public facilities, public and commercial office buildings, various types of commercial uses, institutional uses, theaters, recording or video production studios, surface parking facilities, and parking structures.

Noise-sensitive land uses were identified using a geographic information system (GIS), assessor's parcel maps, aerial photographs, and field surveys. Land use data were obtained from the Southern California Association of Governments (SCAG) 2019 regional land use data set for Los Angeles County (SCAG, 2019). Sensitive land uses were classified into one of the three Federal Transit Administration (FTA) sensitive land use categories (FTA, 2018). Refer to Table 2-1 for a detailed description of each category.

- Category 1 noise-sensitive land uses identified along the Alternative 4 alignment include laboratories and medical facilities in the vicinity of UCLA campus along Westwood Boulevard.
- Category 2 noise-sensitive land uses include single- and multi-family residential and hotels/motels, which are located throughout the Alternative 4 alignment.
- Category 3 noise-sensitive land uses along the Alternative 4 alignment include, but are not limited to, Kingdom Hall of Jehovah's Witnesses in Sherman Oaks, Contractors State License School, and U.S. Census Library in Van Nuys.

Some uses in the UCLA area include multiple noise-sensitive land use categories. For instance, UCLA dorms and medical bedding are Category 2 noise-sensitive land uses, while classrooms are Category 3, and medial operating rooms or scientific and engineering education or research laboratories are Category 1 land uses.

The existing noise conditions along the Alternative 4 alignment were documented through noise monitoring performed at representative noise-sensitive locations along the aboveground segments of the proposed Alternative 4 alignment. This section provides a summary of the noise measurement results.

Representative noise-sensitive locations were identified by using preliminary alignment maps, aerial photographs, visual surveys, and proximity to aboveground noise sources associated with Alternative 4. Long-term (24-hour) noise measurements were conducted at a total of 19 locations representing Category 2 land uses. Short-term noise measurements (two 1-hour measurements) were obtained at four locations representing exterior areas of Category 3 land uses. Figure 8-11 and Figure 8-12 show the locations of noise monitoring sites along the Alternative 1, 3, 4, 5, and 6 alignments. Refer to Attachment 1 and Attachment 2 of this report for detailed results of 24-hour and short-term measurements, respectively. The appendix material also depicts photographic exhibits of the measurement locations.

Table 8-6 presents a summary of long-term (24-hour) noise measurements taken at Category 2 locations that are representative of the residential and lodging land uses and hospitals along the Alternative 4 alignment. The noise monitors were programmed to continuously collect data for a minimum of 24 hours. The microphones were generally placed on tripods approximately 5 feet above the ground at locations near the setback of habitable buildings, between the buildings and the proposed Alternative 4 alignment.

Table 8-6. Alternative 4: Summary of Existing 24-hour Noise Measurements for Category 2 Land Uses

Site No	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{dn} (dBA)
			Date	Time	
2	2203 S. Bentley Avenue	Local traffic	7/5/2023	10:00am	65.9
3	1726 S. Bentley Avenue	Local traffic	7/12/2023	10:00am	62.0
10	UCLA Luskin Conference Center	Local traffic	5/25/2023	3:00pm	62.2
30	10635 Levico Way	Distant aircraft	6/6/2023	1:00pm	55.4
32	2341 Donella Circle	Roscomare Road	6/6/2023	2:00pm	63.4
37	3490 Vista Haven Road	Distant aircraft, local traffic	5/30/2023	4:00pm	54.3
41	15371 Del Gado Drive	I-405 traffic	6/29/2023	10:00am	72.5
43	4440 Sepulveda Boulevard	I-405, Sepulveda Boulevard	3/25/2024	12:00pm	76.5
44	4800 Sepulveda Boulevard	Sepulveda Boulevard	5/30/2023	11:00am	65.8
45	15233½ Valleyheart Drive	Sepulveda Boulevard	7/25/2023	7:00am	63.7
48	15231 Magnolia Boulevard	Sepulveda Boulevard	7/13/2023	12:00pm	66.9
49	5329 Sepulveda Boulevard	Sepulveda Boulevard	6/15/2023	8:00am	67.7
51	5450 Sepulveda Boulevard	Sepulveda Boulevard	6/13/2023	12:00pm	69.9
55	6224 Peach Avenue	Sepulveda Boulevard	5/24/2023	2:00pm	57.3
56	6561 Sepulveda Boulevard	Sepulveda Boulevard	6/15/2023	8:00am	66.5
59	6920 Sepulveda Boulevard	Sepulveda Boulevard	6/13/2023	11:00am	65.6
61	13917 Cohasset Street	LOSSAN Corridor, distant traffic	6/13/2023	10:00am	52.8
63	15235 Wyandotte Street	Sepulveda Boulevard	7/18/2023	9:00am	60.0
66	15018 Marson Street	LOSSAN Corridor	5/24/2023	11:00am	60.5

Source: HTA, 2024

dBA = A-weighted decibel
L_{dn} = day-night noise level

Short-term noise measurements for two 1-hour periods were also taken at Category 1 and Category 3 (institutional) land uses, including schools, religious facilities, museums, and amphitheaters, along the Alternative 4 alignment segments with aboveground noise sources. The general locations of the short-term measurement sites are shown on Figure 8-11 and Figure 8-12. Table 8-7 shows the summarized results of each individual short-term measurement. The details of short-term measurements are included in Attachment 2.

Table 8-7. Alternative 4: Summary of Existing Short-Term (1-Hour) Noise Measurements for Category 1 and Category 3 Land Uses

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{eq} (dBA)
			Date	Time	
8	UCLA Williams Institute, southwest corner of building	Local traffic, fire station activities	5/26/2023	9:29am	63.9
			5/30/2023	1:41pm	61.3
9	UCLA Computer Science/Engineering IV building	Local traffic, students' chatter	5/25/2023	1:04pm	57.9
			5/26/2023	3:36pm	58.8
40	15347 Del Gado Drive, at south end of vacant lot[a]	I-405 traffic	6/30/2023	8:42am	57.8
54	Contractors State License School, 6222 Sepulveda Boulevard	Sepulveda Boulevard traffic	4/13/2023	1:07pm	73.6
			5/11/2023	11:36am	72.4

Source: HTA, 2024

[a]This short-term measurement location was used to estimate noise levels at residential locations farther east of I-405 than the 24-hour site located at 15371 Del Gado Drive.

L_{eq} = equivalent noise level

Figure 8-11. Alternative 4: Noise Monitoring Sites - South

Source: HTA, 2024

Figure 8-12. Alternative 4: Noise Monitoring Sites - North

Source: HTA, 2024

8.2.2 Vibration

Alternative 4is located in an urban environment. Primary existing sources of groundborne vibration (GBV) include trucks traveling along roadways and construction sites using heavy equipment. According to FTA guidance, the background vibration decibel (VdB) levels are expected to range from 50 to 65 (FTA, 2018). Ambient vibration levels were not measured during this stage of Alternative 4. However, measurement of vibration levels is not necessary to complete the general assessment procedure for vibration analysis. The FTA vibration impact assessment is based on FTA vibration impact criteria. These criteria were used to identify vibration-sensitive receivers along the Alternative 4 alignment where potential impacts may occur, based on existing land use activities.

Vibration-sensitive land uses were identified using GIS, assessor's parcel maps, aerial photographs, and field surveys. Vibration-sensitive land uses in the Project Study Area include residences, hotel/motels, medical facilities, schools, and museums.

Sensitive land uses were classified as one of the following three FTA vibration-sensitive land use categories (Table 2-5 presents the details of the criteria pertaining to each category):

- Category 1 – Buildings where vibration would interfere with interior operations
- Category 2 – Residences and buildings where people normally sleep
- Category 3 – Institutional land uses with primarily daytime use

Category 1 vibration-sensitive land uses identified along the Alternative 4 alignment includes two animal hospitals located on Sepulveda Boulevard between the Metro E Line Expo/Sepulveda Station and Santa Monica Boulevard Station; video and music production outfits on Glendon Avenue between Lindbrook Drive and Weyburn Avenue; medical facilities along Westwood Boulevard; and scientific/research laboratories related to UCLA along Westwood Boulevard.

Category 2 vibration-sensitive land uses include single- and multi-family residences and hotels/motels, which are located throughout the Alternative 4 alignment.

Category 3 vibration-sensitive land uses found along the Alternative 4 alignment include schools and religious facilities.

8.3 Impact Evaluation

8.3.1 Impact NOI-1: Would the project cause 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?

8.3.1.1 Operational Noise Impacts

Rail Operations Noise

Noise exposure from the train movements on the aerial guideway section of Alternative 4 (north of the north tunnel portal) was evaluated using the detailed noise assessment procedure in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018). The rail operations noise analysis includes noise generated by rail vehicle passbys, consisting of motor noise, wheel-steel noise, aerodynamic noise, and noise from air conditioning, and other auxiliary equipment on the vehicles. Other factors such as crossover noise, increased noise from aerial guideways, and attenuation effects of intervening buildings and existing soundwalls are also included in the analysis. Section 3.1.1 presents the details of the train noise analysis methodology. The 24-hour day-night noise level (L_{dn}) for Category 2 noise-sensitive receptors and the hourly equivalent noise level (L_{eq}) during peak headways for Category 3 noise-sensitive receptors were predicted based on the anticipated rail operations.

Based on operations reports prepared for Alternative 4 (STCP, 2024), noise modeling for this project alternative assumes a three-car heavy rail train (HRT) with 2.5-minute headways during peak hours (6:00am to 9:00am and 3:00pm to 7:00pm), 4-minute headways during off peak daytime hours (9:00am to 3:00pm and 6:00pm to 8:00pm), and 6-minute or longer headways for the remaining operational hours. Total daily directional train operations would be 331 trains, consisting of 258 daytime and 73 nighttime train movements in each direction of travel. Train speeds assumed in the noise model were obtained from travel speed profiles provided by the Alternative 4 engineering team.

Attachment 9 of this report shows the details of operational noise impact assessment at the representative noise-sensitive receptors and assumed daily and hourly train operations developed from Alternative 4 operations reports. Table 8-8 is a summary of noise-sensitive receptors where moderate or severe operational noise impacts would occur. Impacted receptors are shown on Figure 8-13 through Figure 8-16. Alternative 4 would result in moderate impacts at four Category 2 receptors, severe impacts at six Category 2 receptors. No airborne noise impacts would occur at Category 1 or Category 3 receptors. Generally, the rail operations noise impacts would occur at higher floors of multi-family residential or hotel buildings with direct lines of sight to the aerial guideway tracks. The noise impacts are considered potentially significant impacts. Other noise-sensitive receptors along the Alternative 4 alignment would not be exposed to noise levels in excess of the FTA noise impact criteria because they are located farther from the proposed tracks, train speeds may be slower in their vicinity resulting in decreased noise levels, they are located away from special trackwork which generates elevated noise levels, or the presence of intervening building rows between the alignment and the noise-sensitive receptor. Therefore, operation of Alternative 4 would result in a significant impact related to rail operations noise at the 10 aforementioned receptor locations.

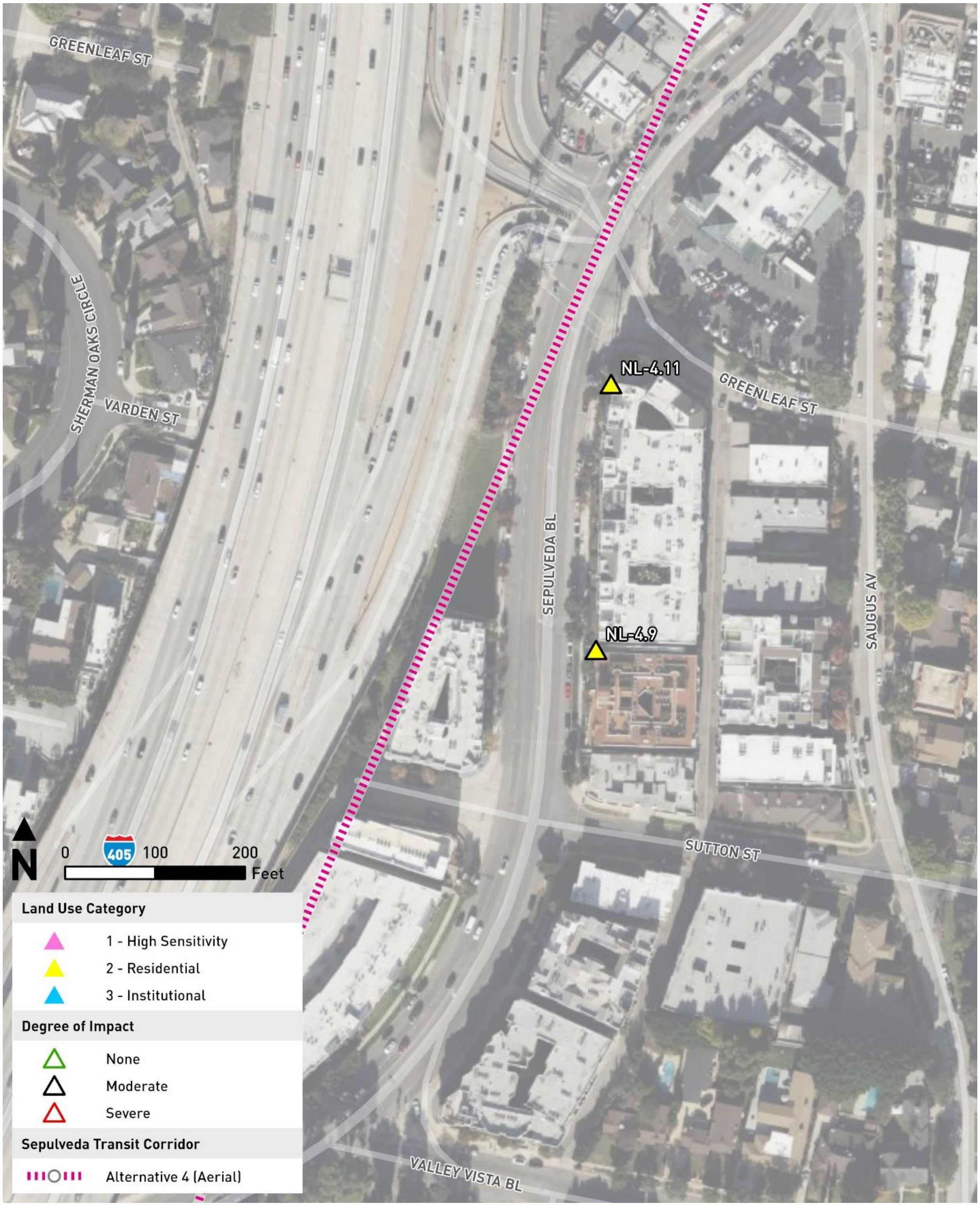
Table 8-8. Alternative 4: Summary of Rail Operations Noise Impacts

Receptor ID	Location	Near Track Direction	Northbound Track Station	Calculated (L_{dn}, dBA)	Baseline (L_{dn}, dBA)	Noise Impact Limits (L_{dn}, dBA)		Impact
						Moderate	Severe	
N-4.9	4410 Sepulveda Boulevard, Sherman Oaks	Northbound	959+70	65	70	65-69	>69	**Moderate**
N-4.11	4440 Sepulveda Boulevard, Sherman Oaks	Northbound	962+48	72	76	66-74	>74	**Moderate**
N-4.44	5307 Sepulveda Boulevard, Sherman Oaks	Southbound	1020+00	69	70	65-69	>69	**Moderate**
N-4.57	Hampton Inn 5638 Sepulveda Boulevard, Van Nuys	Northbound	1043+50	66	70	65-69	>69	**Moderate**

Receptor ID	Location	Near Track Direction	Northbound Track Station	Calculated (L_{dn}, dBA)	Baseline (L_{dn}, dBA)	Noise Impact Limits (L_{dn}, dBA)		Impact
						Moderate	Severe	
N-4.58	5700 Sepulveda Boulevard, Van Nuys	Northbound	1046+50	72	70	65-69	>69	**Severe**
N-4.78	6500 Sepulveda Boulevard, Van Nuys	Northbound	1100+75	72	70	65-69	>69	**Severe**
N-4.82	6530 Sepulveda Boulevard, Van Nuys	Northbound	1101+50	72	70	65-69	>69	**Severe**
N-4.125	7317 Sepulveda Boulevard, Van Nuys	Southbound	1153+00	70	70	65-69	>69	**Severe**
N-4.131	7400 Sepulveda Boulevard, Van Nuys	Northbound	1159+50	68	67	63-67	>67	**Severe**
N-4.135	7440 Sepulveda Boulevard, Van Nuys	Northbound	1162+00	68	67	63-67	>67	**Severe**

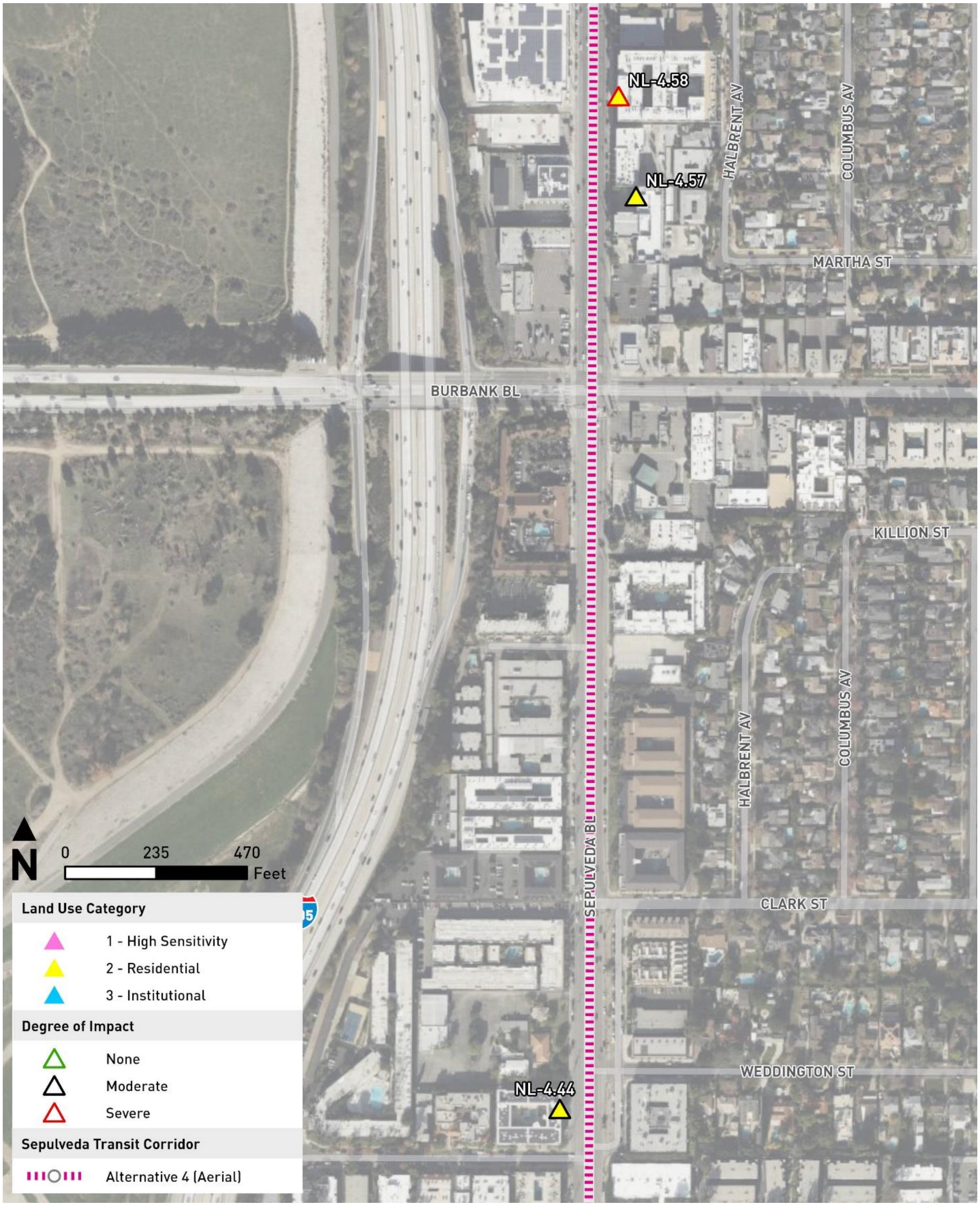
Source: HTA, 2024

Figure 8-13. Alternative 4: Rail Operations Noise Impacts – Sepulveda Boulevard South of Greenleaf Street



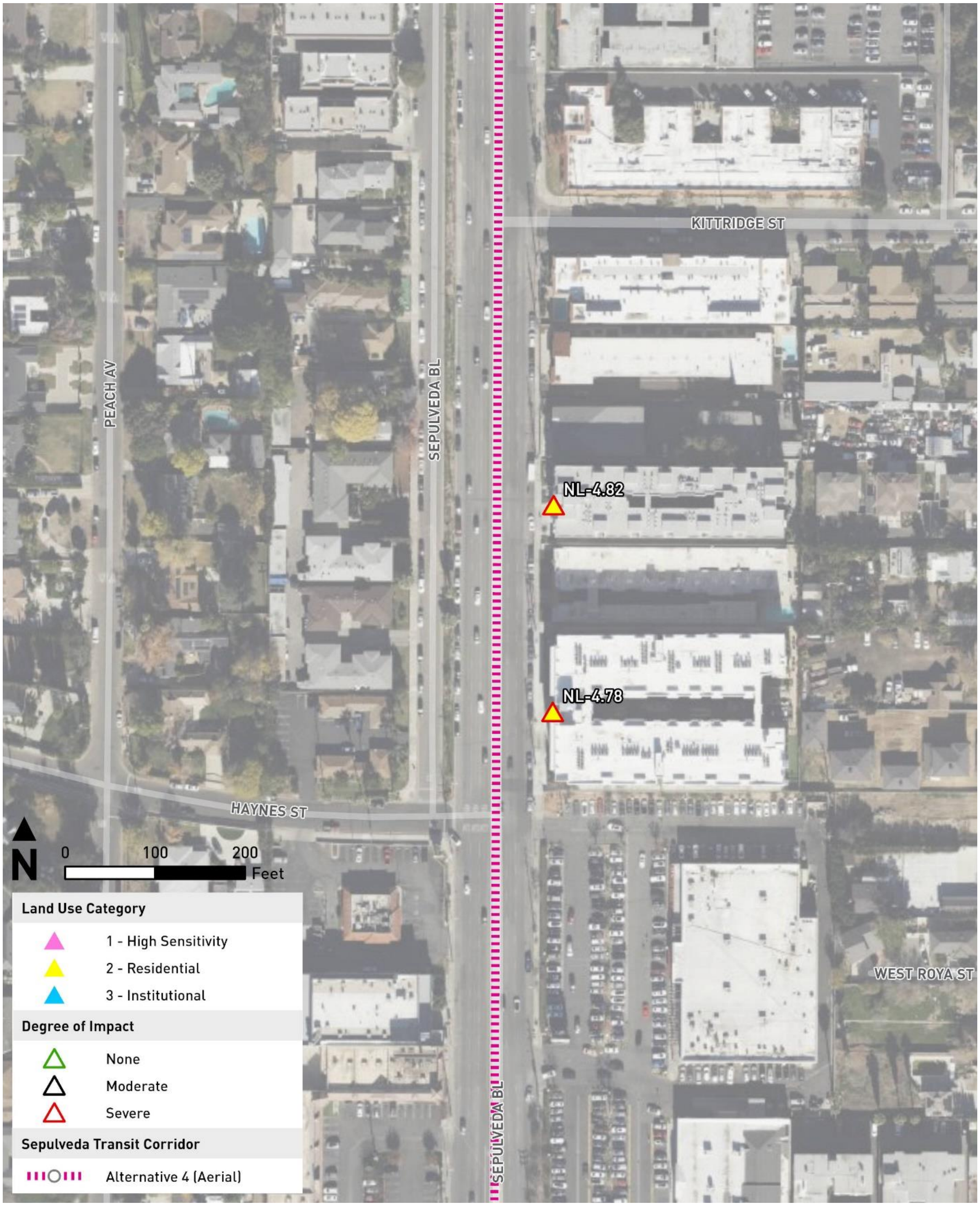
Source: HTA, 2024

Figure 8-14. Alternative 4: Rail Operations Noise Impacts – Sepulveda Boulevard and Burbank Boulevard



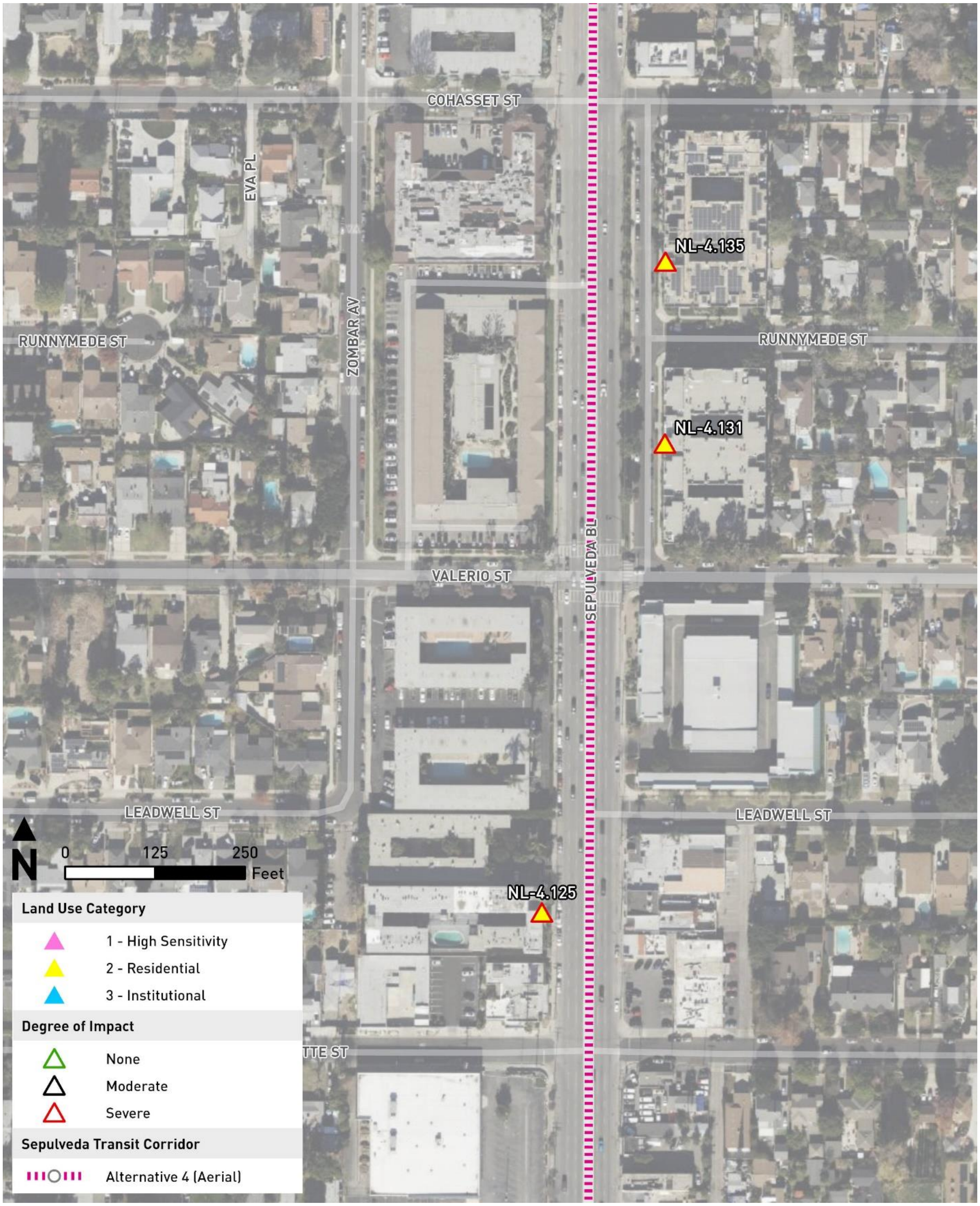
Source: HTA, 2024

Figure 8-15. Alternative 4: Rail Operations Noise Impacts – Sepulveda Boulevard South of Kittridge Street



Source: HTA, 2024

Figure 8-16. Alternative 4: Rail Operations Noise Impacts – Sepulveda Boulevard, Valerio Street to Cohasset Street



Source: HTA, 2024

Wheel Squeal Noise

The only curve along the Alternative 4 aerial segment with a radius less than 1,000 feet that would potentially cause generation of wheel squeal is the curve at the northernmost point of Sepulveda Boulevard turning to the southeast to parallel the LOSSAN Corridor. Wheel squeal noise related to this curve was included in the rail operations noise calculations for noise-sensitive receptors representing the single-family residential (Category 2) land uses along the east side of Zombar Avenue, west of Sepulveda Boulevard in Van Nuys and single-family homes along the south side of Marson Street, between Sepulveda Boulevard and the Pacoima Wash in Panorama City. Details of where wheel squeal was applied can be found in Attachment 9 of this report. The results of the noise analysis show that added noise due to wheel squeal along Alternative 4 tracks would not result in significant noise impacts. This is due to the combination of two factors, including the distance between the tracks and noise-sensitive properties, and noise attenuation provided by the U-shaped girder around the tracks.

Ancillary Facilities Noise

Noise generated by ancillary facilities associated with Alternative 4 would be due to ventilation system fans at TPSS facilities along the Alternative 4 alignment and tunnel ventilation facilities located near the north portal at the beginning of the aerial guideway.

Twelve TPSS sites would be required, of which three would be located near noise-sensitive receptors. Figure 8-6 shows the TPSS sites associated with Alternative 4. Table 8-9 shows a summary of Alternative 4 TPSS noise impact assessments. TPSS facilities would not result in noise impacts at sensitive receptors. This is primarily due to the fact that TPSS installations would be in noisy areas and located at sufficient distances from the nearest noise-sensitive land uses to allow for noise attenuation.

Table 8-9. Alternative 4: Combined Rail and Ancillary Facility Noise Impacts by Traction Power Substation Site

TPSS Site[a]	Nearest Noise-Sensitive Land Use	Distance (feet)	Existing Sound Level (dBA, L_{dn} or Hourly L_{eq})	TPSS Noise Level (dBA, L_{dn} or Hourly L_{eq})	Combined Rail and TPSS Operations Noise Level (dBA, L_{dn} or Hourly L_{eq})	Noise Impact Thresholds		Level of Impact
						Moderate	Severe	
7	Alister Sherman Oaks[b] 4440 Sepulveda Boulevard, Sherman Oaks	350	76	39	72	66-74	>74	**Moderate Impact[d]**
8	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**
9	United States Census Library[c] 15549 Sherman Way, Van Nuys	140	65	47	51	61-66	>66	**No Impact**
10	Single-family residence[b] 14940 Marson Street, Panorama City	270	60	42	50	58-63	>63	**No Impact**
11	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**

TPSS Site[a]	Nearest Noise-Sensitive Land Use	Distance (feet)	Existing Sound Level (dBA, L_{dn} or Hourly L_{eq})	TPSS Noise Level (dBA, L_{dn} or Hourly L_{eq})	Combined Rail and TPSS Operations Noise Level (dBA, L_{dn} or Hourly L_{eq})	Noise Impact Thresholds		Level of Impact
						Moderate	Severe	
12	No nearby sensitive land uses	NA	NA	NA	NA	NA	NA	**No Impact**

Source: HTA, 2024

[a]Under Alternative 4, TPSS Sites 1 through 6 are proposed to be located underground.
[b]Noise levels at these locations are in terms of the day-night equivalent level (L_{dn}).
[c]Noise levels at this location are in terms of hourly average level (L_{eq}).
[d]Noise impact at this location would primarily be due to train passby noise. TPSS contribution to overall noise level would be negligible.

NA = not applicable

Other ancillary facilities under Alternative 4 would include a ventilation facility at the tunnel portal on the northern end of the tunnel segment, located east of I-405 and south of Del Gado Drive. Within this facility, ventilation fan rooms would provide both emergency ventilation, in case of a tunnel fire, and regular ventilation, during non-revenue hours. The noise sources within the ventilation facility would be enclosed and the facility would adhere to Metro's design specification for ancillary facilities, which establishes a limit of 50 dBA L_{eq} at a distance of 50 feet from the ventilation rooms (according to Metro Rail Design Criteria). Assuming a noise level of 50 dBA at 50 feet from the facility, estimated ventilation noise at the nearest single-family residential land uses along Del Gado Drive east of the facility would be 38 dBA, which is approximately 20 dBA below the existing daytime background noise levels of 58 dBA hourly L_{eq} in these areas. Refer to Site 40 in Table 8-6 for measured existing noise levels at noise-sensitive locations in the vicinity of the ventilation facility. As such, noise from tunnel ventilation facilities would be nearly inaudible at the nearest noise-sensitive residential receptors. Therefore, Alternative 4 would result in less than a significant impact related to ancillary facility noise.

Maintenance and Storage Facility Noise

The MSF for Alternative 4 would be located east of the Van Nuys Metrolink Station and would encompass approximately 46 acres. The MSF would be designed to accommodate 184 rail cars (39 four-car train positions available for initial operation and seven extra storage four-car train positions potentially built at a later stage). The site would be bounded by single-family residences to the south, the LOSSAN rail corridor to the north, Woodman Avenue on the east, and Hazeltine Avenue and industrial manufacturing enterprises to the west.

Noise sources included in the MSF noise analysis are train movements on lead tracks, including potential wheel squeal noise on tight curve tracks and increased noise at yard switches located near the residential land uses; washing and blowdown activities at the car wash; maintenance shop operations; and TPSS units within the MSF yard. Based on the analysis results, the primary sources of noise from the MSF would be train movements along the lead tracks, on the tight radius curve (causing wheel squeal), and over track crossovers. Noise from the maintenance shop, car wash facilities, and TPSS units within the MSF would be secondary due to their greater distances to the residential receptors south of the yard and orientation of the car wash and maintenance shop.

Table 8-10 shows the predicted noise levels from the proposed Alternative 4 MSF layout at representative noise-sensitive receptors in the vicinity of the yard. The proposed MSF would not result in noise levels exceeding the noise impact thresholds at the backyards of adjoining single-family residential properties along Cohasset Street and located immediately south of the proposed MSF. Therefore, operation of Alternative 4 would not result in a significant impact related to MSF noise.

Table 8-10. Alternative 4: Predicted Maintenance and Storage Facility Noise

Receptor ID	Location	Land Use	FTA Category	Existing Sound Level (dBA, L_{dn})	Predicted MSF Noise Level (dBA, L_{dn})	Noise Impact Thresholds		Level of Impact
						Moderate	Severe	
MSF-4.1	14001 Cohasset Street, Van Nuys	SFR	2	53	48	55-60	>60	**No Impact**
MSF-4.2	13837 Cohasset Street, Van Nuys	SFR	2	53	51	55-60	>60	**No Impact**
MSF-4.3	13741 Cohasset Street, Van Nuys	SFR	2	53	41	55-60	>60	**No Impact**

Source: HTA, 2024

SFR = single-family residential

8.3.1.2 Construction Noise Impacts

Construction of Alternative 4 would include various phases that would involve the use of construction equipment at specific locations along the proposed alignment. Construction noise levels from Alternative 4 were predicted in terms of the 8-hour equipment noise levels ($L_{eq.equip}$) for each phase of construction based upon the number and types of off-road construction equipment to be employed during the given phase. Attachment 10 of this report shows the results of the construction noise estimations at a reference distance of 50 feet from construction activities.

The FTA has provided guidance for assessing construction noise associated with transit projects (FTA, 2018). The criteria are based upon an 8-hour $L_{eq.equip}$, as shown in Table 2-4. For residential uses, the threshold is 80 dBA for daytime construction and 70 dBA for nighttime construction. Commercial and industrial uses are held to 85 dBA and 90 dBA, respectively, for both daytime and nighttime construction noise thresholds. For the purposes of this analysis, the FTA Detailed Analysis construction noise limit criteria of 8-hour $L_{eq.equip}$ have been applied.

Table 8-11 is a summary of expected construction noise levels at a distance of 50 feet from and at locations of nearest noise-sensitive receptors to each construction activity. Construction noise would range from 8-hour $L_{eq.equip}$ noise levels of approximately 66 to 102 dBA at the nearest sensitive receptors. As shown in Table 8-11, construction activities would result in noise levels that exceed the FTA 80-dBA daytime and 70-dBA nighttime 8-hour $L_{eq.equip}$ thresholds for residential land uses.

The construction noise contours are depicted graphically in Attachment 10, which represent the noise levels that could potentially occur along the entirety of the alignment. Construction noise contours are only included for aboveground construction activities as activities such as tunneling would not generate noise at aboveground receptors. The noisiest phase of construction was used to depict the contours. An interval of 5 dB is used for each contour and each contour was calculated based on the distance at which noise would decrease by 5 dB starting at a noise level of 90 dBA 8-hour $L_{eq.equip}$ to 70 dBA 8-hour $L_{eq.equip}$. The 90 dBA 8-hour $L_{eq.equip}$ noise level is representative of the FTA daytime and nighttime construction noise threshold for industrial uses. The 70 dBA 8-hour $L_{eq.equip}$ contour shows the areas where construction noise levels would exceed the nighttime construction noise threshold for residential uses. The 90 dBA 8-hour $L_{eq.equip}$ contour covers areas within a distance of 80 feet from the nearest construction activity. The 70 dBA 8-hour $L_{eq.equip}$ contour extends to a maximum distance of 793 feet. The construction noise contours do not include noise reductions that may occur as a result of terrain or intervening structures. As an example to read the contours, the figures show that within the first contour of 80 feet (shown in dark purple), the calculated construction noise levels may be above 90 dBA 8-hour $L_{eq.equip}$. At the next distance of 141 feet (shown in light purple), noise levels would decrease to approximately 85 dBA 8-hour $L_{eq.equip}$.

Table 8-11. Alternative 4: Estimated Construction Noise Levels

Construction Phase	$L_{eq.equip}$ (dBA) at 50 feet	$L_{eq.equip\ (8\text{-}hr)}$ (dBA) at Nearest Receptors	Exceeds 80-dBA $L_{eq.equip\ (8\text{-}hr)}$ Daytime Threshold	Exceeds 70-dBA $L_{eq.equip\ (8\text{-}hr)}$ Nighttime Threshold
Segment 1 Southern Terminus				
Demolition/Site Preparation	88	86	Yes	Yes
Launch Box Support of Excavation	90	88	Yes	Yes
Launch Box Excavation	87	85	Yes	Yes
Launch Box Concrete Work	87	85	Yes	Yes
Tunnel Boring Machine Mobilization	86	84	Yes	Yes
Segment 3-Aerial Guideway				
Demolition/Site Preparation	88	96	Yes	Yes
Foundation (CIDH)	94	102	Yes	Yes
Columns	87	95	Yes	Yes
Bent Caps	87	95	Yes	Yes
Assemble Gantry	85	93	Yes	Yes
Segmental Girders	87	93	Yes	Yes
Demobilize Gantry	85	93	Yes	Yes
Guideway Trackwork	87	93	Yes	Yes
Systems Installation	85	91	Yes	Yes
Paving	88	96	Yes	Yes
Ventura Station Staging Area				
Demolition/Site Preparation	88	72	No	No
Laydown Activity	82	66	No	No
Underground Stations				
Demolition/Site Preparation	88	90	Yes	Yes
Support of Excavation	90	92	Yes	Yes
Box Excavation	87	89	Yes	Yes
Tunnel Boring Machine Pass-Through Maintenance	80	82	Yes	Yes
Station Structural Concrete	88	90	Yes	Yes
Fit Out and Completion	85	87	Yes	Yes
Paving/Architectural Coatings	86	88	Yes	Yes
Aerial Stations				
Demolition/Site Preparation	88	80	Yes	Yes
Foundations and Columns	91	83	Yes	Yes
Bent Cap Installation	86	78	No	Yes
Girder Installation/Station Fit Out	88	80	Yes	Yes
Paving/Architectural Coatings	86	78	Yes	Yes

Construction Phase	$L_{eq.equip}$ (dBA) at 50 feet	$L_{eq.equip\ (8\text{-}hr)}$ (dBA) at Nearest Receptors	Exceeds 80-dBA $L_{eq.equip\ (8\text{-}hr)}$ Daytime Threshold	Exceeds 70-dBA $L_{eq.equip\ (8\text{-}hr)}$ Nighttime Threshold
Traction Power Substation Construction				
Site Preparation-Traction Power Utilities	80	72	No	Yes
Grounding-Foundations	80	72	No	Yes
Traction Power Substation Installation	80	72	No	Yes
Site Restoration	82	74	No	Yes
Maintenance and Storage Facility Construction				
Demolition	89	93	Yes	Yes
Site Preparation	87	91	Yes	Yes
Grading	89	93	Yes	Yes
Building Construction	84	76	No	Yes
Paving	88	92	Yes	Yes
Architectural Coating	77	69	No	No
Test Track	81	85	Yes	Yes
Pre-Cast Yard				
Concrete Activity	89	93	Yes	Yes
North Construction Zone Staging Area				
Staging Activity	85	85	Yes	Yes

Source: HTA, 2024

CIDH = cast-in-drilled-hole
$L_{eq.equip\ (8\text{-}hr)}$ = equivalent noise level from construction equipment over 8-hour workday
Note: Variation in noise levels for this phase are due to variation in number of equipment used for different segments.

Pile driving may be required for installation of retaining walls or potentially at TBM launch locations. Impact or vibratory pile drivers are the most noise intensive construction equipment that could result in elevated noise levels above typical construction methods. It is unknown at this stage of design if pile driving would be the required construction method which is dependent on soil type. Typically, where possible, piles are drilled which is a quieter method of pile installation such as cast-in-drilled-hole (CIDH). For instance, foundations for the aerial guideway are proposed to be constructed using CIDH instead of impact driven piles. Impact pile driving generates an hourly noise level of approximately 94.3 dBA L_{eq} at 50 feet, vibratory pile driving generates an hourly noise level of 93.8 dBA $L_{eq,}$ at 50 feet and CIDH generates an hourly noise level of approximately 77.4 dBA L_{eq} at 50 feet. Vibratory pile driving is approximately 0.5 dBA quieter than impact pile driving and CIDH is approximately 16.9 dBA quieter. To reduce noise levels where piles may be required, impact pile driving should be avoided where possible and drilled or vibratory pile driving should be used where feasible. Soil improvements such as grouting injection would be required for cut-and-cover construction to stabilize soils. Soil improvement activity would typically require drilling equipment and pumping equipment to inject the grout into the soil. A noise level of 90 dBA 8-hour $L_{eq.equip_}$at 50 feet reflects equipment required for cut-and-cover construction, which is shown in Table 8-11 as "Support of Excavation."

Based on the construction equipment noise analysis, Alternative 4 would result in a significant impact related to construction noise.

Regarding health effects of noise, it is unlikely for construction noise to result in noise-induced hearing loss for persons residing or working near construction zones, as this is an occupational hazard related to working over long periods of time (years) in high noise environments. However, construction noise could increase stress at affected sensitive use locations. Nighttime construction could adversely affect sleep for residents living near active construction sites. If required by the jurisdiction, a noise variance would be prepared that demonstrates the implementation of control measures to maintain noise levels below the applicable FTA and local standards. Nonetheless, construction noise could potentially still exceed the FTA nighttime criteria.

8.3.2 Impact NOI-2: Would the project cause generation of excessive groundborne vibration or groundborne noise levels?

8.3.2.1 Operational Vibration Impacts

Rail Operations Vibration

GBV and groundborne noise (GBN) levels from train operations associated with Alternative 4 were evaluated using the general vibration assessment procedure in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018). Section 3.2 describes the operational vibration assessment methodology.

Attachment 11 of this report shows the details of operations vibration impact assessment at the representative Category 1, 2, and 3 receptors along the Alternative 4 alignment. Based on the results of the vibration analysis, there would be GBV and/or GBN impacts at sensitive receptors along the alignment. Table 8-12 summarizes the results of the GBV and noise impact analysis by land use category. Alternative 4 would result in 133 impacts at Category 2 receptors and 15 impacts at Category 1. No impacts would occur at Category 3 receptors. Impacted receptors are shown on Figure 8-17 through Figure 8-24.

Table 8-12. Alternative 4: Summary of Groundborne Vibration and Groundborne Noise Impact Assessment

Impact Area	Description of Impacted Area	Civil Station Limits		Calculated GBV (VdB)	Calculated GBN (dBA)	Number of Impacts by FTA Category	
		Start	End			Category 1	Category 2
1	Pico Boulevard to Tennessee Avenue	519+00	525+00	72-8	37-46	1	14
2	Tennessee Avenue to Olympic Boulevard	525+00	532+00	70-81	35-46	0	14
3	Olympic Boulevard to Mississippi Avenue	532+00	538+00	71-73	36-38	0	15
4	Mississippi Avenue to Santa Monica Station	538+00	555+50	71-72	36-38	1	32
5	South of Ashton Avenue and Midvale Avenue	599+73	602+31	72-74	37-39	0	4
6	Wilshire/Westwood Station to Le Conte Avenue	611+50	616+00	61-62	26-27	4	0
7	Le Conte Avenue to UCLA Gateway Plaza Station	625+50	639+00	67-73	32-38	9	0
8a/8b	Sunset Boulevard to Stone Canyon Road	673+50	711+00	68-72	35-37	0	24

Impact Area	Description of Impacted Area	Civil Station Limits		Calculated GBV (VdB)	Calculated GBN (dBA)	Number of Impacts by FTA Category	
		Start	End			Category 1	Category 2
9a/9b	Mulholland Drive to North Tunnel Portal	907+00	931+00	70-72	35-38	0	30
Total Number of Impacts:						**15**	**133**

Source: HTA, 2024

GBN = groundborne noise
GBV = groundborne vibration
VdB = vibration decibel

The impacted receptors include various FTA category land uses, described as follows:

- Seventy-five single- and multi-family residential buildings along South Bentley Avenue between Pico Boulevard and the Santa Monica Station would be affected by GBV or GBN levels that exceed the Category 2 criteria. Two animal hospitals on Sepulveda Boulevard along this segment of the alignment would also be impacted as Category 1 uses.
- Four multi-family residential buildings along the south side of Ashton Avenue at Midvale Avenue in the vicinity of the double crossover would experience GBV and GBN levels in excess of Category 2 criteria.
- A total of four receptors, including the UCLA Science and Technology Research Building on Veteran Avenue and three music or video production facilities along Glendon Avenue, would be exposed to GBN levels that exceed the 25 dBA GBN criterion for Category 1 uses.
- Along Westwood Boulevard, between Le Conte Avenue and the UCLA Gateway Plaza Station, there would be GBV and GBN impacts at nine medical buildings and research laboratories nearest to the alignment.
- In the mountain segment, between Sunset Boulevard and Stone Canyon Road, 23 single-family homes and the Bel Air Hotel would be affected by GBN levels exceeding the FTA limit for Category 2 land uses. Of these, six single-family dwellings would be subject to GBV levels slightly above the 72 VdB criterion.
- Also in the mountain segment, between Mulholland Drive and the north tunnel portal, GBV levels at seven single-family buildings are estimated to be 72 to 73 VdB, which is at or near the threshold of impact. GBN levels at 30 homes, including the seven impacted by GBV, would slightly exceed the applicable criterion in this same segment.

Based on the previously described FTA category land uses, operation of Alternative 4 would result in vibration levels that would exceed the FTA vibration criteria related to rail operations for both GBV and GBN. Therefore, operation of Alternative 4 would result in a significant impact related to operational vibration. It should be noted that since the type of intervening soil between the receptors and the proposed rail tunnel was not known at the time of the vibration analysis, normal soil was assumed for the ground between the tracks and receptor areas. Any significant impacts identified in areas that may actually have rock-based soil, such as in the mountain region, may be deemed to be less than significant impacts upon verification of actual soil information during final design.

Maintenance and Storage Facility Vibration

The MSF for Alternative 4 would be located east of the Van Nuys Metrolink Station. Trains would access the site from the fixed guideway's tail tracks at the northwest corner of the site. Trains would then travel southeast to maintenance facilities and storage tracks. Vibration levels from trains heading towards the maintenance facility and storage tracks along the curved tracks, where they come closest to the residential buildings south of the MSF, were evaluated. The MSF vibration analysis assumed that HRT vehicles would be traveling at speeds of 10 mph along the MSF tracks. Increases in GBV levels due to presence of rail switches were also taken into account. Predicted MSF vibration levels at the nearest residential structures south of the yard are between 59 VdB and 61 VdB. These levels would be below the FTA impact criterion of 72 dBA for Category 2 land uses. Therefore, operation of Alternative 4 MSF would result in a less than significant impact related to MSF GBV and GBN.

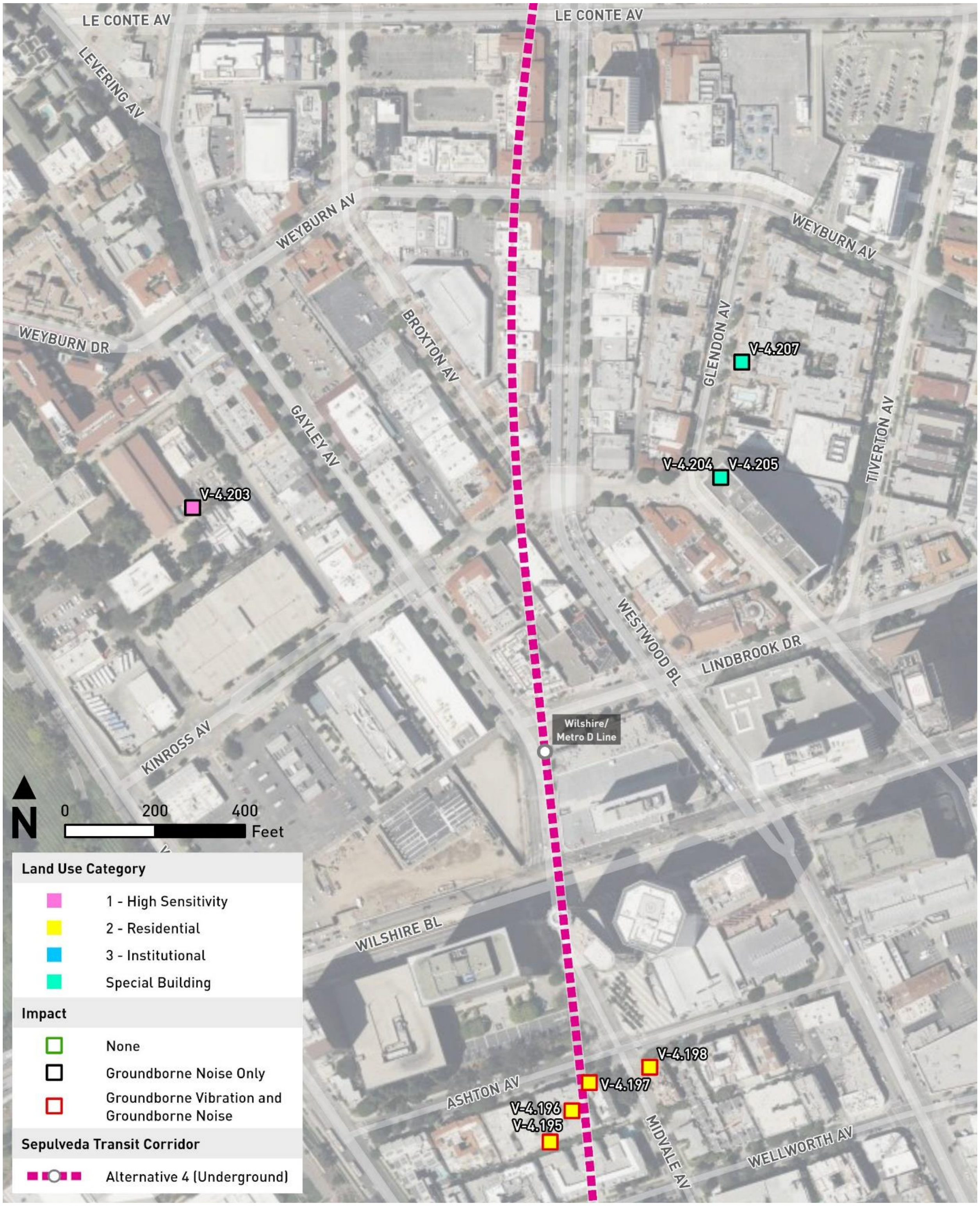
Figure 8-17. Alternative 4: Operational Vibration Impacts – Impact Areas 1, 2, and 3 Bentley Corridor, Pico Boulevard to Mississippi Avenue

Source: HTA, 2024

Figure 8-18. Alternative 4: Operational Vibration Impacts – Impact Area 4 Bentley Corridor, Mississippi Avenue to Santa Monica Boulevard Station

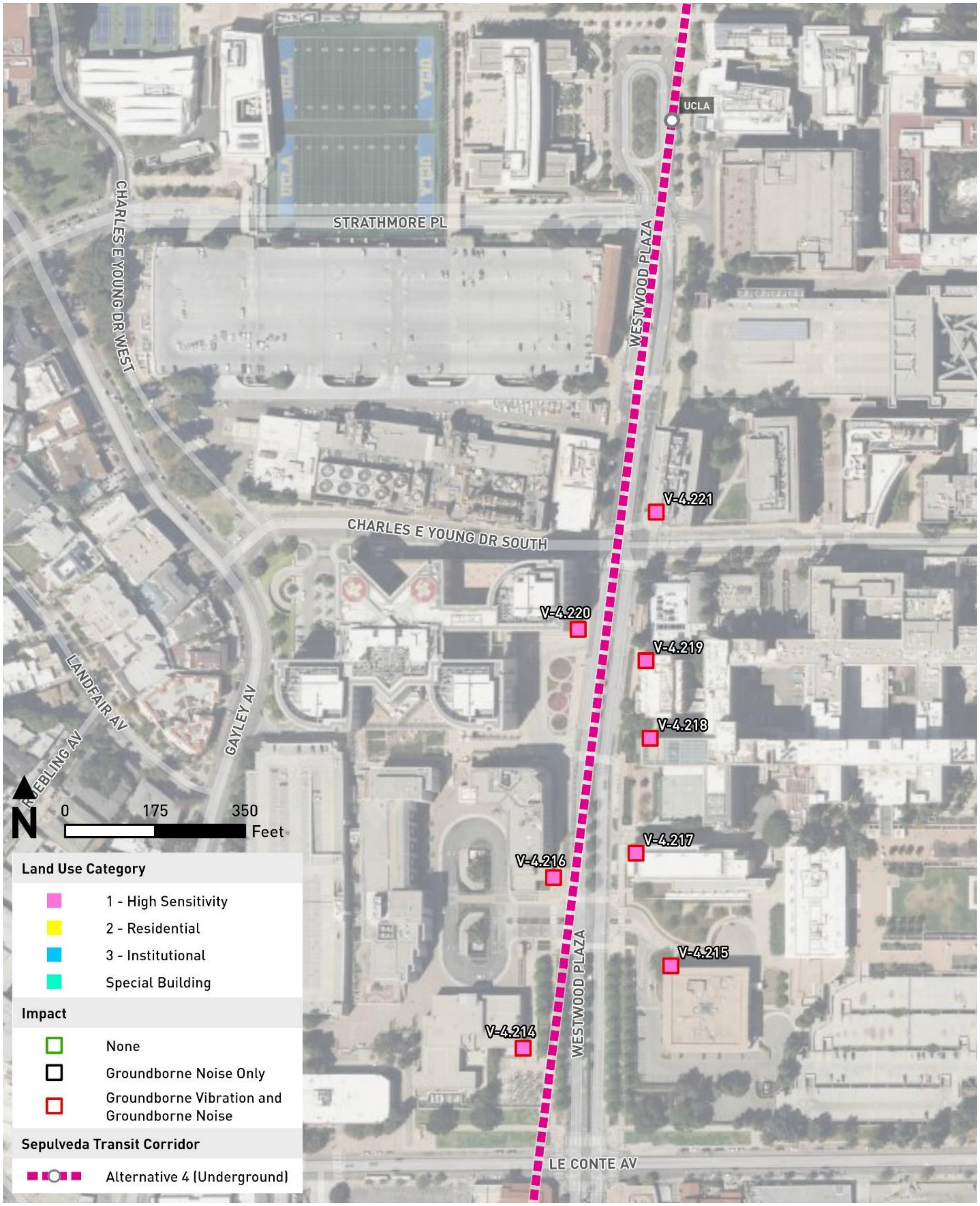
Source: HTA, 2024

Figure 8-19. Alternative 4: Operational Vibration Impacts – Impact Areas 5 and 6 Westwood Area, Veteran Avenue to Le Conte Avenue



Source: HTA, 2024

Figure 8-20. Alternative 4: Operational Vibration Impacts – Impact Area 7 Westwood Area, Le Conte Avenue to UCLA Gateway Plaza Station

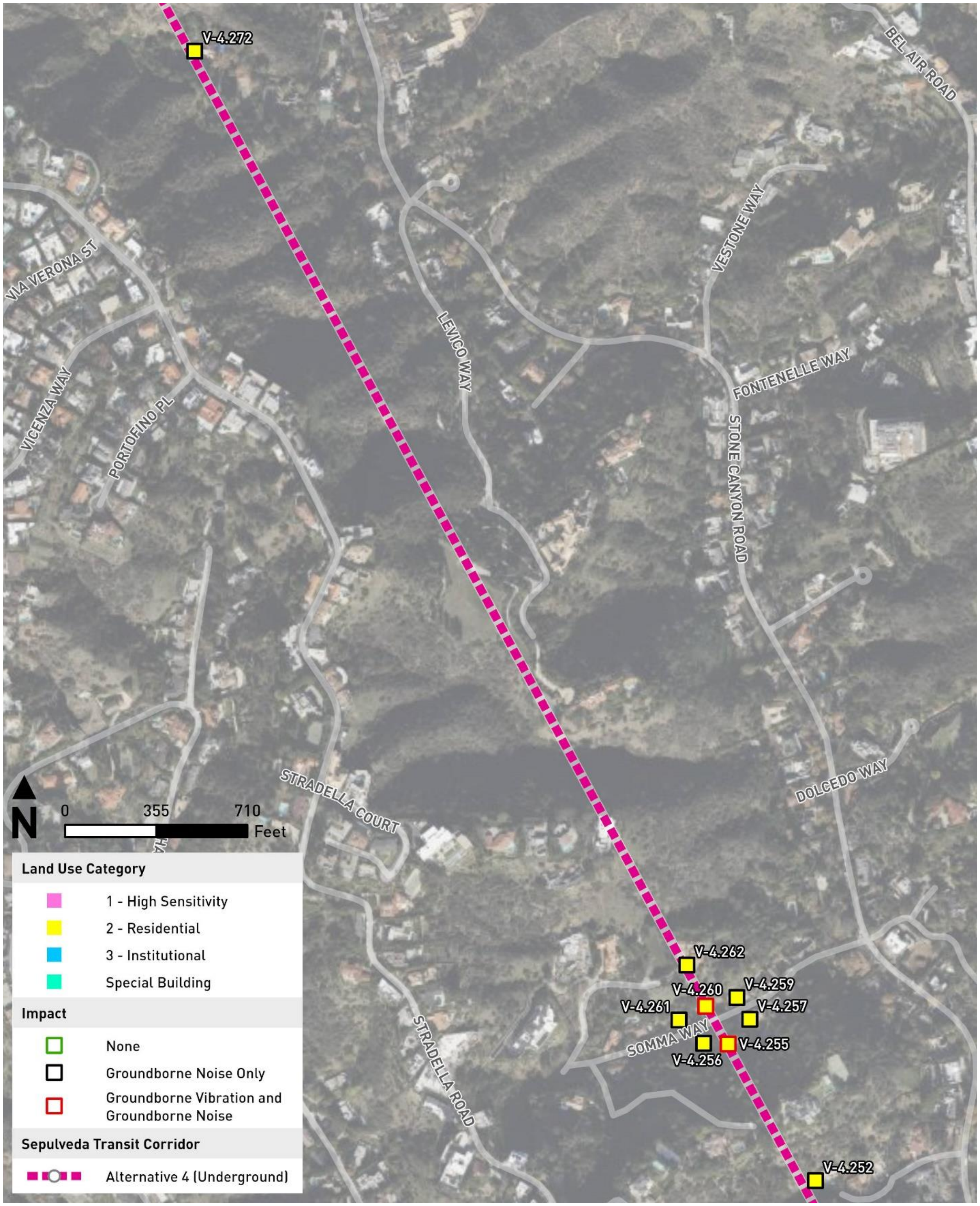


Source: HTA, 2024

**Figure 8-21. Alternative 4: Operational Vibration Impacts – Impact Area 8a
Southern Santa Monica Mountains North of Sunset Boulevard**

Source: HTA, 2024

Figure 8-22. Alternative 4: Operational Vibration Impacts – Impact Area 8b Southern Santa Monica Mountains



Source: HTA, 2024

**Figure 8-23. Alternative 4: Operational Vibration Impacts – Impact Area 9a
Central Santa Monica Mountains North of Mulholland Drive**

Source: HTA, 2024

Figure 8-24. Alternative 4: Operational Vibration Impacts – Impact Area 9b Northern Santa Monica Mountains, South of Tunnel Portal

Source: HTA, 2024

8.3.2.2 Construction Vibration Impacts

The primary concern related to vibration during construction is the potential to damage structures. Some construction activities, such as pile driving, use of drill rigs, pavement breaking, and the use of tracked vehicles (e.g., bulldozers) and hoe rams, could result in perceptible levels of GBV at sensitive buildings located in close proximity to construction sites. These activities would typically be limited in duration and their vibration levels are likely to be well below thresholds for minor cosmetic building damage. The planned project construction would include a limited number of activities expected to generate vibration that approaches the lowest building damage limit of 0.12 inch per second (in/sec) peak particle velocity (PPV) (refer to Table 2-7). Table 8-13 shows the distances at which the 0.12 in/sec PPV, 0.2 in/sec PPV, and 0.3 in/sec PPV thresholds would not be exceeded. For example, use of a drilling rig, hoe ram, or large bulldozer would be safe at distances greater than 22 feet from Category IV buildings. A vibratory roller would be safe at distances greater than 22 feet from Category IV buildings and typical impact pile driver operation would be safe at distances of 79 feet or greater. Typical building construction in an urban setting consists of buildings that are Category II engineered concrete and masonry that have a 0.3 in/sec PPV threshold or Category III non-engineered timber and masonry buildings that have a 0.2 in/sec PPV threshold. Typical construction equipment, such as a large bulldozer, would not exceed the 0.2 in/sec PPV building damage criterion at distances of 18 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 13 feet or greater. A vibratory roller would not exceed the 0.2 in/sec PPV building damage criterion at distances of 32 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 23 feet or greater. An impact pile driver would not exceed the 0.2 in/sec PPV building damage criterion at distances of 67 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 47 feet or greater.

Table 8-13. Construction Equipment Vibration Damage Potential by Distance

Equipment	Reference Vibration Level PPV (inches/second)	Distance to not Exceed 0.12 PPV Damage (feet)	Distance to not Exceed 0.2 PPV Damage (feet)	Distance to not Exceed 0.3 PPV Damage (feet)
Drill (CIDH)	0.089	22	18	13
Impact Pile Driver	0.644 (typical vibration level)	79	67	47
	1.518 (upper range vibration level)	140	117	84
Large Bulldozer	0.089	22	18	13
Vibratory Pile Driver	0.17 (typical vibration level)	33	28	20
	0.734 (upper range vibration level)	87	73	52
Vibratory Roller	0.210	38	32	23

Source: HTA, 2024

PPV = peak particle velocity

Vibration annoyance is another concern during construction. In rare instances, when vibration-intensive construction activities occur close to sensitive structures (within 25 feet), such as residential buildings, or special use buildings like laboratories or recording studios, Vibration could exceed the FTA vibration annoyance criteria shown in Table 2-5 and Table 2-6.

Along the underground alignment of Alternative 4, the TBM and other tunnel construction activities would be potential sources of GBVs. However, the TBM is slow moving and causes very little vibration and related GBN to the surrounding area when operating at full tunnel depths. The Alternative 4 underground tunnel would be at depths of approximately 30 feet to over 750 feet from the aboveground buildings along the tunnel alignment. In some residential areas, GBV from the TBM may be felt for a short period (about 2 days) while the machine passes under the receptor locations. In residential areas in the mountain region between Sunset Boulevard and the north tunnel portal, GBV from the TBM would not be perceptible because the tunnel would be very deep underground. Expected TBM vibration levels would be well below the strictest building damage threshold of 0.12 in/sec along the entire underground alignment.

Construction of Metro E Line Station and Santa Monica Boulevard station along the underground alignment would likely be cut-and-cover construction, which could at times occur within 25 feet of structures potentially resulting in excessive vibration. The alignment would surface in the Santa Monica Mountains near Del Gado Drive. Between Del Gado Drive and Ventura Boulevard, construction activity could occur at distances of 25 feet or less of adjacent buildings, including single-family residences, multi-family residences, and commercial buildings. Construction activity in this area could result in the exceedance of the FTA building damage or vibration annoyance criteria. North of Ventura Boulevard, construction activity would typically occur within the Sepulveda Boulevard ROW and nearby buildings would typically be located at distances of 50 feet or greater, thus reducing the potential for vibration damage or annoyance. In some instances, construction activity may occur at closer distances to sensitive buildings or more intense vibration generating equipment (vibratory roller) may be used which could result in the potential to exceed the FTA building damage or vibration annoyance criteria. East of the intersection of Sepulveda Boulevard and Raymer Street, construction activity would primarily occur in the rail ROW surrounded by industrial buildings which would have limited potential for vibration damage and annoyance.

Significant GBV could occur when certain construction activities would occur at close distances to sensitive receptors. Therefore, Alternative 4 would result in a significant impact related to construction vibration.

Maintenance and Storage Facility Construction Vibration

The nearest existing buildings to the construction of the proposed MSF are buildings within the residential properties along Cohasset Street south of the MSF site. The closest structures within the residential properties are as close as 17 feet from the proposed construction activities. The highest vibration levels from construction of the MSF at the closest off-site building would be 0.375 in/sec PPV from the use of a vibratory roller during paving and 0.16 in/sec PPV from a large bulldozer during the grading phase. Estimated vibration levels from ballast tamper and caisson drilling would be less than the applicable damage risk criterion for the building type in this area is 0.2 in/sec PPV (Building Type III in Table 2-7). Therefore, vibration impacts due to use of a vibratory roller at the southern edges of the proposed MSF would be significant without mitigation. The minimum distance from the south property line of the MSF site at which large vibratory rollers must operate is 26 feet during the construction of the proposed MSF. This mitigation measure would be a part of Mitigation Measure (MM) VIB-4.2 (Vibration Control Plan).

Construction Vibration Impacts on Historic Buildings

Construction under Alternative 4 would have the potential to damage buildings in close proximity to vibration-intensive construction activities. Using the reference levels in the FTA *Transit Noise and*

Vibration Impact Assessment Manual (FTA, 2018), vibration levels from project construction activities were estimated at historic buildings or structures eligible for the National Register of Historic Places along the Alternative 4alignment. Such buildings are generally classified as extremely susceptible to vibration damage (Building Type IV in Table 2-7).

Findings of the construction vibration assessment at historic structures are as follows:

- The following historic buildings are very close to the proposed project construction areas. Most vibration-intensive construction activities at these locations would likely result in levels exceeding the damage criterion of 0.12 in/sec PPV. Special consideration should be made for these buildings in MM VIB-4.2 outlined in Section 8.4.
  - Gayley Center located at 1101 Gayley Avenue, adjoining the proposed Wilshire Boulevard/Metro D Line Station
  - Linde Medical Building located at 10921 Wilshire Boulevard, adjacent to the proposed Wilshire Boulevard/Metro D Line Station
  - Tishman Building located at 10950 Wilshire Boulevard, adjacent to the proposed Wilshire Boulevard/Metro D Line Station
  - Historic building located at 4511 Sepulveda Boulevard, Sherman Oaks, next to the proposed aerial structure
  - UCLA Ackerman Hall, 308 Westwood Plaza, Los Angeles
- Pile driving at locations along the alignment in the vicinity of the following historic properties would potentially result in GBV levels exceeding the damage criterion of 0.12 in/sec PPV. Therefore, these locations must be addressed in the Vibration Control Plan if pile driving is to occur within 150 feet of the buildings:
  - Historic buildings located at 15300 and 15233 Ventura Boulevard, Sherman Oaks
  - Historic building located at 4700 Sepulveda Boulevard, Sherman Oaks
  - Lt. Patrick H. Daniels United States Army Reserve Center located at 5161 Sepulveda Boulevard, Sherman Oaks
  - Starlight Cottage located at 5450 Sepulveda Boulevard, Sherman Oaks
  - Cathedral of St. Mary Church located at 5335 Sepulveda Boulevard, Sherman Oaks
  - Historic building located at 5724 Sepulveda Boulevard, Van Nuys
  - Cabana Motel located at 5764 Sepulveda Boulevard, Van Nuys
  - El Cortez Motel located at 5746 Sepulveda Boulevard, Van Nuys
  - Historic building located at 6160 Sepulveda Boulevard, Van Nuys
  - Historic building located at 6833 Sepulveda Boulevard, Van Nuys
  - Lancer Lion II Apartments located at 7657 Sepulveda Boulevard, Van Nuys
  - Historic building located at 7721 Sepulveda Boulevard, Van Nuys
  - The Performing Arts Center located at 7735 Sepulveda Boulevard, Van Nuys

- Historic building located at 6833 Sepulveda Boulevard, Van Nuys
- Historic building located at 14746 Raymer Street, Van Nuys
- Air Raid Siren No. 110 located at the northeast corner of Covello Street and Sepulveda Boulevard, and Air Raid Siren No. 117 on the north side of Oxnard Street just west of Sepulveda Boulevard in Van Nuys

8.3.3 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 2 miles of a public airport or public use airport, would the project expose people residing or working in the Project Study Area to excessive noise levels?

The Santa Monica Airport and Van Nuys Airport are located within 2 miles of Alternative 4. However, Alternative 4 is a transit project that is not sensitive to noise. Transit riders would not dwell at one location for an extended period of time and, therefore, would not be exposed to excessive airport noise. Construction workers working on Alternative 4 would utilize ear protection as required while working on Alternative 4. Therefore, no impacts related to airport noise would occur.

8.4 Mitigation Measures

8.4.1 Operational

The following mitigation measures are recommended to reduce operational noise impacts from train movements along the Alternative 4 alignment:

MM NOI-4.1: ***Soundwalls***:

- *Soundwalls of heights of 3 to 10 feet shall be installed above the U-shaped rail guideway structure to reduce noise impacts to below the Federal Transit Administration moderate noise impact criteria. Soundwalls reduce noise levels at noise-sensitive receptors by breaking the direct line-of-sight between source and receptor with a solid wall. Aerial guideways typically do not require tall walls due to the height of the guideway over the receptors and the specified wall heights were determined to reduce noise levels to below the FTA noise impact criteria. Locations shall be verified during final design as necessary to reduce noise to below the Federal Transit Administration moderate-impact noise criteria. Table 8-14 shows the recommended locations of soundwalls.*

Table 8-14. Alternative 4: MM NOI-4.1 – Soundwalls Locations

Location	Type	Civil Stations	Track Side
East of aerial guideway, between Sutton Street and Greenleaf Street	4-foot-high absorptive soundwall atop U-shaped girder	958+00 to 961+00	Northbound
	5-foot-high absorptive soundwall atop U-shaped girder	961+00 to 963+00	Northbound
West of aerial guideway, north of Weddington Street	3-foot-high absorptive soundwall atop U-shaped girder	1018+00 to 1021+00	Southbound
East of aerial guideway, between Burbank Boulevard and Hatteras Street	3-foot-high absorptive soundwall atop U-shaped girder	1041+60 to 1044+40	Northbound

Location	Type	Civil Stations	Track Side
	10-foot-high absorptive soundwall atop U-shaped girder	1045+00 to 1048+00	Northbound
East of aerial guideway, between Haynes Street and Kittridge Street	10-foot-high absorptive soundwall atop U-shaped girder	1098+00 to 1101+00	Northbound
	5-foot-high absorptive soundwall atop U-shaped girder	1101+00 to 1102+50	Northbound
West of aerial guideway, between Wyandotte Street and Leadwell Street	3-foot-high absorptive soundwall atop U-shaped girder	1152+00 to 1154+00	Southbound
East of aerial guideway, between Valerio Street and Cohasset Street	3-foot-high absorptive soundwall atop U-shaped girder	1157+50 to 1161+00	Northbound
	3-foot-high absorptive soundwall atop U-shaped girder	1161+00 to 1164+20	Northbound

Source: HTA, 2024

Mitigation measures recommended to reduce operational vibration impacts from train movements along the Alternative 4 alignment are:

MM VIB-4.1: Trackwork Isolation Methods:

- *Metro shall implement trackwork isolation to reduce groundborne vibration levels to below the Federal Transit Administration groundborne vibration impact criteria for frequent events at the locations where exceedance of the groundborne vibration impact criteria are anticipated to occur. Metro will isolate trackwork using one of the following four methods:*
  - *High Resilience Direct Fixation Rail Fasteners (HRDF): HRDF attaches the rail directly to the fastener body. HRDF is used to attach the rails to the first concrete pour and then the space around the tacks is filled with precast concrete panels. There are several models of highly resilient direct fixation fasteners available that can be effective at controlling vibration.*
  - *Low-Impact or Spring Frogs: Wheel impacts at crossovers could increase vibration levels up to 10 VdB at sensitive buildings near the crossovers. Where vibration impact occurs at the crossovers along the project alignment, the impact vibration can be reduced through the use of low-impact frogs.*
  - *Floating Slab Track: This approach typically provides the highest reduction in GBV levels and is employed near Category 1 buildings where thresholds of impact are more stringent. Under this method, the track is constructed on a concrete slab that is supported by either resilient pads or a continuous resilient mat.*
  - *Resiliently Supported Ties: The resiliently supported tie system consists of concrete ties supported by rubber pads resting on top of a slab track or subway invert. The rails are fastened directly to the concrete ties using standard rail clips. This type of system has been shown to reduce GBV levels by up to 10 VdB.*

- *Locations where mitigation is required are identified in Table 8-15 and will be verified during final design.*

Table 8-15. Alternative 4: MM VIB-4.1 – Trackwork Isolation Methods Locations

Mitigation Measure Type	Civil Station Limits From – To		Location Description
High Resilience Direct Fixation Rail Fasteners	519+00	520+50	between 2355 S Bentley Avenue and 2345 S Bentley Avenue
Resiliently Supported Ties	520+50	525+50	2337 S Bentley Avenue to Tennessee Avenue
High Resilience Direct Fixation Rail Fasteners	525+50	549+00	Tennessee Avenue to 1921 S Bentley Avenue
Resiliently Supported Ties	549+00	551+00	1921 S Bentley Avenue to Missouri Avenue
High Resilience Direct Fixation Rail Fasteners	551+00	555+50	Missouri Avenue to 1835 S Bentley Avenue
Spring Frogs at Double Crossover	599+73	602+31	crossovers north of Ashton Avenue
High Resilience Direct Fixation Rail Fasteners	611+50	616+00	1101 Westwood Boulevard to 1045 Westwood Boulevard
Resiliently Supported Ties	625+50	633+00	North of Le Conte Avenue to 710 Westwood Plaza
Resiliently Supported Ties	633+00	639+00	710 Westwood Plaza to south of 570 Westwood Plaza
High Resilience Direct Fixation Rail Fasteners	673+50	711+00	south side of 121 Udine Way to north side of Hotel Bel-Air
High Resilience Direct Fixation Rail Fasteners	721+00	722+50	residence located at 10651 Capello Way
High Resilience Direct Fixation Rail Fasteners	727+00	733+00	10650 Somma Way to 10687 Somma Way
High Resilience Direct Fixation Rail Fasteners	771+00	773+00	residence located at 1545 Tanner Bridge Road
High Resilience Direct Fixation Rail Fasteners	907+00	909+00	3671 Meadville Drive to 3677 Meadville Drive
High Resilience Direct Fixation Rail Fasteners	918+00	931+00	3800 Scadlock Lane to north end of Briarwood Drive cul-de-sac

Source: HTA, 2024

8.4.2 Construction

The following mitigation measures would be needed to reduce construction noise and vibration levels to below the applicable limits:

MM NOI-4.2: ***Noise Control Plan:***

- *Prior to the initiation of localized construction activities, the Project contractor shall develop a Noise Control Plan demonstrating how the Federal Transit Administration 8-hour $L_{eq.equip}$ (equivalent noise level of equipment) noise criteria would be achieved during construction. The Noise Control Plan shall be prepared by a board-certified acoustical engineer. The Federal Transit Administration 8-hour $L_{eq.equip}$ construction noise standards are as follows: Residential daytime standard of 80 dBA 8-hour $L_{eq.equip}$ and nighttime standard of 70 dBA 8-hour $L_{eq.equip}$, Commercial daytime and nighttime standard of 85 dBA 8-hour $L_{eq.equip}$, and Industrial daytime and nighttime standard of 90 dBA 8-hour $L_{eq.equip}$. The*

Noise Control Plan shall be designed to follow Metro requirements, and shall include measurements of existing noise, a list of the major pieces of construction equipment that would be used, predictions of the noise levels at the closest noise-sensitive receptors (residences, hotels, schools, religious facilities, and similar facilities), and noise mitigation measures to be implemented to achieve compliance with the Federal Transit Administration 8-hour $L_{eq.equip}$ construction noise standards to the degree feasible. The Noise Control Plan must be approved by Metro prior to initiating noise-generating construction activities. The Project contractor shall conduct continuous noise monitoring to demonstrate compliance with the Federal Transit Administration 8-hour $L_{eq.equip}$ noise limits. If the Federal Transit Administration 8-hour $L_{eq.equip}$ criteria are exceeded, the Project contractor shall implement measures to reduce construction noise as much as feasible. The Project contractor shall establish a public information and complaint system. The Project contractor shall respond to and provide corrective action for complaints within 24-hours. In addition, the Project shall comply with local noise ordinances when applicable, including by obtaining a variance(s) from the applicable local jurisdiction when nighttime work is required. Noise reducing methods that may be implemented by the Project contractor include:

- *If nighttime construction is planned, a noise variance may be prepared by the Project contractor, if required by the jurisdiction, that demonstrates the implementation of control measures to maintain noise levels below the applicable Federal Transit Administration and local standards.*
- *Where nighttime construction would exceed the FTA nighttime criteria, avoid nighttime construction to the degree feasible.*
- *Utilize specialty equipment equipped with enclosed engines and/or high performance mufflers as feasible. The Project contractor shall locate equipment and staging areas as far from noise-sensitive receptors as possible.*
- *Limit unnecessary idling of equipment.*
- *Install temporary noise barriers as needed where feasible.*
- *Reroute construction related truck traffic away from residential streets to the extent permitted by the relevant municipality.*
- *Avoid impact pile driving where possible. Drilled piles or vibratory pile drivers would be required where feasible.*
- *Where Project construction cannot be performed in accordance with the requirements of the applicable noise limits, the Project contractor should be required to investigate alternative construction methods that would result in lower sound levels. Also, the Project contractor should be required to conduct noise monitoring to demonstrate compliance with noise limits outlined in the Noise Control Plan.*

MM VIB-4.2: Vibration Control Plan:

- *Prior to construction, the Project contractor shall prepare a Vibration Control Plan demonstrating how the Federal Transit Administration building damage risk criteria and the Federal Transit Administration vibration annoyance criteria would be achieved. The Vibration Control Plan must be approved by Metro prior to initiating vibration-generating construction activities. The Vibration Control Plan would include a list of the major pieces of construction equipment that would be used, and the predictions of the vibration levels at the closest sensitive receivers. The Project contractor would conduct vibration monitoring to demonstrate compliance with the vibration limits during construction activity. Where the construction cannot be performed to meet the vibration criteria, the Project contractor shall implement alternative means and methods of construction measures to reduce vibration levels as much as feasible. Vibration reducing methods that may be implemented by the Project contractor include:*
  - *When feasible, use construction equipment or less vibration intensive techniques near vibration sensitive locations.*
  - *Use as small an impact device (i.e., hoe ram, pile driver) as possible to accomplish necessary tasks.*
  - *Avoid impact pile driving where possible. Drilled piles or vibratory pile drivers would be required where feasible.*
  - *When feasible, in construction areas close to sensitive buildings, select non-impact demolition and construction methods such as saw or torch cutting and removal for off-site demolition, and use chemical splitting, or hydraulic jack splitting, instead of high impact methods.*
- *The Project contractor shall monitor construction vibration levels at structures identified as a “historic” resource within the meaning of CEQA Guidelines Section 15064.5(a)to ensure the vibration damage threshold of 0.12 in/sec PPV shall not be exceeded. The vibration monitoring shall be conducted by a qualified professional for real-time vibration monitoring for construction work at the Project construction site requiring heavy equipment or ground compaction devices. A pre-construction and post-construction survey of these buildings shall be conducted by a qualified structural engineer. Any damage shall be noted. All vibration monitors used for these measurements shall be equipped with an “alarm” feature to provide advanced notification that vibration impact criteria have been approached. Documented damage in the post-construction survey shall be repaired as required by the Secretary of the Interior’s (SOI’s) Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. The following historic resources shall be included in the Vibration Control Plan.*
  - *Gayley Center located at 1101 Gayley Avenue, adjoining the proposed Wilshire Boulevard/Metro D Line Station*
  - *Linde Medical Building located at 10921 Wilshire Boulevard, adjacent to the proposed Wilshire Boulevard/Metro D Line Station*

- *Tishman Building located at 10950 Wilshire Boulevard, adjacent to the proposed Wilshire Boulevard/Metro D Line Station*
- *Historic building located at 4511 Sepulveda Boulevard, Sherman Oaks, next to the proposed aerial structure*
- *UCLA Ackerman Hall, 308 Westwood Plaza, Los Angeles*
- *Historic buildings located at 15300 and 15233 Ventura Boulevard, Sherman Oaks*
- *Historic building located at 4700 Sepulveda Boulevard, Sherman Oaks*
- *Lt. Patrick H. Daniels United States Army Reserve Center located at 5161 Sepulveda Boulevard, Sherman Oaks*
- *Starlight Cottage located at 5450 Sepulveda Boulevard, Sherman Oaks*
- *Cathedral of St. Mary Church located at 5335 Sepulveda Boulevard, Sherman Oaks*
- *Historic building located at 5724 Sepulveda Boulevard, Van Nuys*
- *Cabana Motel located at 5764 Sepulveda Boulevard, Van Nuys*
- *El Cortez Motel located at 5746 Sepulveda Boulevard, Van Nuys*
- *Historic building located at 6160 Sepulveda Boulevard, Van Nuys*
- *Historic building located at 6833 Sepulveda Boulevard, Van Nuys*
- *Lancer Lion II Apartments located at 7657 Sepulveda Boulevard, Van Nuys*
- *Historic building located at 7721 Sepulveda Boulevard, Van Nuys*
- *The Performing Arts Center located at 7735 Sepulveda Boulevard, Van Nuys*
- *Historic building located at 6833 Sepulveda Boulevard, Van Nuys*
- *Historic building located at 14746 Raymer Street, Van Nuys*
- *Air Raid Siren No. 110 located at the northeast corner of Covello Street and Sepulveda Boulevard, and*
- *Air Raid Siren No. 117 on the north side of Oxnard Street just west of Sepulveda Boulevard in Van Nuys*

8.4.3 Impacts After Mitigation

8.4.3.1 Rail Operations Noise

Alternative 4 operations would result in moderate to severe noise impacts at 10 receptors representing nine multi-family buildings and a hotel. Effects of implementing MM NOI-4.1 (soundwalls) were evaluated. Rail operations noise impacts after implementation of mitigation are shown on Figure 8-25 through Figure 8-28. As shown in Table 8-16, MM NOI-4.1 would result in reduced HRT noise levels. At eight of the ten impacted buildings, 3- to 5-foot-high soundwalls placed at the top of the aerial guideway concrete girder between the trains and receptors would mitigate impacts to below significant. At two of the impacted receptors, 10-foot-high soundwalls would reduce noise impacts from severe to below the threshold of moderate impact. Therefore, implementation of MM NOI-4.1 would result in a less than significant operational noise impact at the impacted receptors. Therefore, Alternative 4 would result in a less than significant impact related to rail operations noise.

Table 8-16. Alternative 4: Summary of Operational Noise Impacts After Mitigation

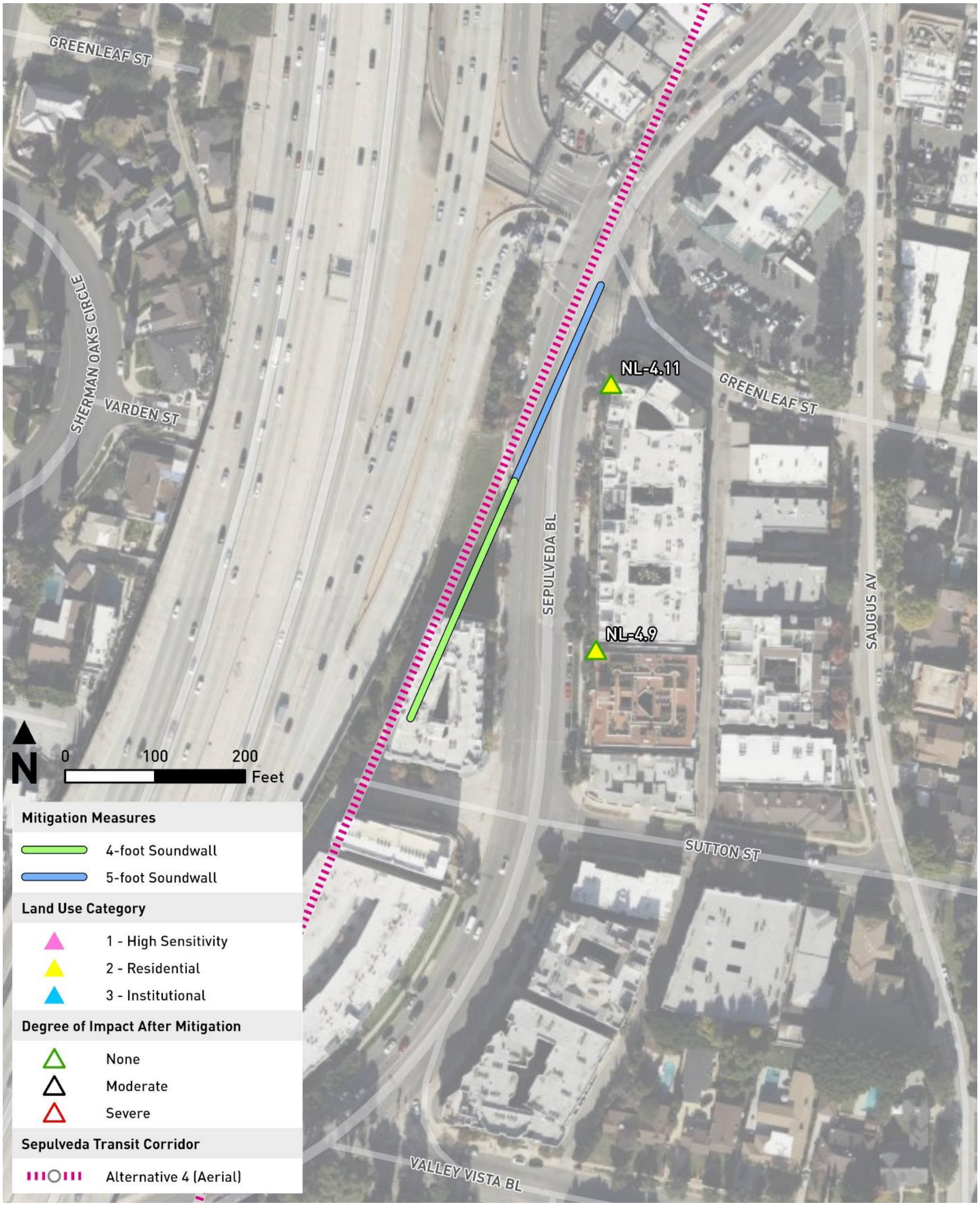
Receptor ID	Location	Unmitigated Impact	Mitigation			
			Type	Location(s)	Project Noise Level (L_{dn}, dBA)	Residual Impact Level
N-4.9	4410 Sepulveda Boulevard, Sherman Oaks	Moderate	4-foot-high absorptive soundwall atop U-shaped girder	959+00 to 961+00 (northbound)	57	**No Impact**
N-4.11	4440 Sepulveda Boulevard, Sherman Oaks	Moderate	5-foot-high absorptive soundwall atop U-shaped girder	961+00 to 963+00 (northbound)	65	**No Impact**
N-4.44	5307 Sepulveda Boulevard, Sherman Oaks	Moderate	3-foot-high absorptive soundwall atop U-shaped girder	1018+00 to 1025+50 (southbound)	61	**No Impact**
N-4.57	Hampton Inn 5638 Sepulveda Boulevard, Van Nuys	Moderate	3-foot-high absorptive soundwall atop U-shaped girder	1042+60 to 1044+40 (northbound)	59	**No Impact**
N-4.58	5700 Sepulveda Boulevard, Van Nuys	Severe	10-foot-high absorptive soundwall atop U-shaped girder	1045+00 to 1048+00 (northbound)	61	**No Impact**
N-4.78	6500 Sepulveda Boulevard, Van Nuys	Severe	10-foot-high absorptive soundwall atop U-shaped girder	1098+00 to 1101+00 (northbound)	61	**No Impact**
N-4.82	6530 Sepulveda Boulevard, Van Nuys	Severe	5-foot-high absorptive soundwall atop U-shaped girder	1101+00 to 1102+50 (northbound)	64	**No Impact**
N-4.125	7317 Sepulveda Boulevard, Van Nuys	Severe	3-foot-high absorptive soundwall atop U-shaped girder	1152+00 to 1154+00 (southbound)	63	**No Impact**
N-4.131	7400 Sepulveda Boulevard, Van Nuys	Severe	3-foot-high absorptive soundwall atop U-shaped girder	1157+50 to 1161+00 (northbound)	62	**No Impact**
N-4.135	7440 Sepulveda Boulevard, Van Nuys	Severe	3-foot-high absorptive soundwall atop U-shaped girder	1161+00 to 1164+20 (northbound)	62	**No Impact**

Source: HTA, 2024

8.4.3.2 Construction Noise

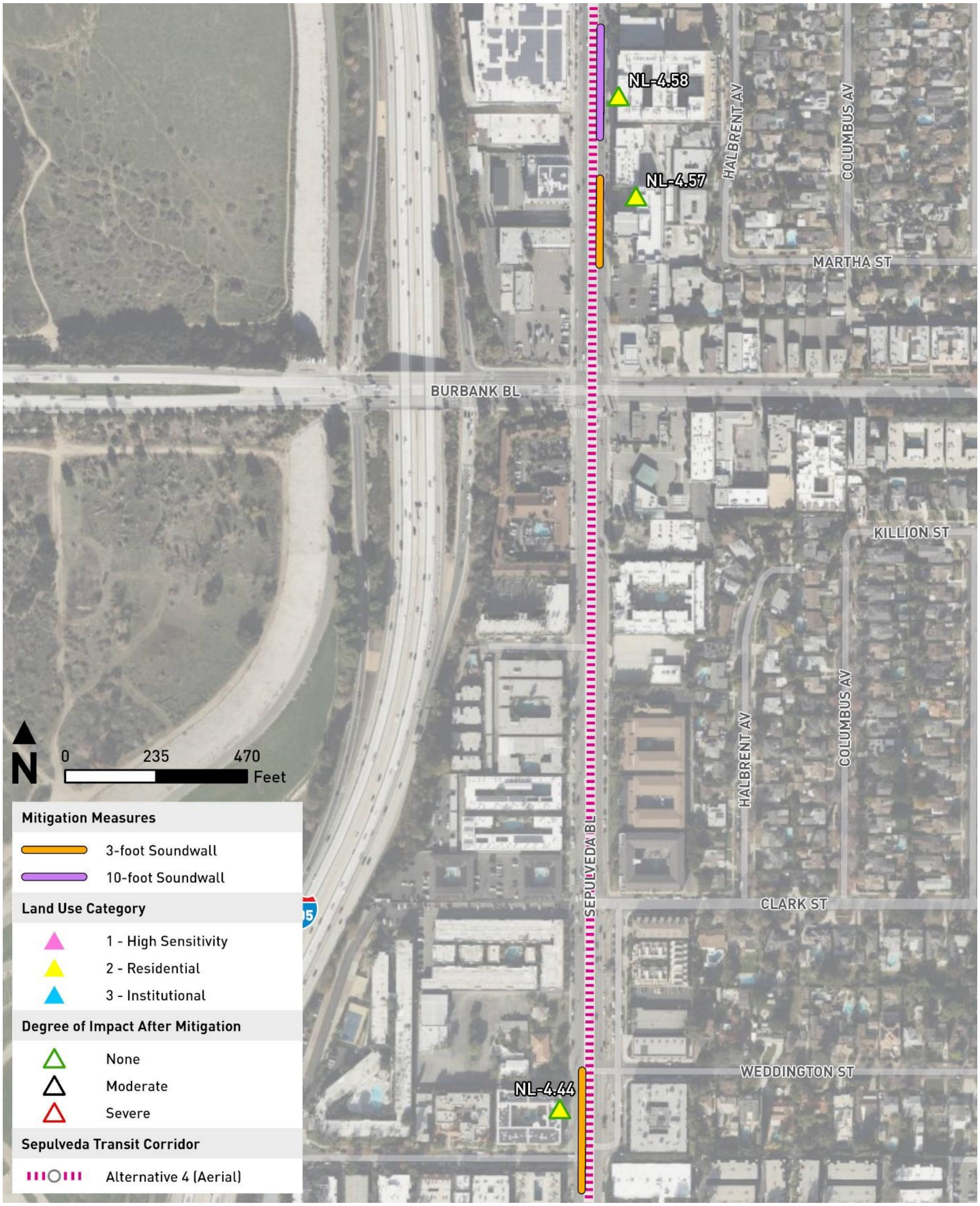
The proposed Alternative 4would result in temporary and periodic increases in ambient noise levels due to construction activity that would exceed FTA's criteria, and, where applicable, the standards established by the local noise ordinances. While MM NOI-4.2 would be implemented, which would include noise-reducing measures, there may still be temporary or periodic increases in ambient noise levels that exceed FTA construction impact criteria. There are no feasible mitigation measures to completely eliminate all anticipated instances of construction noise levels above the FTA criteria. Therefore, impacts related to construction noise would be significant and unavoidable.

Figure 8-25. Alternative 4: Mitigated Rail Operations Noise Impacts – Sepulveda Boulevard South of Greenleaf Street



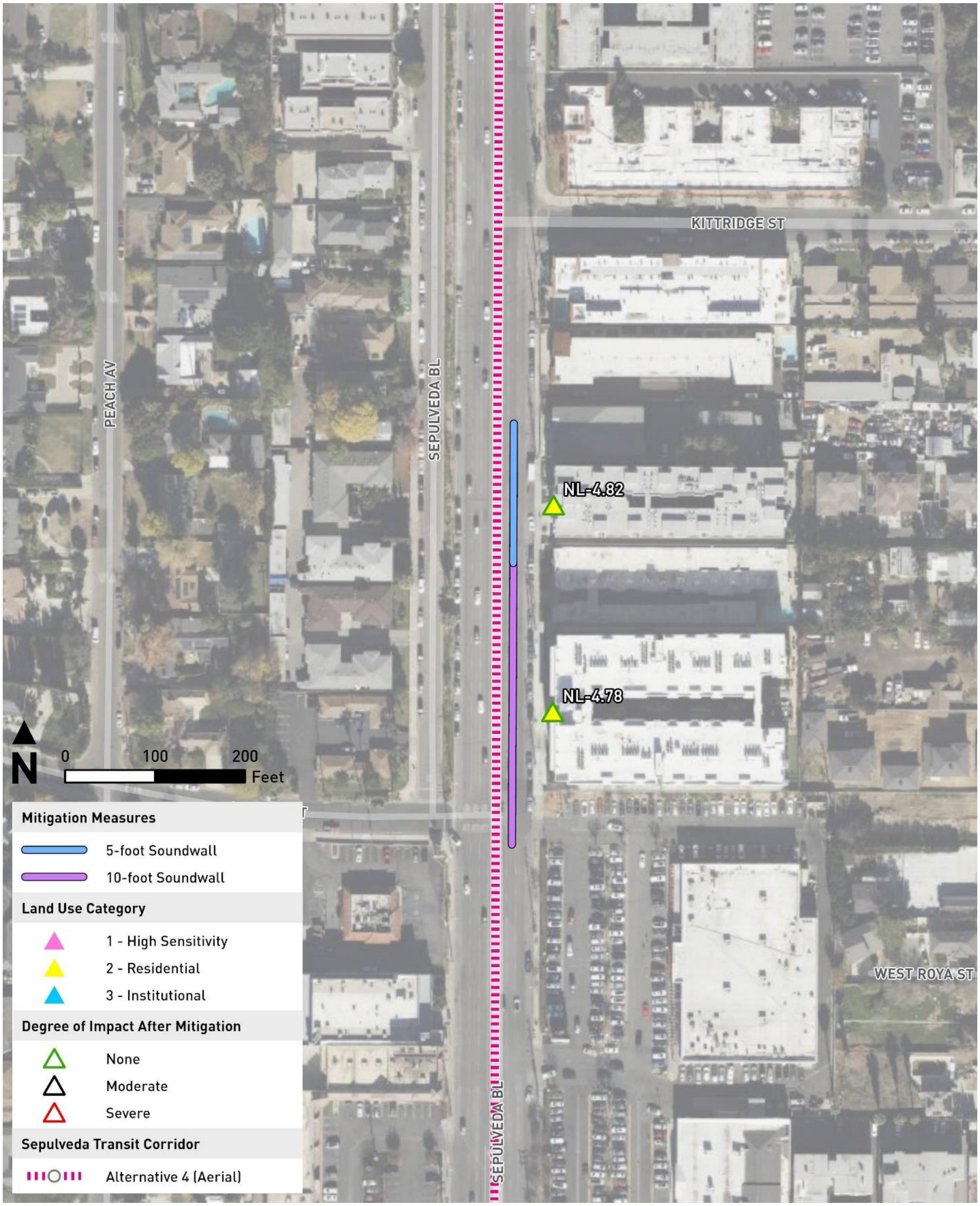
Source: HTA, 2024

Figure 8-26. Alternative 4: Mitigated Rail Operations Noise Impacts – Sepulveda Boulevard and Burbank Boulevard



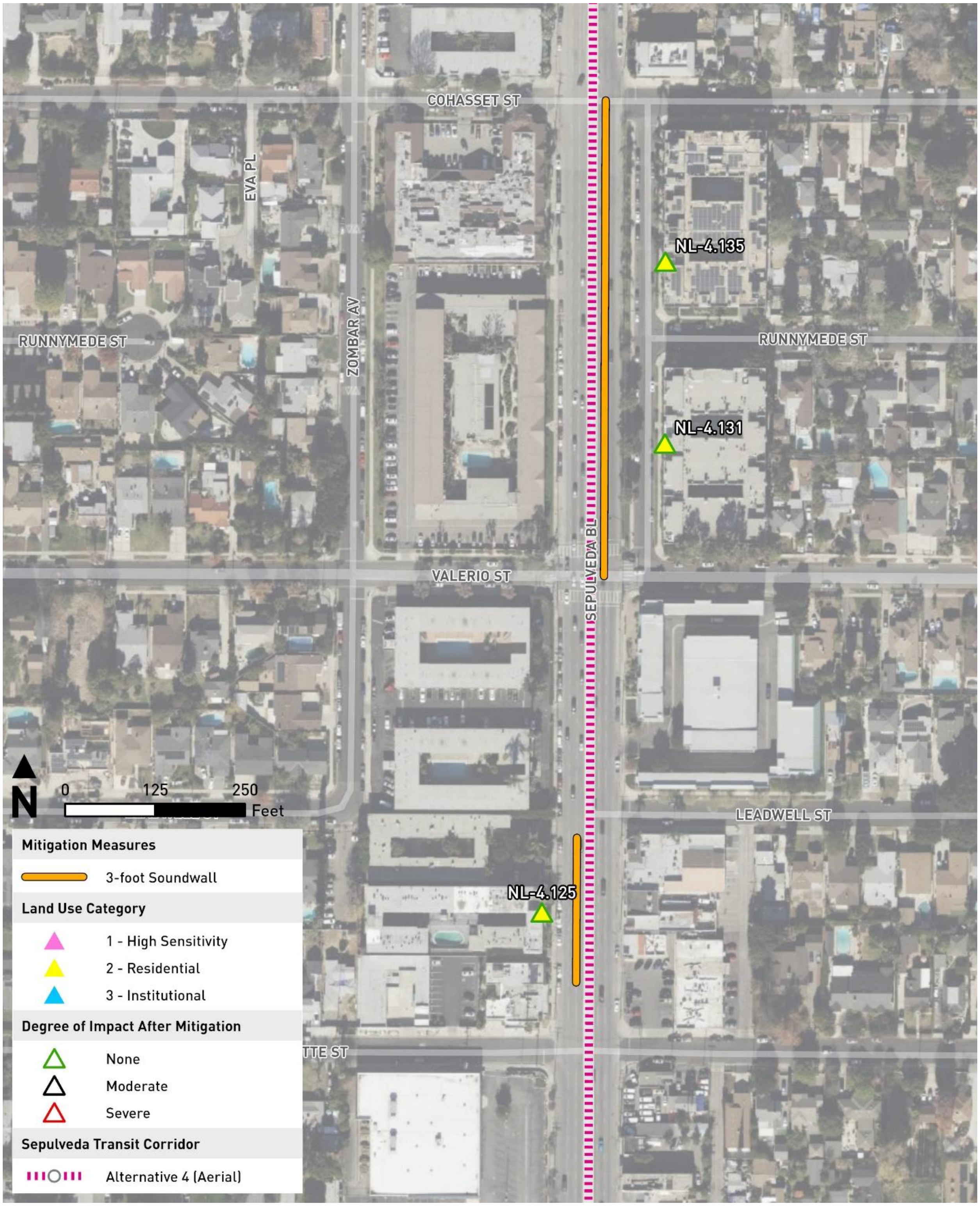
Source: HTA, 2024

Figure 8-27. Alternative 4: Mitigated Rail Operations Noise Impacts – Sepulveda Boulevard South of Kittridge Street



Source: HTA, 2024

Figure 8-28. Alternative 4: Mitigated Rail Operations Noise Impacts – Sepulveda Boulevard, Valerio Street to Cohasset Street



Source: HTA, 2024

8.4.3.3 Operational Vibration

As shown in Table 8-12, there would be operational GBV and GBN impacts at Category 1 and Category 2 land uses along the Alternative 4 alignment. Vibration Impacts after implementation of mitigation are shown on Figure 8-29 through Figure 8-36. Results of implementation of MM VIB-4.1 are shown in Table 8-17. Therefore, operational GBV and GBN impacts would be less than significant after mitigation.

Table 8-17. Alternative 4: Summary of Groundborne Vibration and Groundborne Noise Impacts After Mitigation

Impact Area	Description of Impacted Area	Civil Station Limits		Calculated GBV (VdB)	Calculated GBN (dBA)	Impacts After Mitigation	
		Start	End			Category 1	Category 2
1	Pico Boulevard to Tennessee Avenue	519+00	525+00	57-69	22-34	0	0
2	Tennessee Avenue to Olympic Boulevard	525+00	532+00	65-69	30-34	0	0
3	Olympic Boulevard to Mississippi Avenue	532+00	538+00	66-68	31-33	0	0
4	Mississippi Avenue to Santa Monica Station	538+00	555+50	58-66	21-33	0	0
5	South of Ashton Avenue and Midvale Avenue	599+73	602+31	67-69	32-34	0	0
6	Wilshire/Westwood Station to Le Conte Avenue	611+50	616+00	56-57	21-22	0	0
7	Le Conte Avenue to UCLA Gateway Plaza Station	625+50	639+00	52-59	17-24	0	0
8a/8b	Sunset Boulevard to Stone Canyon Road	673+50	711+00	65-67	30-32	0	0
9a/9b	Mulholland Drive to North Tunnel Portal	907+00	931+00	65-68	30-33	0	0

Source: HTA, 2024

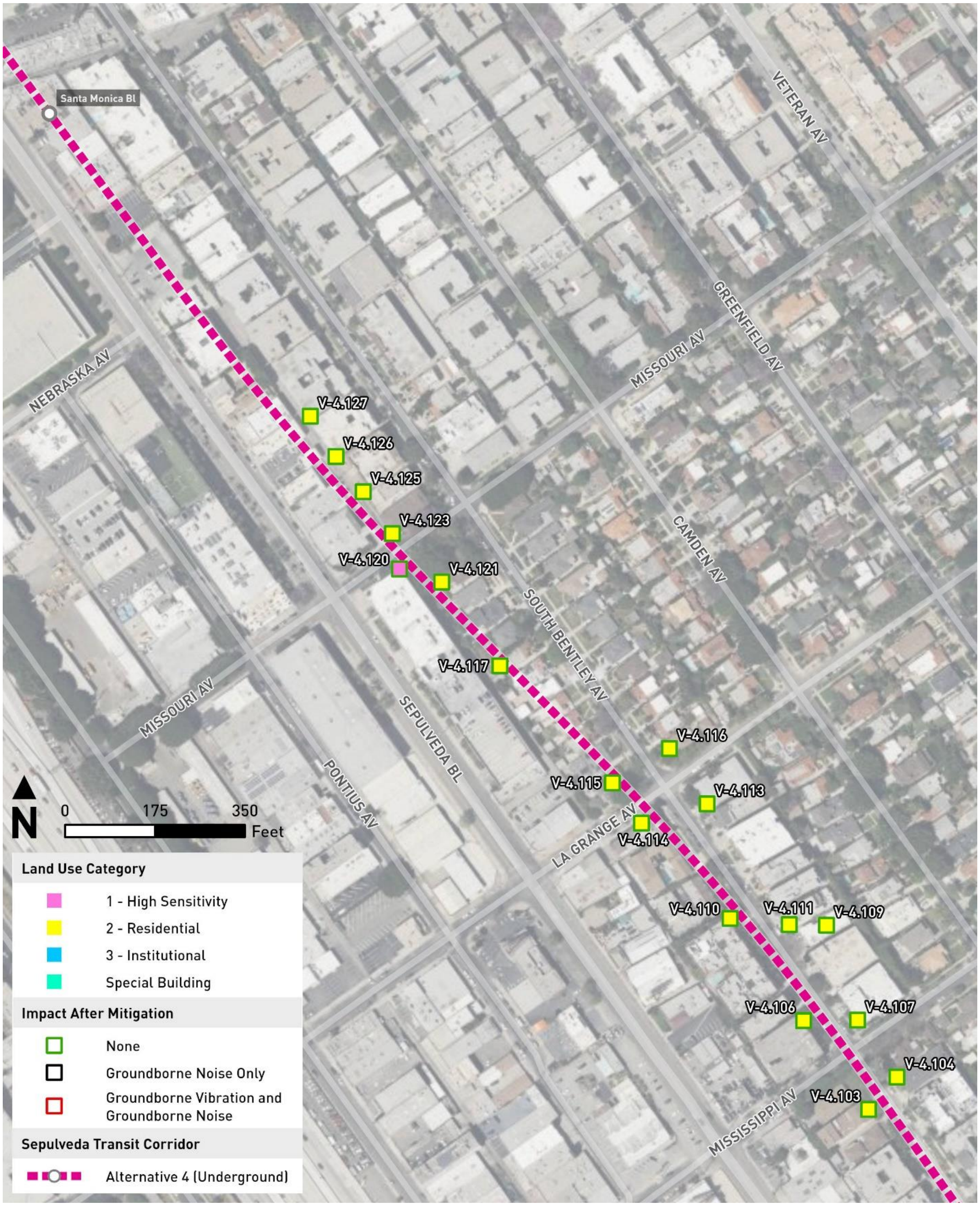
8.4.3.4 Construction Vibration

The proposed Alternative 4would result in temporary and periodic increases in ambient vibration levels due to construction activity that would exceed FTA's criteria. While MM VIB-4.2 would be implemented, which would include vibration-reducing measures, there may still be temporary or periodic increases in vibration levels that exceed FTA construction vibration impact criteria. Historic resources have been identified in MM VIB-4.2 that would require vibration monitoring and pre-construction and post-construction surveys. The mitigation would also require a pre-construction and post construction survey to be prepared, and any damage noted and restored per the requirements of SOI Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. Therefore, impacts related to construction vibration at historic resources would be less than significant with mitigation. Regarding construction vibration at non-historic structures, in some instances it may not be possible to reduce vibration by using less vibration intensive equipment due to geological conditions or physical constraints of the construction site. There are no feasible mitigation measures to completely eliminate all anticipated incidents of construction vibration levels exceeding the FTA criteria. Therefore, impacts related to construction vibration would be significant and unavoidable for both damage and annoyance.

Figure 8-29. Alternative 4: Mitigated Operational Vibration Impacts – Impact Areas 1, 2, and 3 Bentley Corridor, Pico Boulevard to Mississippi Avenue

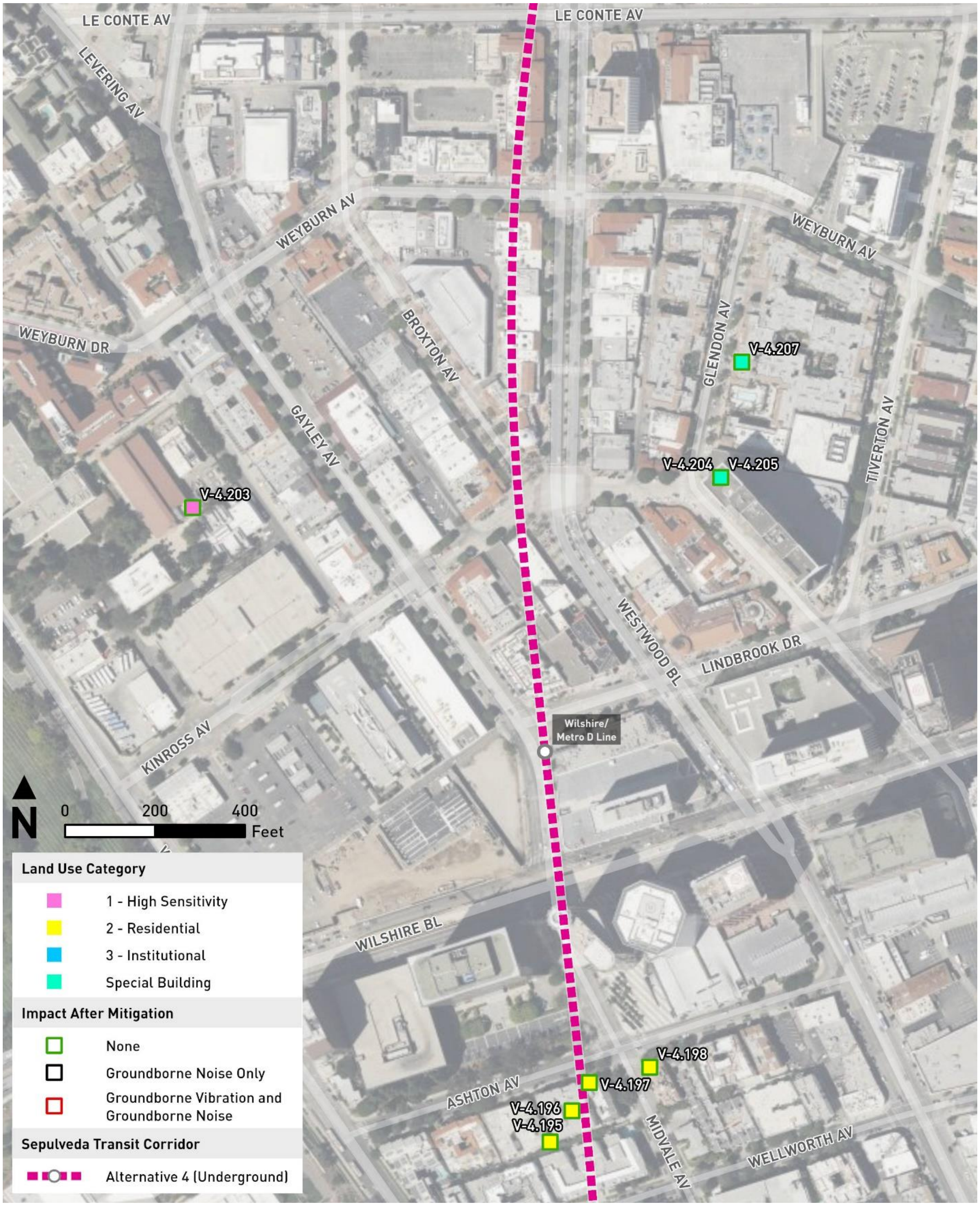
Source: HTA, 2024

Figure 8-30. Alternative 4: Mitigated Operational Vibration Impacts – Impact Area 4 Bentley Corridor, Mississippi Avenue to Santa Monica Boulevard Station



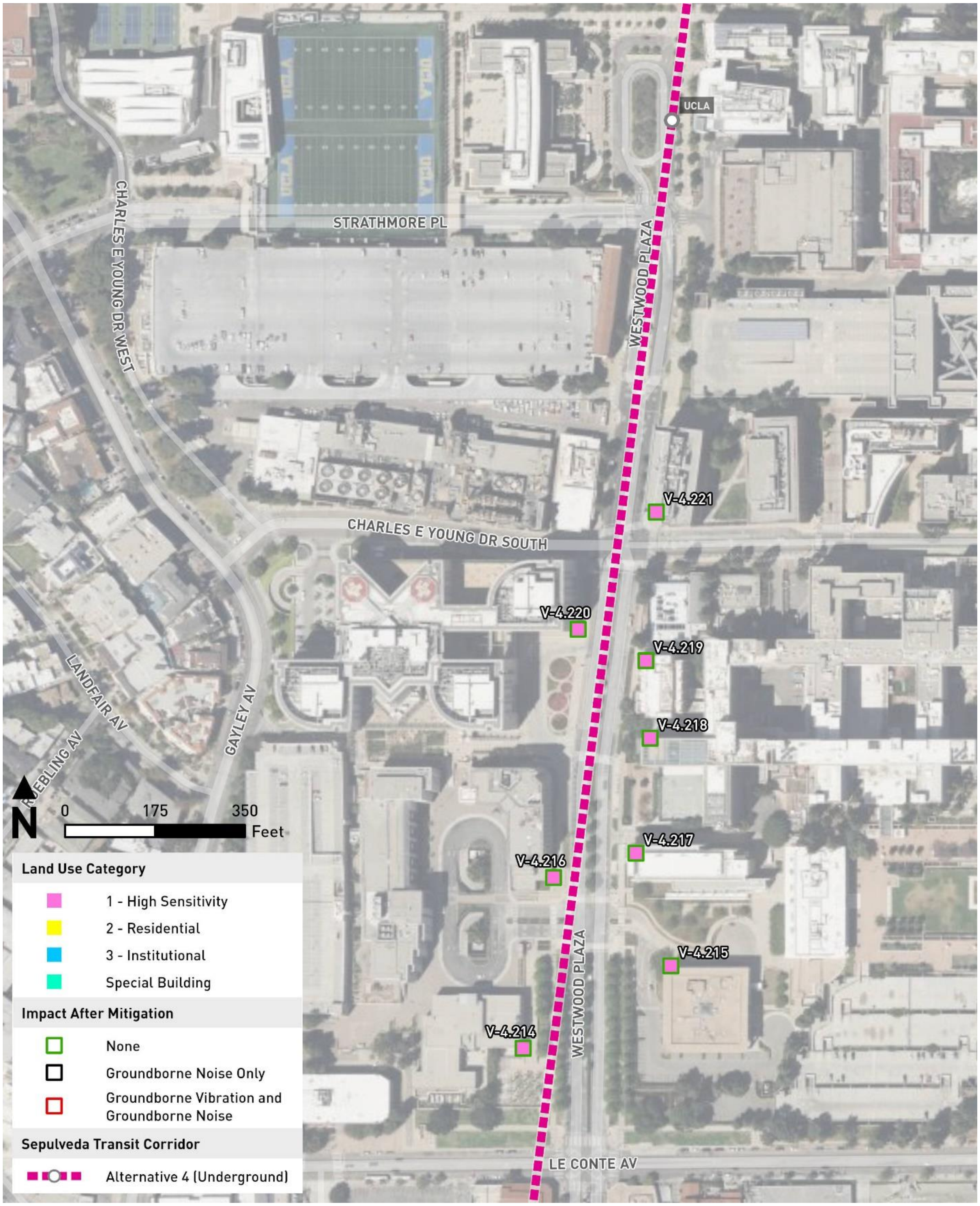
Source: HTA, 2024

Figure 8-31. Alternative 4: Mitigated Operational Vibration Impacts – Impact Areas 5 and 6 Westwood Area, Veteran Avenue to Le Conte Avenue



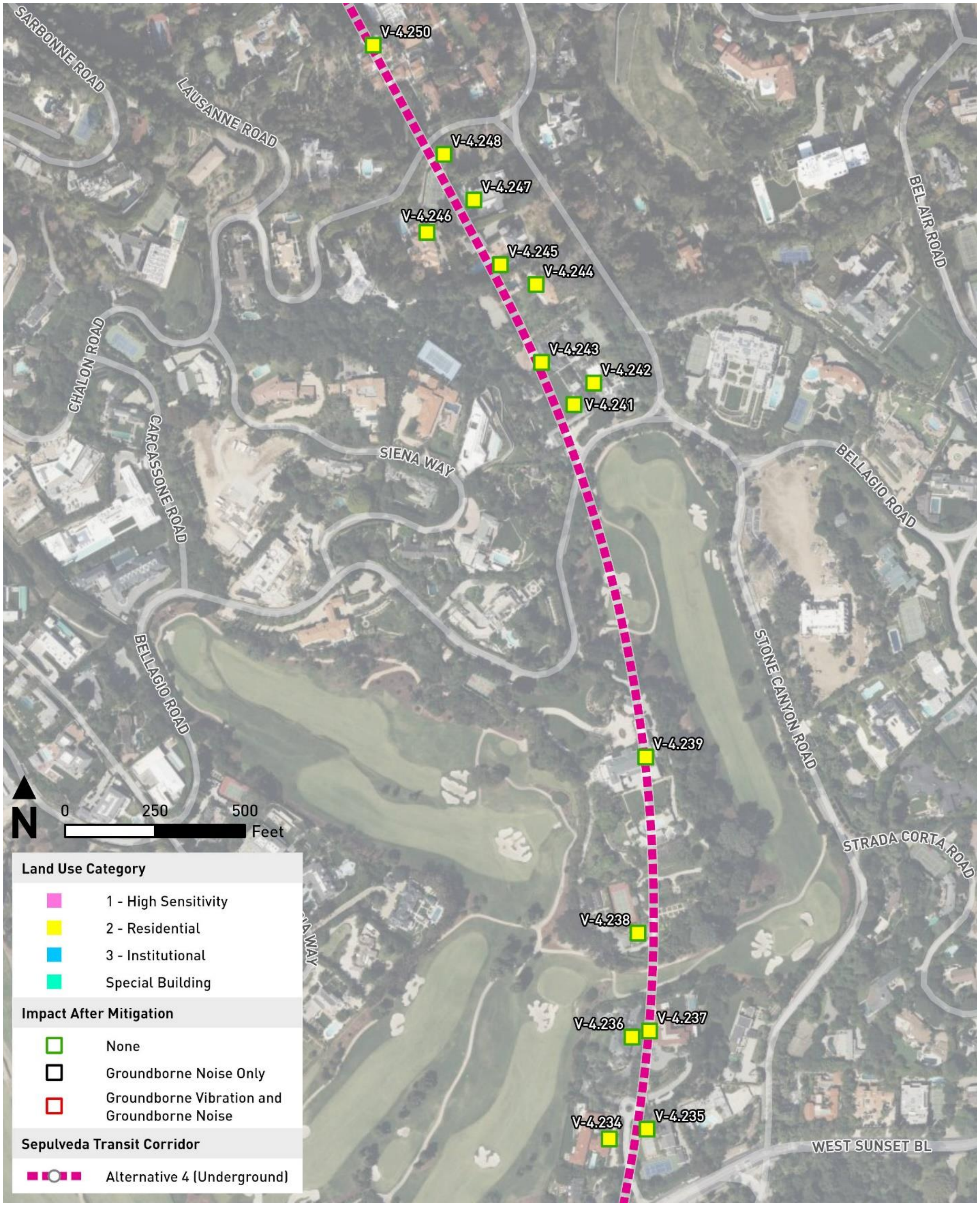
Source: HTA, 2024

Figure 8-32. Alternative 4: Mitigated Operational Vibration Impacts – Impact Area 7 Westwood Area, Le Conte Avenue to UCLA Gateway Plaza Station



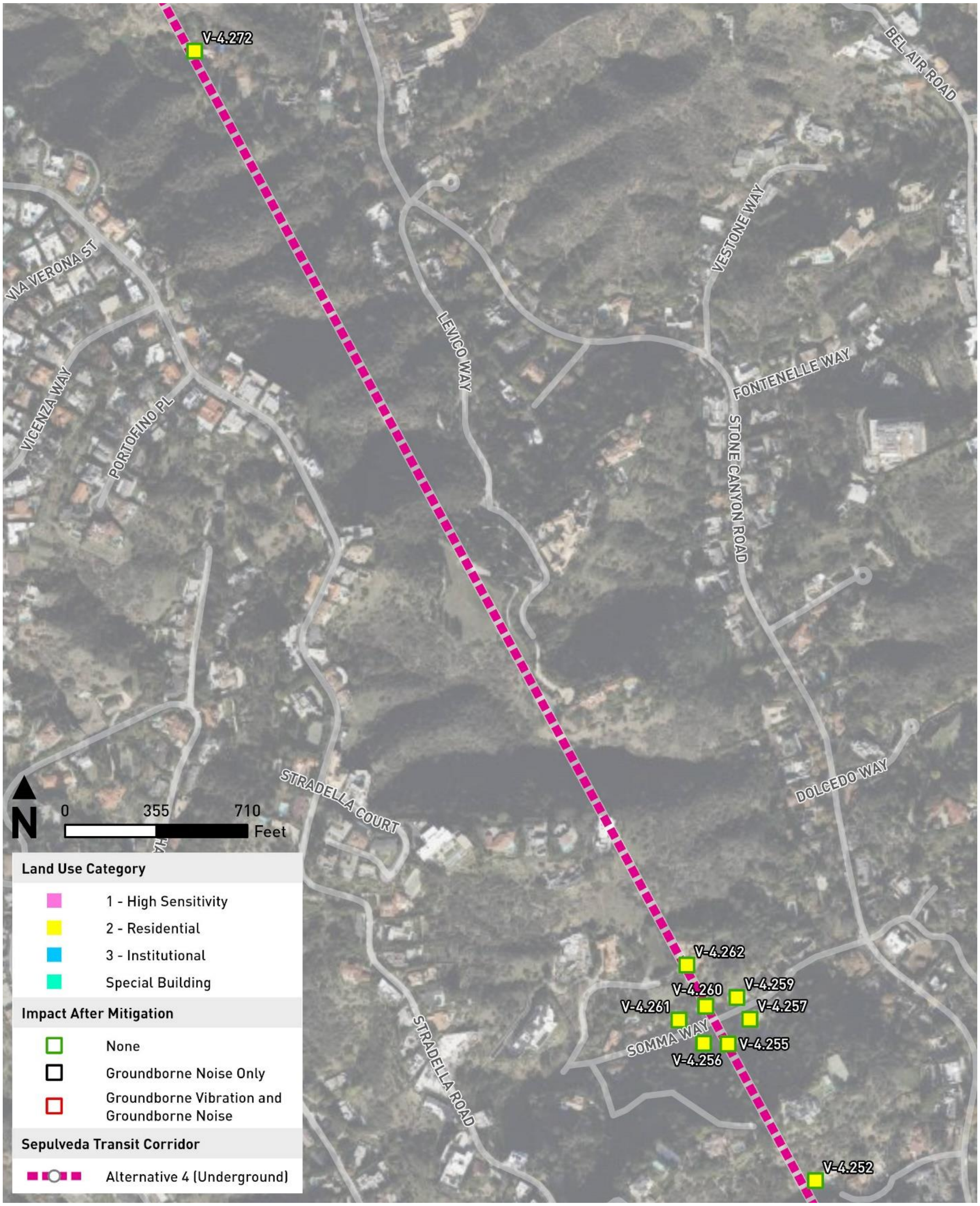
Source: HTA, 2024

Figure 8-33. Alternative 4: Mitigated Operational Vibration Impacts – Impact Area 8a Southern Santa Monica Mountains North of Sunset Boulevard



Source: HTA, 2024

Figure 8-34. Alternative 4: Mitigated Operational Vibration Impacts – Impact Area 8b Southern Santa Monica Mountains



Source: HTA, 2024

Figure 8-35. Alternative 4: Mitigated Operational Vibration Impacts – Impact Area 9a Central Santa Monica Mountains North of Mulholland Drive

Source: HTA, 2024

Figure 8-36. Alternative 4: Mitigated Operational Vibration Impacts – Impact Area 9b Northern Santa Monica Mountains, South of Tunnel Portal

Source: HTA, 2024

9 ALTERNATIVE 5

9.1 Alternative Description

Alternative 5 consists of a heavy rail transit (HRT) system with a primarily underground guideway track configuration, including seven underground stations and one aerial station. This alternative would include five transfers to high-frequency fixed guideway transit and commuter rail lines, including the Los Angeles County Metropolitan Transportation Authority's (Metro) E, Metro D, and Metro G Lines, East San Fernando Valley Light Rail Transit Line, and the Metrolink Ventura County Line. The length of the alignment between the terminus stations would be approximately 13.8 miles, with 0.7 miles of aerial guideway and 13.1 miles of underground configuration.

The seven underground and one aerial HRT stations would be as follows:

1. Metro E Line Expo/Sepulveda Station (underground)
2. Santa Monica Boulevard Station (underground)
3. Wilshire Boulevard/Metro D Line Station (underground)
4. UCLA Gateway Plaza Station (underground)
5. Ventura Boulevard/Sepulveda Boulevard Station (underground)
6. Metro G Line Sepulveda Station (underground)
7. Sherman Way Station (underground)
8. Van Nuys Metrolink Station (aerial)

9.1.1 Operating Characteristics

9.1.1.1 Alignment

As shown on Figure 9-1, from its southern terminus station at the Metro E Line Expo/Sepulveda Station, the alignment of Alternative 5 would run underground north through the Westside of Los Angeles (Westside), the Santa Monica Mountains, and the San Fernando Valley (Valley) to a tunnel portal east of Sepulveda Boulevard and south of Raymer Street. As it approaches the tunnel portal, the alignment would curve eastward and begin to transition to an aerial guideway along the south side of the Los Angeles-San Diego-San Luis Obispo (LOSSAN) rail corridor that would continue to the northern terminus station adjacent to the Van Nuys Metrolink/Amtrak Station.

The proposed southern terminus station would be located underground east of Sepulveda Boulevard between the existing elevated Metro E Line tracks and Pico Boulevard. Tail tracks for vehicle storage would extend underground south of National Boulevard east of Sepulveda Boulevard. The alignment would continue north beneath Bentley Avenue before curving northwest to an underground station at the southeast corner of Santa Monica Boulevard and Sepulveda Boulevard. From the Santa Monica Boulevard Station, the alignment would continue and curve eastward to the Wilshire Boulevard/Metro D Line Station beneath the Metro D Line Westwood/UCLA Station, which is currently under construction as part of the Metro D Line Extension Project. From there, the underground alignment would curve slightly to the northeast and continue beneath Westwood Boulevard before reaching the UCLA Gateway Plaza Station.

Figure 9-1. Alternative 5: Alignment

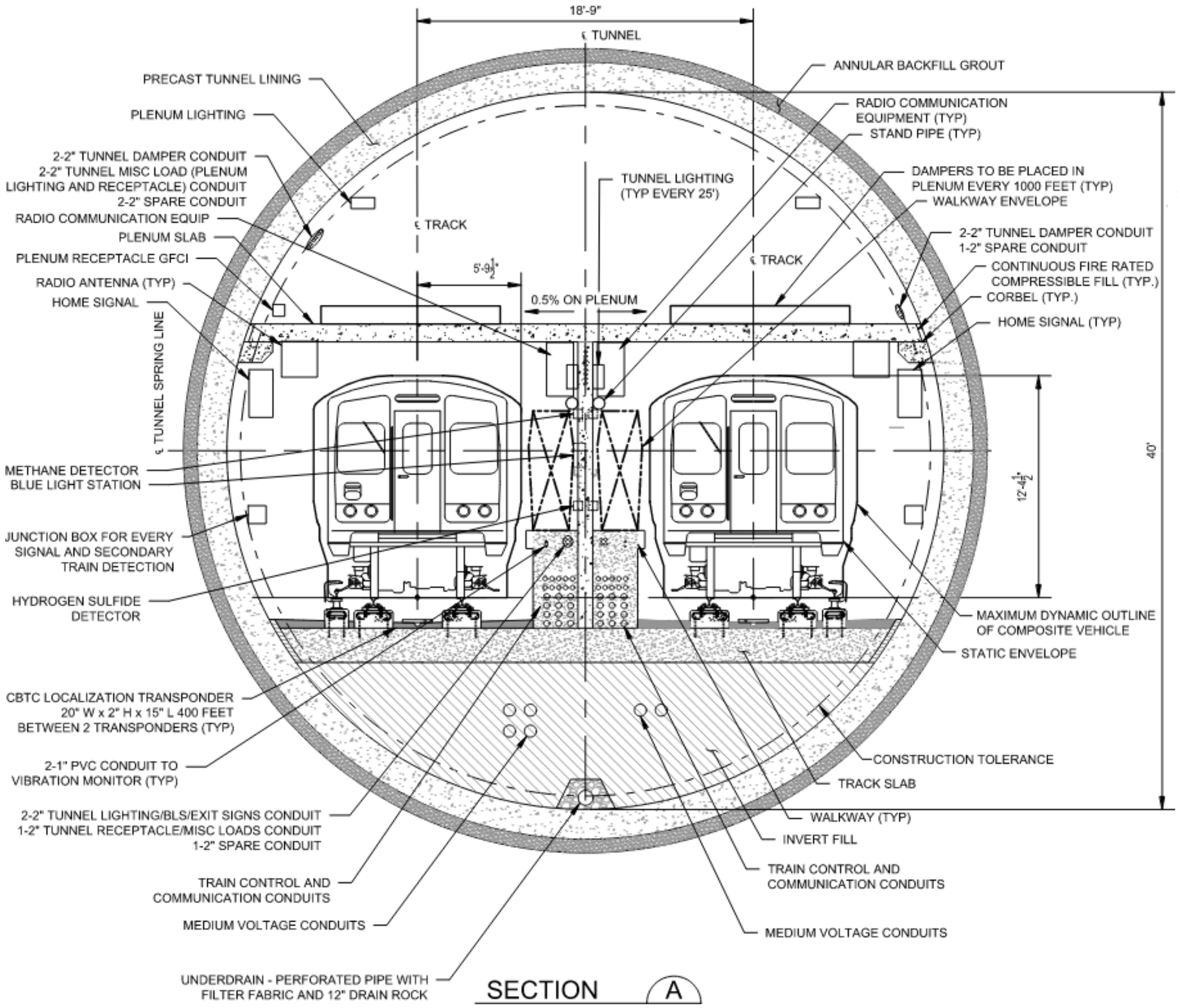
Source: STCP, 2024; HTA, 2024

From the UCLA Gateway Plaza Station, the alignment would turn to the northwest beneath the Santa Monica Mountains to the east of Interstate 405 (I-405). South of Mulholland Drive, the alignment would curve to the north, aligning with Saugus Avenue south of Valley Vista Boulevard. The Ventura Boulevard Station would be located under Saugus Avenue between Greenleaf Street and Dickens Street. The alignment would then continue north beneath Sepulveda Boulevard to the Metro G Line Sepulveda Station immediately south of the Metro G Line Busway. After leaving the Metro G Line Sepulveda Station, the alignment would continue beneath Sepulveda Boulevard to reach the Sherman Way Station, the final underground station along the alignment, immediately south of Sherman Way. From the Sherman Way Station, the alignment would continue north before curving slightly to the northeast to the tunnel portal south of Raymer Street. The alignment would then transition from an underground configuration to an aerial guideway structure after exiting the tunnel portal. East of the tunnel portal, the alignment would transition to a cut-and-cover U-structure segment followed by a trench segment before transitioning to an aerial guideway that would run east along the south side of the LOSSAN rail corridor. Parallel to the LOSSAN rail corridor, the guideway would conflict with the existing Willis Avenue Pedestrian Bridge which would be demolished. The alignment would follow the LOSSAN rail corridor before reaching the proposed northern terminus Van Nuys Metrolink Station located adjacent to the existing Metrolink/Amtrak Station. The tail tracks and yard lead tracks would descend to the proposed at-grade maintenance and storage facility (MSF) east of the proposed northern terminus station. Modifications to the existing pedestrian underpass to the Metrolink platforms to accommodate these tracks would result in reconfiguration of an existing rail spur serving City of Los Angeles Department of Water and Power (LADWP) property.

9.1.1.2 Guideway Characteristics

For underground sections, Alternative 5 would utilize a single-bore tunnel configuration with an outside diameter of approximately 43.5 feet. The tunnel would include two parallel tracks at 18.75-foot spacing in tangent sections separated by a continuous central dividing wall throughout the tunnel. Inner walkways would be constructed adjacent to the two tracks. Inner and outer walkways would be constructed within tunnel sections near the track crossovers. At the crown of tunnel, a dedicated air plenum would be provided by constructing a concrete slab above the railway corridor. The air plenum would allow for ventilation throughout the underground portion of the alignment. Figure 9-2 illustrates these components at a typical cross-section of the underground guideway.

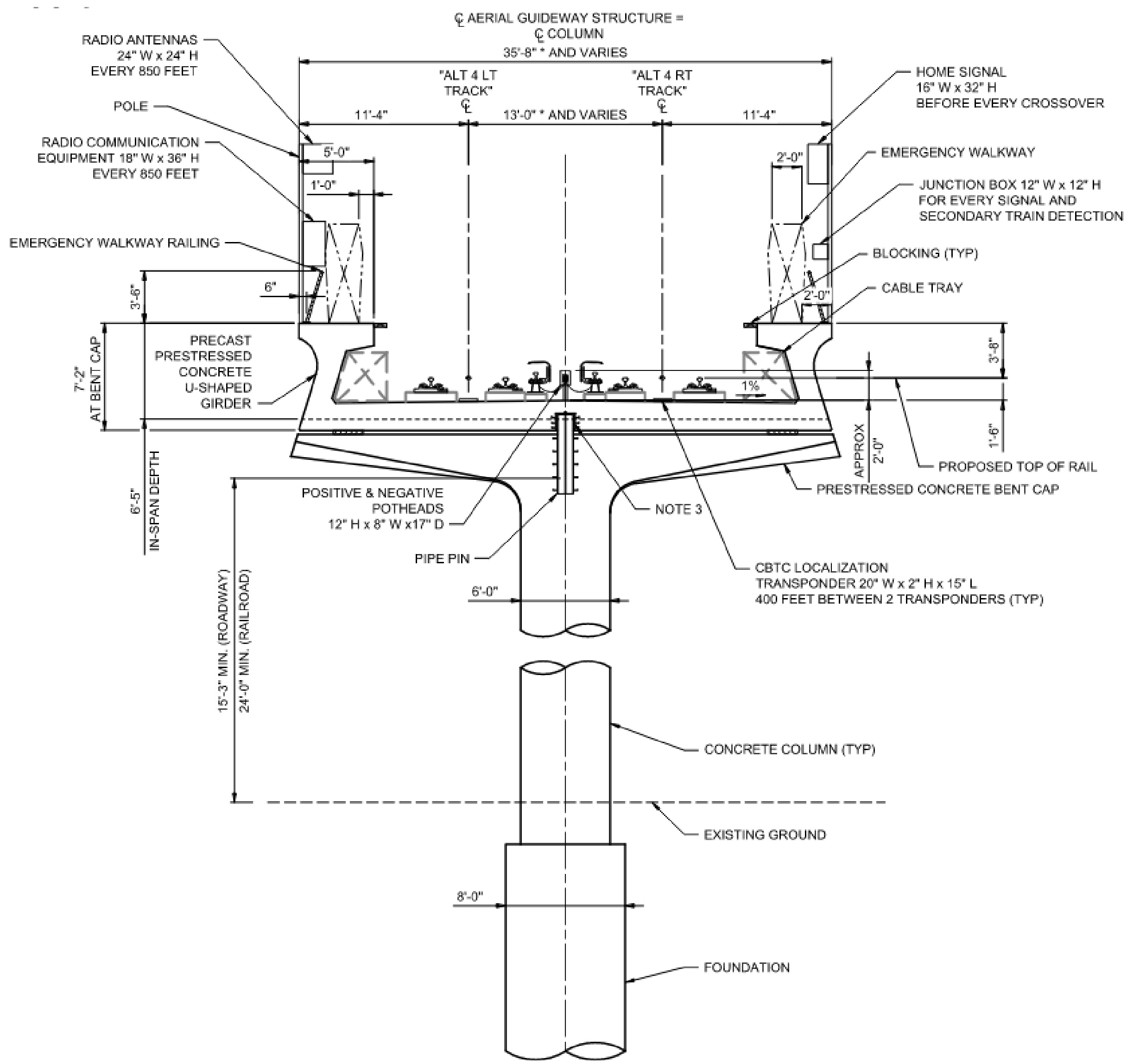
Figure 9-2. Typical Underground Guideway Cross-Section



Source: STCP, 2024

In aerial sections adjacent to Raymer Street and the LOSSAN rail corridor, the guideway would consist of single-column spans. The single-column spans would include a U-shaped concrete girder structure that supports the railway track atop a series of individual columns. The single-column aerial guideway would be approximately 36 feet wide. The track would be constructed on the concrete girders with direct fixation and would maintain a minimum of 13 feet between the two-track centerlines. On the outer side of the tracks, emergency walkways would be constructed with a minimum width of 2 feet. The single-column aerial guideway would be the primary aerial structure throughout the aerial portion of the alignment. Figure 9-3 shows a typical cross-section of the single-column aerial guideway.

Figure 9-3. Typical Aerial Guideway Cross-Section



Source: STCP, 2024

9.1.1.3 Vehicle Technology

Alternative 5 would utilize steel-wheel HRT trains, with automated train operations and planned peak-period headways of 2.5 minutes and off-peak-period headways ranging from 4 to 6 minutes. Each train could consist of three or four cars with open gangways between cars. The HRT vehicle would have a maximum operating speed of 70 miles per hour; actual operating speeds would depend on the design of the guideway and distance between stations. Train cars would be approximately 10 feet wide with three double doors on each side. Each car would be approximately 72 feet long with capacity for 170 passengers. Trains would be powered by a third rail.

9.1.1.4 Stations

Alternative 5 would include seven underground stations and one aerial station with station platforms measuring 280 feet long for both station configurations. The aerial station would be constructed a minimum of 15.25 feet above ground level, supported by rows of dual columns with 8-foot diameters. The southern terminus station would be adjacent to the Metro E Line Expo/Sepulveda Station, and the northern terminus station would be adjacent to the Van Nuys Metrolink/Amtrak Station.

All stations would be side-platform stations where passengers would select and travel up to station platforms depending on their direction of travel. All stations would include 20-foot-wide side platforms separated by 30 feet for side-by-side trains. Each underground station would include an upper and lower concourse level prior to reaching the train platforms. The Van Nuys Metrolink Station would include a mezzanine level prior to reaching the station platforms. Each station would have a minimum of two elevators, two escalators, and one stairway from ground level to the concourse or mezzanine.

Stations would include automatic, bi-parting fixed doors along the edges of station platforms. These platform screen doors would be integrated into the automatic train control system and would not open unless a train is stopped at the platform.

The following information describes each station, with relevant entrance, walkway, and transfer information. Bicycle parking would be provided at each station.

Metro E Line Expo/Sepulveda Station

- This underground station would be located just north of the existing Metro E Line Expo/Sepulveda Station, on the east side of Sepulveda Boulevard.
- A station entrance would be located on the east side of Sepulveda Boulevard north of the Metro E Line.
- A direct internal transfer to the Metro E Line would be provided at street level within the fare paid zone.
- A 126-space parking lot would be located immediately north of the station entrance, east of Sepulveda Boulevard. Passengers would also be able to park at the existing Metro E Line Expo/Sepulveda Station parking facility, which provides 260 parking spaces.

Santa Monica Boulevard Station

- This underground station would be located under the southeast corner of Santa Monica Boulevard and Sepulveda Boulevard.
- The station entrance would be located on the south side of Santa Monica Boulevard between Sepulveda Boulevard and Bentley Avenue.
- No dedicated station parking would be provided at this station.

Wilshire Boulevard/Metro D Line Station

- This underground station would be located beneath the Metro D Line tracks and platform under Gayley Avenue between Wilshire Boulevard and Lindbrook Drive.
- Station entrances would be provided on the northeast corner of Wilshire Boulevard and Gayley Avenue and on the northeast corner of Lindbrook Drive and Gayley Avenue. Passengers would also be able to use the Metro D Line Westwood/UCLA Station entrances to access the station platform.

- A direct internal station transfer to the Metro D Line would be provided at the south end of the station.
- No dedicated station parking would be provided at this station.

UCLA Gateway Plaza Station

- This underground station would be located underneath Gateway Plaza on the University of California, Los Angeles (UCLA) campus.
- Station entrances would be provided on the north side of Gateway Plaza and on the east side of Westwood Boulevard across from Strathmore Place.
- No dedicated station parking would be provided at this station.

Ventura Boulevard/Sepulveda Boulevard Station

- This underground station would be located under Saugus Avenue between Greenleaf Street and Dickens Street.
- A station entrance would be located on the southeast corner of Saugus Avenue and Dickens Street.
- Approximately 92 parking spaces would be supplied at this station west of Sepulveda Boulevard between Dickens Street and the U.S. Highway 101 (US-101) On-Ramp.

Metro G Line Sepulveda Station

- This underground station would be located under Sepulveda Boulevard immediately south of the Metro G Line Busway.
- A station entrance would be provided on the west side of Sepulveda Boulevard south of the Metro G Line Busway.
- Passengers would be able to park at the existing Metro G Line Sepulveda Station parking facility, which has a capacity of 1,205 parking spaces. Currently, only 260 parking spaces are currently used for transit parking. No new parking would be constructed.

Sherman Way Station

- This underground station would be located below Sepulveda Boulevard between Sherman Way and Gault Street.
- The station entrance would be located near the southwest corner of Sepulveda Boulevard and Sherman Way.
- Approximately 122 parking spaces would be supplied at this station on the west side of Sepulveda Boulevard with vehicle access from Sherman Way.

Van Nuys Metrolink Station

- This aerial station would span Van Nuys Boulevard, just south of the LOSSAN rail corridor.
- The primary station entrance would be located on the east side of Van Nuys Boulevard just south of the LOSSAN rail corridor. A secondary station entrance would be located between Raymer Street and Van Nuys Boulevard.
- An underground pedestrian walkway would connect the station plaza to the existing pedestrian underpass to the Metrolink/Amtrak platform outside the fare paid zone.

- Existing Metrolink Station parking would be reconfigured, maintaining approximately the same number of spaces, but 66 parking spaces would be relocated west of Van Nuys Boulevard. Metrolink parking would not be available to Metro transit riders.

9.1.1.5 Station-to-Station Travel Times

Table 9-1 presents the station-to-station distance and travel times at peak period for Alternative 5. The travel times include both run time and dwell time. Dwell time is 30 seconds for transfer stations and 20 seconds for other stations. Northbound and southbound travel times vary slightly because of grade differentials and operational considerations at end-of-line stations.

Table 9-1. Alternative 5: Station-to-Station Travel Times and Station Dwell Times

From Station	To Station	Distance (miles)	Northbound Station-to-Station Travel Time (seconds)	Southbound Station-to-Station Travel Time (seconds)	Dwell Time (seconds)
Metro E Line Station					*30*
Metro E Line	Santa Monica Boulevard	0.9	89	86	—
Santa Monica Boulevard Station					*20*
Santa Monica Boulevard	Wilshire/Metro D Line	0.9	91	92	—
Wilshire/Metro D Line Station					*30*
Wilshire/Metro D Line	UCLA Gateway Plaza	0.7	75	69	—
UCLA Gateway Plaza Station					*20*
UCLA Gateway Plaza	Ventura Boulevard	6.0	368	359	—
Ventura Boulevard Station					*20*
Ventura Boulevard	Metro G Line	2.0	137	138	—
Metro G Line Station					*30*
Metro G Line	Sherman Way	1.4	113	109	—
Sherman Way Station					*20*
Sherman Way	Van Nuys Metrolink	1.9	166	162	—
Van Nuys Metrolink Station					*30*

Source: STCP, 2024

— = no data

9.1.1.6 Special Trackwork

Alternative 5 would include 10 double crossovers throughout the alignment enabling trains to cross over to the parallel track. Each terminus station would include a double crossover immediately north and south of the station. Except for the Santa Monica Boulevard Station, each station would have a double crossover immediately south of the station. The remaining crossover would be located along the alignment midway between the UCLA Gateway Plaza Station and the Ventura Boulevard Station.

9.1.1.7 Maintenance and Storage Facility

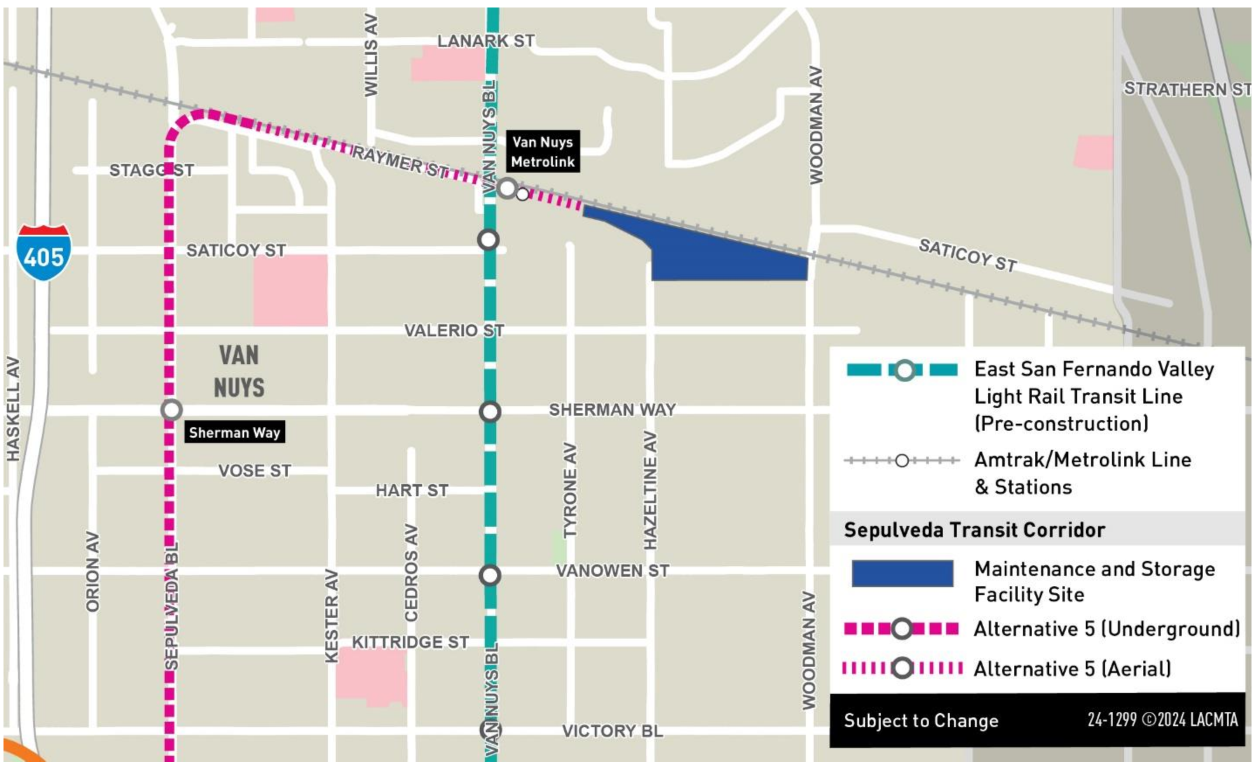
The MSF for Alternative 5 would be located east of the Van Nuys Metrolink Station and would encompass approximately 46 acres. The MSF would be designed to accommodate 184 rail cars and would be bounded by single-family residences to the south, the LOSSAN rail corridor to the north, Woodman Avenue on the east, and Hazeltine Avenue and industrial manufacturing enterprises to the west. Trains would access the site from the fixed guideway's tail tracks at the northwest corner of the site. Trains would then travel southeast to maintenance facilities and storage tracks.

The site would include the following facilities:

- Two entrance gates with guard shacks
- Main shop building
- Maintenance-of-way building
- Storage tracks
- Carwash building
- Cleaning and inspections platforms
- Material storage building
- Hazmat storage locker
- Traction power substation (TPSS) located on the west end of the MSF to serve the mainline
- TPSS located on the east end of the MSF to serve the yard and shops
- Parking area for employees
- Grade separated access roadway (over the HRT tracks at the east end of the facility) and necessary drainage

Figure 9-4 shows the location of the MSF site for Alternative 5.

Figure 9-4. Alternative 5: Maintenance and Storage Facility Site



Source: STCP, 2024; HTA, 2024

9.1.1.8 Traction Power Substations

TPSSs transform and convert high voltage alternating current supplied from power utility feeders into direct current suitable for transit operation. Twelve TPSS facilities would be located along the alignment and would be spaced approximately 0.5 to 2.5 miles apart. All TPSS facilities would be located within the stations, adjacent to the tunnel through the Santa Monica Mountains, or within the MSF. Table 9-2 lists the TPSS locations for Alternative 5.

Figure 9-5 shows the TPSS locations along the Alternative 5 alignment

Table 9-2. Alternative 5: Traction Power Substation Locations

TPSS No.	TPSS Location Description	Configuration
1	TPSS 1 would be located east of Sepulveda Boulevard and north of the Metro E Line.	Underground (within station)
2	TPSS 2 would be located south of Santa Monica Boulevard between Sepulveda Boulevard and Bentley Avenue.	Underground (within station)
3	TPSS 3 would be located at the southeast corner of UCLA Gateway Plaza.	Underground (within station)
4	TPSS 4 would be located south of Bellagio Road and west of Stone Canyon Road.	Underground (adjacent to tunnel)
5	TPSS 5 would be located west of Roscomare Road between Donella Circle and Linda Flora Drive.	Underground (adjacent to tunnel)
6	TPSS 6 would be located east of Loom Place between Longbow Drive and Vista Haven Road.	Underground (adjacent to tunnel)
7	TPSS 7 would be located west of Sepulveda Boulevard between the I-405 Northbound On-Ramp and Dickens Street.	Underground (within station)
8	TPSS 8 would be located west of Sepulveda Boulevard between the Metro G Line Busway and Oxnard Street.	Underground (within station)
9	TPSS 9 would be located at the southwest corner of Sepulveda Boulevard and Sherman Way.	Underground (within station)
10	TPSS 10 would be located south of the LOSSAN rail corridor and north of Raymer Street and Kester Avenue.	At-grade
11	TPSS 11 would be located south of the LOSSAN rail corridor and east of the Van Nuys Metrolink Station.	At-grade (within MSF)
12	TPSS 12 would be located south of the LOSSAN rail corridor and east of Hazeltine Avenue.	At-grade (within MSF)

Source: STCP, 2024; HTA, 2024

Note: Sepulveda Transit Corridor Partners (STCP) has stated that Alternative 5 traction power substation locations are derived from and assumed to be similar to the Alternative 4 traction power substation locations.

Figure 9-5. Alternative 5: Traction Power Substation Locations

Source: STCP, 2024; HTA, 2024

9.1.1.9 Roadway Configuration Changes

Table 9-3 lists the roadway changes necessary to accommodate the guideway of Alternative 5. Figure 9-6 shows the location of the roadway changes within the Sepulveda Transit Corridor Project (Project) Study Area. In addition to the changes made to accommodate the guideway, as listed in Table 9-3, roadways and sidewalks near stations would be reconstructed, resulting in modifications to curb ramps and driveways.

Table 9-3. Alternative 5: Roadway Changes

Location	From	To	Description of Change
Raymer Street	Kester Avenue	Keswick Street	Reconstruction resulting in narrowing of width and removal of parking on the westbound side of the street to accommodate aerial guideway columns.
Cabrito Road	Raymer Street	Marson Street	Closure of Cabrito Road at the LOSSAN rail corridor at-grade crossing. A new segment of Cabrito Road would be constructed from Noble Avenue and Marson Street to provide access to extra space storage from the north.

Source: STCP, 2024; HTA, 2024

Figure 9-6. Alternative 5: Roadway Changes

Source: STCP, 2024; HTA, 2024

9.1.1.10 Ventilation Facilities

For ventilation, a plenum within the crown of the tunnel would provide a separate compartment for air circulation and allow multiple trains to operate between stations. Each underground station would include a fan room with additional ventilation facilities. Alternative 5 would also include a stand-alone ventilation facility at the tunnel portal on the northern end of the tunnel segment, located east of Sepulveda Boulevard and south of Raymer Street. Within this facility, ventilation fan rooms would provide both emergency ventilation, in case of a tunnel fire, and regular ventilation, during non-revenue hours. The facility would also house sump pump rooms to collect water from various sources, including storm water; wash-water (from tunnel cleaning); and water from a fire-fighting incident, system testing, or pipe leaks.

9.1.1.11 Fire/Life Safety – Emergency Egress

Within the tunnel segment, emergency walkways would be provided between the center dividing wall and each track. Sliding doors would be located in the central dividing wall at required intervals to connect the two sides of the railway with a continuous walkway to allow for safe egress to a point of safety (typically at a station) during an emergency. Similarly, the aerial guideway near the LOSSAN rail corridor would include two emergency walkways with safety railing located on the outer side of the tracks. Access to tunnel segments for first responders would be through stations and the portal.

9.1.2 Construction Activities

Temporary construction activities for Alternative 5 would include project work zones at permanent facility locations, construction staging and laydown areas, and construction office areas. Construction of the transit facilities through substantial completion is expected to have a duration of 8 ¼ years. Early works, such as site preparation, demolition, and utility relocation, could start in advance of construction of the transit facilities.

For the guideway, Alternative 5 would consist of a single-bore tunnel through the Westside, Valley, and Santa Monica Mountains. The tunnel would comprise three separate segments, one running north from the southern terminus to the UCLA Gateway Plaza Station (Westside segment), one running south from the Ventura Boulevard Station to the UCLA Gateway Plaza Station (Santa Monica Mountains segment), and one running north from the Ventura Boulevard Station to the portal near Raymer Street (Valley segment). Tunnel boring machines (TBM) with approximately 45-foot-diameter cutting faces would be used to construct the tunnel segments underground. For the Westside segment, the TBM would be launched from Staging Area No. 1 in Table 9-4 at Sepulveda Boulevard and National Boulevard. For the Santa Monica Mountains segment, the TBMs would be launched from the Ventura Boulevard Station. Both TBMs would be extracted from the UCLA Gateway Plaza Station Staging Area No. 3 in Table 9-4. For the Valley segment, the TBM would be launched from Staging Area No. 8 as shown in Table 9-4 and extracted from the Ventura Boulevard Station. Figure 9-7 shows the location of construction staging locations along the Alternative 5 alignment.

Table 9-4. Alternative 5: On-Site Construction Staging Locations

No.	Location Description
1	Commercial properties on southeast corner of Sepulveda Boulevard and National Boulevard
2	North side of Wilshire Boulevard between Veteran Avenue and Gayley Avenue
3	UCLA Gateway Plaza
4	Commercial property on southwest corner of Sepulveda Boulevard and Dickens Street
5	West of Sepulveda Boulevard between US-101 and Sherman Oaks Castle Park
6	Lot behind Los Angeles Fire Department Station 88
7	Property on the west side of Sepulveda Boulevard between Sherman Way and Gault Street
8	Industrial property on both sides of Raymer Street, west of Burnet Avenue
9	South of the LOSSAN rail corridor east of Van Nuys Metrolink Station, west of Woodman Avenue

Source: STCP, 2024; HTA, 2024

Figure 9-7. Alternative 5: On-Site Construction Staging Locations

Source: STCP, 2024; HTA, 2024

The distance from the surface to the top of the tunnel for the Westside tunnel would vary from approximately 40 feet to 90 feet depending on the depth needed to construct the underground stations. The depth of the Santa Monica Mountains tunnel segment varies greatly from approximately 470 feet as it passes under the Santa Monica Mountains to 50 feet near UCLA. The depth of the Valley segment would vary from approximately 40 feet near the Ventura Boulevard/Sepulveda Station and north of the Metro G Line Sepulveda Station to 150 feet near Weddington Street. The tunnel segments through the Westside and Valley would be excavated in soft ground while the tunnel through the Santa Monica Mountains would be excavated primarily in hard ground or rock as geotechnical conditions transition from soft to hard ground near the UCLA Gateway Plaza Station.

Construction work zones would also be co-located with future MSF and station locations. All work zones would comprise the permanent facility footprint with additional temporary construction easements from adjoining properties.

All underground stations would be constructed using a “cut-and-cover” method whereby the underground station structure would be constructed within a trench excavated from the surface with a portion or all being covered by a temporary deck and backfilled during the later stages of station construction. Traffic and pedestrian detours would be necessary during underground station excavation until decking is in place and the appropriate safety measures are taken to resume cross traffic.

In addition to work zones, Alternative 5 would include construction staging and laydown areas at multiple locations along the alignment as well as off-site staging areas. Construction staging areas would provide the necessary space for the following activities:

- Contractors’ equipment
- Receiving deliveries
- Testing of soils for minerals or hazards
- Storing materials
- Site offices
- Work zone for excavation
- Other construction activities (including parking and change facilities for workers, location of construction office trailers, storage, staging and delivery of construction materials and permanent plant equipment, and maintenance of construction equipment).

A larger, off-site staging area would be used for temporary storage of excavated material from both tunneling and station cut-and-cover excavation activities. Table 9-4 and Figure 9-7 present the potential construction staging areas along the alignment for Alternative 5. Table 9-5 and Figure 9-8 present candidate sites for off-site staging and laydown areas.

Table 9-5. Alternative 5: Potential Off-Site Construction Staging Locations

No.	Location Description
S1	East of Santa Monica Airport Runway
S2	Ralph's Parking Lot in Westwood Village
N1	West of Sepulveda Basin Sports Complex, south of the Los Angeles River
N2	West of Sepulveda Basin Sports Complex, north of the Los Angeles River
N3	Metro G Line Sepulveda Station park & ride lot
N4	North of Roscoe Boulevard and Hayvenhurst Avenue
N5	LADWP property south of the LOSSAN rail corridor, east of Van Nuys Metrolink Station

Source: STCP, 2024; HTA, 2024

LADWP = City of Los Angeles Department of Water and Power

Figure 9-8. Alternative 5: Potential Off-Site Construction Staging Locations

Source: STCP, 2024; HTA, 2024

Construction of the HRT guideway between the Van Nuys Metrolink Station and the MSF would require reconfiguration of an existing rail spur serving LADWP property. The new location of the rail spur would require modification to the existing pedestrian undercrossing at the Van Nuys Metrolink Station.

Alternative 5 would require construction of a concrete casting facility for tunnel lining segments because no existing commercial fabricator capable of producing tunnel lining segments for a large-diameter tunnel exists within a practical distance of the Project Study Area. The site of the MSF would initially be used for this casting facility. The casting facility would include casting beds and associated casting equipment, storage areas for cement and aggregate, and a field quality control facility, which would need to be constructed on-site. When a more detailed design of the facility is completed, the contractor would obtain all permits and approvals necessary from the City of Los Angeles, the South Coast Air Quality Management District, and other regulatory entities.

As areas of the MSF site begin to become available following completion of pre-casting operations, construction of permanent facilities for the MSF would begin, including construction of surface buildings such as maintenance shops, administrative offices, train control, traction power, and systems facilities. Some of the yard storage track would also be constructed at this time to allow delivery and inspection of passenger vehicles that would be fabricated elsewhere. Additional activities occurring at the MSF during the final phase of construction would include staging of trackwork and welding of guideway rail.

9.2 Existing Conditions

9.2.1 Noise

The noise environment in the Project Study Area is dominated by traffic noise, including freeways and arterial roads, such as I-405, Interstate 10, US-101, and Sepulveda Boulevard. Aircraft flyovers are also contributors to the existing noise environment in most areas along the Alternative 5 alignment. Land uses found along the alignment include single- and multi-family residential uses, hotels/motels, religious facilities, educational facilities, public facilities, public and commercial office buildings, various types of commercial uses, institutional uses, theaters, recording or video production studios, surface parking facilities, and parking structures.

Noise-sensitive land uses were identified using a geographic information system (GIS), assessor's parcel maps, aerial photographs, and field surveys. Land use data were obtained from the Southern California Association of Governments (SCAG) 2019 regional land use data set for Los Angeles County (SCAG, 2019). Sensitive land uses were classified into one of the three Federal Transit Administration (FTA) sensitive land use categories (FTA, 2018). Refer to Table 2-1 for a detailed description of each category.

- Category 1 noise-sensitive land uses identified along the Alternative 5 alignment include laboratories, medical facilities in the vicinity of the UCLA campus along Westwood Boulevard, music and video production outfits, television and radio stations, and two recording studios.
- Category 2 noise-sensitive land uses include single- and multi-family residential, hotels/motels, and a convalescent home located throughout the Alternative 5 alignment.
- Category 3 noise-sensitive land uses along the Alternative 5 alignment include, but are not limited to, Kingdom Hall of Jehovah's Witnesses in Sherman Oaks, Contractors State License School, and U.S. Census Library in Van Nuys. Some uses in the UCLA area include multiple noise-sensitive land use categories.

Some uses in the UCLA area include multiple noise-sensitive land use categories. For instance, the UCLA dorms and medical bedding are Category 2 noise-sensitive land uses, while classrooms are Category 3, and medial operating rooms or scientific and engineering education or research laboratories are Category 1 land uses.

The existing noise conditions along the Alternative 5 alignment were documented through noise monitoring performed at representative noise-sensitive locations along the aboveground segments of the proposed alignment. This section provides a summary of the noise measurement results.

Representative noise-sensitive locations were identified by using preliminary alignment maps, aerial photographs, visual surveys, and proximity to aboveground noise sources associated with Alternative 5. Long-term (24-hour) noise measurements were conducted at a total of eight locations representing Category 2 land uses. Short-term noise measurements (two 1-hour measurements) were obtained at two locations representing exterior areas of Category 3 land uses. Figure 9-9 and Figure 9-10 show the locations of noise monitoring sites along the Alternative 5 alignment. Attachment 1 and Attachment 2 of this report provides the detailed results of 24-hour and short-term measurements, respectively. The appendix material also depicts photographic exhibits of the measurement locations.

Table 9-6 presents a summary of long-term (24-hour) noise measurements taken at Category 2 locations that are representative of the residential land uses above the Alternative 5 alignment. The noise monitors were programmed to continuously collect data for a minimum of 24 hours. The microphones were generally placed on tripods approximately 5 feet above the ground at locations near the setback of habitable buildings, between the buildings and the proposed Alternative 5 alignment.

Table 9-6. Alternative 5: Summary of Existing 24-hour Noise Measurements for Category 2 Land Uses

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{dn} (dBA)
			Date	Time	
2	2203 South Bentley Avenue	Local traffic	7/5/2023	10:00am	65.9
3	1726 South Bentley Avenue	Local traffic	7/12/2023	10:00am	62.0
10	UCLA Luskin Conference Center	Local traffic	5/25/2023	3:00pm	62.2
30	10635 Levico Way	Distant aircraft	6/6/2023	1:00pm	55.4
32	2341 Donella Circle	Roscomare Road	6/6/2023	2:00pm	63.4
37	3490 Vista Haven Road	Distant aircraft, local traffic	5/30/2023	4:00pm	54.3
61	13917 Cohasset Street	LOSSAN Corridor, distant traffic	6/13/2023	10:00am	52.8
66	15018 Marson Street	LOSSAN Corridor	5/24/2023	11:00am	60.5

Source: HTA, 2024

dBA = A-weighted decibel
L_{dn} = day-night noise level

Short-term noise measurements for two 1-hour periods were also taken at Category 1 and Category 3 (institutional) land uses along the Alternative 5 alignment segments in the UCLA area. The general locations of the short-term measurement sites are shown on Figure 9-9. Table 9-7 shows the summarized results of each individual short-term measurement. The details of short-term measurements are also included in Attachment 2 of this report.

Table 9-7. Alternative 5: Summary of Existing Short-Term (1-Hour) Noise Measurements for Category 1 and Category 3 Land Uses

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{eq} (dBA)
			Date	Time	
8	UCLA Williams Institute, southwest corner of building	Local traffic, fire station activities	5/26/2023	9:29am	63.9
			5/30/2023	1:41pm	61.3
9	UCLA Computer Science/ Engineering IV building	Local traffic, students' chatter	5/25/2023	1:04pm	57.9
			5/26/2023	3:36pm	58.8
			5/11/2023	11:36am	72.4

Source: HTA, 2024

L_{eq} = equivalent noise level

9.2.2 Vibration

Alternative 5is located in an urban environment. Primary existing sources of groundborne vibration (GBV) include trucks traveling along roadways and construction sites using heavy equipment. According to FTA guidance, the background vibration decibels (VdB) levels are expected to range from 50 to 65 (FTA, 2018). Ambient vibration levels were not measured during this stage of Alternative 5. However, measurement of vibration levels is not necessary to complete the general assessment procedure for vibration analysis. The FTA vibration impact assessment is based on FTA vibration impact criteria. These criteria were used to identify vibration-sensitive receivers along the Alternative 5 alignment where potential impacts may occur, based on existing land use activities.

Vibration-sensitive land uses were identified using GIS, assessor's parcel maps, aerial photographs, and field surveys. Vibration-sensitive land uses in the Project Study Area include residences, hotel/motels, religious facilities, medical facilities, schools, and museums.

Sensitive land uses were classified as one of the following three FTA vibration-sensitive land use categories (FTA, 2018). Table 2-5 presents the details of the criteria pertaining to each category.

- Category 1 – Buildings where vibration would interfere with interior operations
- Category 2 – Residences and buildings where people normally sleep
- Category 3 – Institutional land uses with primarily daytime use

Category 1 vibration-sensitive land uses identified along the Alternative 5 alignment include two animal hospitals located on Sepulveda Boulevard between Metro E Line Expo/Sepulveda Station and Santa Monica Boulevard Station, video and music production outfits on Glendon Avenue between Lindbrook Drive and Weyburn Avenue, medical facilities along Westwood Boulevard, scientific/research laboratories related to UCLA, a radio station and a television station in Sherman Oaks, and three recording studios in Van Nuys.

Category 2 vibration-sensitive land uses include single- and multi-family residences and hotels/motels, which are located throughout the Alternative 5 alignment.

Category 3 vibration-sensitive land uses found along the Alternative 5 alignment include schools and religious facilities.

Figure 9-9. Alternative 5: Noise Monitoring Sites – South

Source: HTA, 2024

Figure 9-10. Alternative 5: Noise Monitoring Sites – North

Source: HTA, 2024

9.3 Impact Evaluation

9.3.1 Impact NOI-1: Would the project cause 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?

9.3.1.1 Operational Noise Impacts

Rail Operations Noise

As described in Section 9.1, Alternative 5 consists of an HRT system with a primarily underground guideway track configuration, including seven underground stations and one aerial station. The short aerial section of the alignment would be located in an industrial area south of the LOSSAN Corridor. Train movements along the Alternative 5 alignment would not result in any airborne noise impacts at sensitive receivers located above the underground tunnel. At residential receptors north of the LOSSAN Corridor, where the tracks emerge from the underground tunnel on an aerial guideway, calculated noise exposure due to rail operations would be 49 dBA day-night noise level (L_{dn}). The existing noise level at the residential areas is 60 dBA L_{dn}, which means that the moderate impact threshold is 58 dBA L_{dn} for these areas. The predicted rail operations noise level of 49 dBA L_{dn} would be below the FTA moderate impact threshold of 58 dBA L_{dn}. Therefore, rail operations associated with Alternative 5 would result in a less than significant impact related to rail operations noise.

Ancillary Facilities Noise

Noise generated by ancillary facilities associated with Alternative 5 would be due to ventilation system fans at TPSS facilities along the Alternative 5 alignment. Twelve TPSS sites would be required, of which three would be located aboveground and only one near noise-sensitive receptors. Table 9-2 presents descriptions of TPSS sites associated with Alternative 5. Table 9-8 shows a summary of Alternative 5 TPSS noise impact assessments. TPSS facilities would not result in noise impacts at sensitive receptors. This is primarily due to the fact that TPSS installations would be in noisy areas and located at sufficient distances from the nearest noise-sensitive land uses. Therefore, operation of Alternative 5 would result in a less than significant impact related to ancillary facilities noise.

Table 9-8. Alternative 5: Combined Rail and Ancillary Facility Noise Impacts by Traction Power Substation Site

TPSS Site	Nearest Noise-Sensitive Land Use	Distance (feet)	Existing Sound Level (dBA, L_{dn})	TPSS Noise Level (dBA, L_{dn})	Noise Impact Thresholds		Level of Impact
					Moderate	Severe	
10	Single-family residence 14940 Marson Street, Panorama City	270	60	42	58-63	>63	**No Impact**
11	No nearby sensitive land uses	NA	NA	NA	NA	NA	**No Impact**
12	No nearby sensitive land uses	NA	NA	NA	NA	NA	**No Impact**

Source: HTA, 2024

NA = not applicable
Note: Under Alternative 5, TPSS Sites 1 through 9 are proposed to be located underground.

The other ancillary facility under Alternative 5 would be a ventilation facility at the tunnel portal on the northern end of the tunnel segment located east Sepulveda Boulevard and south of Raymer Street in Van Nuys. Within this facility, ventilation fan rooms would provide both emergency ventilation, in case of a tunnel fire, and regular ventilation, during non-revenue hours. The nearest noise-sensitive areas to the proposed location of the ventilation facility are single-family and multi-family uses located over 400 feet north of the facility across the LOSSAN rail corridor. At these distances, the predicted ventilation facility noise is estimated to be 32 dBA equivalent noise level (L_{eq}), which would be below the existing daytime and nighttime noise levels in these areas which range from 36 to 65 dBA L_{eq} (refer to long-term noise monitoring location 66 in Attachment 1 of this report for further detail).

Therefore, Alternative 5 would result in less than a significant impact related to ancillary facility noise.

Maintenance and Storage Facility Noise

The MSF for Alternative 5 would be located east of the Van Nuys Metrolink Station and would encompass approximately 46 acres. The MSF would be designed to accommodate 184 rail cars (39 four-car train positions available for initial operation and seven extra storage four-car train positions potentially built at a later stage). The site would be bounded by single-family residences to the south, the LOSSAN Corridor ROW to the north, Woodman Avenue on the east, and Hazeltine Avenue and industrial manufacturing enterprises to the west.

Noise sources included in the MSF noise analysis are train movements on lead tracks, including potential wheel squeal noise on tight curve tracks and increased noise at yard switches located near the residential land uses, washing and blowdown activities at the car wash, maintenance shop operations, and TPSS units within the MSF yard. Based on the analysis results, the primary sources of noise from the MSF would be train movements along the lead tracks, on the tight radius curve (causing wheel squeal), and over track crossovers. Noise from the maintenance shop, car wash facilities, and TPSS units within the MSF would be secondary due to their greater distances to the residential receptors south of the yard and orientation of the car wash and maintenance shop.

Table 9-9 shows the predicted noise levels from the proposed Alternative 5 MSF layout at representative noise-sensitive receptors in the vicinity of the yard. The proposed MSF would not result in noise levels exceeding the noise impact thresholds at the backyards of adjoining single-family residential properties along Cohasset Street and located immediately south of the proposed MSF. Therefore, operation of Alternative 5 would not result in a significant impact related to MSF noise.

Table 9-9. Alternative 5: Predicted Maintenance and Storage Facility Noise

Receptor ID	Location	Land Use	FTA Category	Existing Sound Level (dBA, L_{dn})	Predicted MSF Noise Level (dBA, L_{dn})	Noise Impact Thresholds		Level of Impact
						Moderate	Severe	
MSF-5.1	14001 Cohasset Street, Van Nuys	SFR	2	53	48	55-60	>60	**No Impact**
MSF-5.2	13837 Cohasset Street, Van Nuys	SFR	2	53	51	55-60	>60	**No Impact**
MSF-5.3	13741 Cohasset Street, Van Nuys	SFR	2	53	41	55-60	>60	**No Impact**

Source: HTA, 2024

SFR = single-family residential

9.3.1.2 Construction Noise Impacts

Construction of Alternative 5 would include various phases that would involve the use of construction equipment at specific locations along the proposed alignment. Construction noise levels from Alternative 5 were estimated in terms of the equipment noise levels ($L_{eq.equip}$) for each phase of construction based upon the number and types of off-road construction equipment to be employed during the given phase. Attachment 12 shows the results of the construction noise estimations at a reference distance of 50 feet from construction activities.

The FTA has provided guidance for assessing construction noise associated with transit projects (FTA, 2018). The criteria are based upon an 8-hour $L_{eq.equip}$, as shown in Table 2-4. For residential uses, the threshold is 80 dBA for daytime construction and 70 dBA for nighttime construction. Commercial and industrial uses are held to 85 dBA and 90 dBA, respectively, for both daytime and nighttime construction noise thresholds. For the purposes of this analysis, the FTA Detailed Analysis construction noise limit criteria of 8-hour $L_{eq.equip}$ have been applied.

Table 9-10 is a summary of expected construction noise levels at a reference distance of 50 feet from construction activities and at locations of nearest noise-sensitive receptors to each construction activity. Construction noise would range from 8-hour $L_{eq.equip}$ noise levels of approximately 57 to 93 dBA at the nearest sensitive receptors. As shown in Table 9-10, construction activities would result in noise levels that exceed the FTA 80-dBA daytime and 70-dBA nighttime 8-hour $L_{eq.equip}$ thresholds for residential land uses.

Table 9-10. Alternative 5: Estimated Construction Noise Levels

Construction Phase	$L_{eq.equip}$ (dBA) at 50 feet	$L_{eq.equip\ (8\text{-}hr)}$ (dBA) at Nearest Receptors	Exceeds 80-dBA $L_{eq.equip\ (8\text{-}hr)}$ Daytime Threshold	Exceeds 70-dBA $L_{eq.equip\ (8\text{-}hr)}$ Nighttime Threshold
Segment 1 to Segment 5 Tunnel Construction				
Demolition/Site Preparation	88	86	Yes	Yes
Launch Box Support of Excavation	90	88	Yes	Yes
Launch Box Excavation	87	85	Yes	Yes
Launch Box Concrete Work	87	85	Yes	Yes
TBM Mobilization	86	84	Yes	Yes
TBM Tunneling/Precast Liners	84	82	Yes	Yes
TBM Demobilization	86	84	Yes	Yes
Invert Fill	81	79	No	Yes
Segment 6-Reach 3 Portal to Maintenance and Storage Facility Cut-and-Cover Box				
Demolition/Site Preparation	88	73	No	Yes
Support of Excavation	90	75	No	Yes
Excavation	87	72	No	Yes
Concrete Work	87	72	No	Yes
Trackwork/Systems Installation	83	68	No	No
Aerial Guideway Foundation (CIDH)	91	76	No	Yes
Columns	84	69	No	No
Bent Caps	84	69	No	No
Assemble Gantry	85	70	No	Yes
Segmental Girders	87	72	No	Yes
Demobilize Gantry	85	70	No	Yes
Guideway Trackwork	86	71	No	Yes

Construction Phase	$L_{eq.equip}$ (dBA) at 50 feet	$L_{eq.equip\ (8-hr)}$ (dBA) at Nearest Receptors	Exceeds 80-dBA $L_{eq.equip\ (8-hr)}$ Daytime Threshold	Exceeds 70-dBA $L_{eq.equip\ (8-hr)}$ Nighttime Threshold
Systems Installation	85	70	No	Yes
Paving	85	70	No	Yes
Tunnel Boring Machine Access Shaft Staging Site				
Demolition/Site Preparation	88	77	No	Yes
Shaft Support of Excavation	91	80	Yes	Yes
Shaft Excavation	87	76	No	Yes
Shaft Concrete Work	84	73	No	Yes
Staging Area TBM Support Activities	86	75	No	Yes
Underground Stations				
Demolition/Site Preparation	88	90	Yes	Yes
Support of Excavation	90	92	Yes	Yes
Box Excavation	87	89	Yes	Yes
TBM Pass-Through Maintenance	80	82	Yes	Yes
Station Structural Concrete	88	90	Yes	Yes
Fit Out and Completion	85	87	Yes	Yes
Paving/Arch Coatings	86	88	Yes	Yes
Aerial Stations				
Demolition/Site Preparation	88	59	No	No
Foundations and Columns	91	62	No	No
Bent Cap Installation	86	57	No	No
Girder Installation/Station Fit Out	88	59	No	No
Paving/Arch Coatings	86	57	No	No
Traction Power Substation Construction				
Site Preparation -Traction Power Utilities	80	72	No	Yes
Grounding-Foundations	80	72	No	Yes
Traction Power Substation Installation	80	72	No	Yes
Site Restoration	82	74	No	Yes
Maintenance and Storage Facility Construction				
Demolition	89	93	Yes	Yes
Site Preparation	87	91	Yes	Yes
Grading	89	93	Yes	Yes
Building Construction	84	76	No	Yes
Paving	88	92	Yes	Yes
Architectural Coating	77	69	No	No
Test Track	81	62	No	No
Pre-Cast Yard				
Concrete Activity	89	93	Yes	Yes
North Construction Zone Staging Area				
Staging Activity	85	85	Yes	Yes

Source: HTA, 2024

CIDH = cast-in-drilled-hole
$L_{eq.equip\ (8-hr)}$ = equivalent noise level from construction equipment over 8-hour workday
TBM = tunnel boring machine
Note: Variation in noise levels for this phase are due to variation in number of equipment used for different segments.

The construction noise contours are depicted graphically in Attachment 12, which represent the noise levels that could potentially occur along the entirety of the alignment. Construction noise contours are only included for aboveground construction activities as activities such as tunnelling would not generate noise at aboveground receptors. The noisiest phase of construction was used to depict the contours. An interval of 5 dB is used for each contour and each contour was calculated based on the distance at which noise would decrease by 5 dB starting at a noise level of 90 dBA 8-hour $L_{eq.equip}$ to 70 dBA 8-hour $L_{eq.equip}$. The 90 dBA 8-hour $L_{eq.equip}$ noise level is representative of the FTA daytime and nighttime construction noise threshold for industrial uses. The 70 dBA 8-hour $L_{eq.equip}$ contour shows the areas where construction noise levels would exceed the nighttime construction noise threshold for residential uses. The 90 dBA 8-hour $L_{eq.equip}$ contour covers areas within a distance of 45 feet from the nearest construction activity. The 70 dBA 8-hour $L_{eq.equip}$ contour extends to a maximum distance of 562 feet. The construction noise contours do not include noise reductions that may occur as a result of terrain or intervening structures. As an example to read the contours, the figures show that within the first contour of 45 feet (shown in dark purple), the calculated construction noise levels may be above 90 dBA 8-hour $L_{eq.equip}$. At the next distance of 100 feet (shown in light purple), noise levels would be decrease to approximately 85 dBA 8-hour $L_{eq.equip}$.

Pile driving may be required for installation of retaining walls or potentially at TBM launch locations. Impact or vibratory pile drivers are the most noise intensive construction equipment that could result in elevated noise levels above typical construction methods. It is unknown at this stage of design if pile driving would be the required construction method which is dependent on soil type. Typically, where possible, piles are drilled which is a quieter method of pile installation such as cast-in-drilled-hole (CIDH). For instance, foundations for the aerial guideway are proposed to be constructed using CIDH instead of impact driven piles. Impact pile driving generates an hourly noise level of approximately 94.3 dBA L_{eq} at 50 feet, vibratory pile driving generates an hourly noise level of 93.8 dBA $L_{eq,}$ at 50 feet and CIDH generates an hourly noise level of approximately 77.4 dBA L_{eq} at 50 feet. Vibratory pile driving is approximately 0.5 dBA quieter than impact pile driving and CIDH is approximately 16.9 dBA quieter. To reduce noise levels where piles may be required, impact pile driving should be avoided where possible and drilled or vibratory pile driving should be used where feasible. Soil improvements such as grouting injection would be required for cut-and-cover construction to stabilize soils. Soil improvement activity would typically require drilling equipment and pumping equipment to inject the grout into the soil. A noise level of 90 dBA 8-hour $L_{eq.equip}$ at 50 feet reflects equipment required for cut-and-cover construction, which is shown in Table 9-10 as “Support of Excavation.”

Based on the construction equipment noise analysis, Alternative 5 would result in a significant impact related to construction noise.

Regarding health effects of noise, it is unlikely for construction noise to result in noise-induced hearing loss for persons residing or working near construction zones, as this is an occupational hazard related to working over long periods of time (years) in high noise environments. However, construction noise could increase stress at affected sensitive use locations. Nighttime construction could adversely affect sleep for residents living near active construction sites. If required by the jurisdiction, a noise variance would be prepared that demonstrates the implementation of control measures to maintain noise levels below the applicable FTA and local standards. Nonetheless, construction noise could potentially still exceed the FTA nighttime criteria.

9.3.2 Impact NOI-2: Would the project cause generation of excessive groundborne vibration or groundborne noise levels?

9.3.2.1 Operational Impacts

Rail Operations Vibration

GBV and groundborne noise (GBN) levels from Alternative 5 rail operations were evaluated using the general vibration assessment procedure in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018). Section 3.2 describes the operational vibration assessment methodology.

Attachment 13 of this report shows the details of operations vibration impact assessment at the representative Category 1, 2, and 3 receptors along the Alternative 5 alignment. Based on the results of the vibration analysis, there would be GBV and/or GBN impacts at sensitive receptors along the alignment. Table 9-11 summarizes the results of the GBV and noise impact analysis by land use category. Alternative 5 would result in 292 impacts at Category 2 receptors and 21 impacts at Category 1. No impacts would occur at Category 3 receptors. Impacted receptors are shown on Figure 9-11 through Figure 9-27.

Table 9-11. Alternative 5: Summary of Groundborne Vibration and Groundborne Noise Impact Assessment

Impact Area	Description of Impacted Area	Civil Station Limits		Calculated GBV (VdB)	Calculated GBN (dBA)	Number of Impacts by FTA Category	
		Start	End			Category 1	Category 2
1	Pico Boulevard to Tennessee Avenue	519+00	525+00	72-81	37-46	1	14
2	Tennessee Avenue to Olympic Boulevard	525+00	532+00	70-81	35-46	0	14
3	Olympic Boulevard to Mississippi Avenue	532+00	538+00	71-73	36-38	0	15
4	Mississippi Avenue to Santa Monica Station	538+00	555+50	71-72	36-38	1	32
5	South of Ashton Avenue and Midvale Avenue	599+73	602+31	72-74	37-39	0	4
6	Wilshire/Westwood Station to Le Conte Avenue	611+50	616+00	61-62	26-27	4	0
7	Le Conte Avenue to UCLA Gateway Plaza Station	625+50	639+00	67-73	32-38	9	0
8a/8b	Sunset Boulevard to Stone Canyon Road	673+50	711+00	68-72	35-37	0	24
9a/9b	Mulholland Drive to Valley Vista Boulevard	907+00	948+00	70-72	35-37	0	58
10	Valley Vista Boulevard to Ventura Boulevard/Sepulveda Boulevard Station	949+00	958+00	70-79	35-44	0	15
11	Ventura Boulevard/Sepulveda Boulevard Station to US-101	965+90	987+00	68-72	33-37	2	15
12	US-101 to Magnolia Boulevard	990+70	1007+80	70-71	35-36	0	11
13	Magnolia Boulevard to Burbank Boulevard	1008+50	1034+00	70	35	1	20

Impact Area	Description of Impacted Area	Civil Station Limits		Calculated GBV (VdB)	Calculated GBN (dBA)	Number of Impacts by FTA Category	
		Start	End			Category 1	Category 2
14	Burbank Boulevard to Metro G-Line/Sepulveda Station	1038+00	1047+50	71	36	0	8
15	Metro G-Line/Sepulveda Station to Victory Boulevard	1078+30	1078+60	70	35	0	1
16	Victory Boulevard to Vanowen Street	1094+50	1110+30	71-73	36-38	0	31
17	Vanowen Street to Sepulveda/Sherman Way Station	1117+00	1133+00	70-77	35-42	0	18
18	Sepulveda/Sherman Way Station to Saticoy Street	1148+30	1163+50	70-72	35-37	0	11
19	Saticoy Street to Van Nuys Metrolink Station	1168+50	1188+00	62-71	27-36	3	1
Total Number of Impacts						**21**	**292**

Source: HTA, 2024

GBN = groundborne noise
GBV = groundborne vibration
VdB = vibration decibel

The impacted receptors include various FTA category land uses, described as follows:

- Seventy-five single- and multi-family residential buildings along South Bentley Avenue between Pico Boulevard and the Santa Monica Station would be affected by GBV or GBN levels that exceed the Category 2 criteria. Two animal hospitals on Sepulveda Boulevard along this segment of the alignment would also be impacted as Category 1 uses.
- Four multi-family residential buildings along the south side of Ashton Avenue at Midvale Avenue in the vicinity of the double crossover would also experience GBV and GBN levels in excess of Category 2 criteria.
- The UCLA Science and Technology Research Building on Veteran Avenue and three music or video production facilities along Glendon Avenue would be exposed to GBN levels that exceed the 25 dBA GBN criterion for Category 1 uses.
- Along Westwood Boulevard between Le Conte Avenue and the UCLA Gateway Plaza Station, there would be GBV and GBN impacts at a total of nine medical buildings and research laboratories nearest to the alignment.
- In the mountain segment, between Sunset Boulevard and Stone Canyon Road, 23 single-family homes and the Bel Air Hotel (a total of 24 Category 2 receptors) would be affected by GBN levels exceeding the FTA limit for Category 2 land uses. Of these, six single-family dwellings would be subject to GBV levels slightly above the 72 VdB criterion.
- Also in the mountain segment, between Mulholland Drive and Valley Vista Boulevard in Sherman Oaks, GBV levels at eight single-family buildings along Saugus Avenue, between Encanto Drive and Valley Vista Boulevard, are estimated to be 72 VdB, which is at the FTA threshold of impact. GBN levels at 58 homes, including the eight impacted by vibration, would slightly exceed the applicable criterion in this same segment.

- Between Valley Vista Boulevard and the proposed Ventura Boulevard/Sepulveda Boulevard Station, there would be GBN impacts at 15 single- and multi-family residential buildings. Of those, nine structures would also be exposed to GBV levels that reach or exceed the FTA criterion. The presence of a double crossover south of the underground station would result in GBV levels as high as 79 VdB in this area.
- Between the Ventura Boulevard/Sepulveda Boulevard Station and US-101, two Category 1 receptors, namely Premiere Networks/Steve Harvey/Fox Sports Radio and 3 Ball Entertainment, would be impacted by GBV and GBN. In addition, a total of 15 Category 2 receptors (14 multi-family buildings and a hotel) along Sepulveda Boulevard would also be impacted. GBV levels at three of these buildings would reach 72 VdB, and the buildings would experience GBN levels between 35 and 37 dBA.
- Between US-101 and Magnolia Boulevard, 11 single- and multi-family buildings would be exposed to GBN levels at the threshold of impact. GBV levels along this segment would be below the impact threshold.
- Along the segment between Magnolia Boulevard and Burbank Boulevard, 20 multi-family buildings would be exposed to GBN levels of 35 dBA, which is the FTA criterion for residential uses. At one Category 1 use, LA Live Stream (audio/video production), GBV and GBN would exceed the applicable criteria.
- From Burbank Boulevard to the Metro G-Line/Sepulveda Station, eight Category 2 buildings, including three hotels/motels and five residential buildings, would be exposed to GBN levels at the threshold of impact.
- Between the Metro G-Line/Sepulveda Station and Victory Boulevard, one motel, Cinema Motel, would be impacted by GBN.
- Along the tunnel segment between Victory Boulevard and Vanowen Street, there would be 31 Category 2 sensitive receptors, including 29 multi-family buildings, one motel and a hospital (Beverly Manor Convalescent Center), which would experience GBN levels that reach or exceed the 35 dBA criterion. GBV levels at 13 of these buildings would be between 72 VdB and 73 VdB.
- Between Vanowen Street and Sepulveda/Sherman Way Station, there would be GBN impacts at 18 Category 2 receptors, including one hospital (Valley Presbyterian), two hotels/motels, and 15 multi-family residential buildings. Of those, six structures would also be exposed to GBV levels that reach or exceed the FTA criterion. The presence of a double crossover south of the underground station would result in GBV levels as high as 77 VdB at a hotel and multi-family building in this area.
- A total of 11 Category 2 receptors (Ten multi-family buildings and a nursing home) along the underground alignment located between Sepulveda/Sherman Way Station and Saticoy Street would be exposed to GBN levels that reach or slightly exceed the FTA criterion. Five of these receptors would also experience GBV levels at the threshold of impact.
- Between Saticoy Street and the Van Nuys Metrolink Station, one hotel (Category 2), two recording studios (Third Encore Annex Studios and Stagg and Stagg Street Studio), and one animal hospital (Valley Animal Hospital) would be exposed to GBV and GBN levels exceeding the FTA criteria.

Based on the previously described FTA category land uses, operation of Alternative 5 would result in vibration levels that would exceed the FTA vibration criteria related to rail operations for both GBV and

GBN. Therefore, operation of Alternative 5 would result in a significant impact related to operational vibration. It should be noted that since the type of intervening soil between the receptors and the proposed rail tunnel was not known at the time of the vibration analysis, normal soil was assumed for the ground between the tracks and receptor areas. Any significant impacts identified in areas that may actually have rock-based soil, such as in the mountain region, may be deemed to be less than significant impacts upon verification of actual soil information during final design.

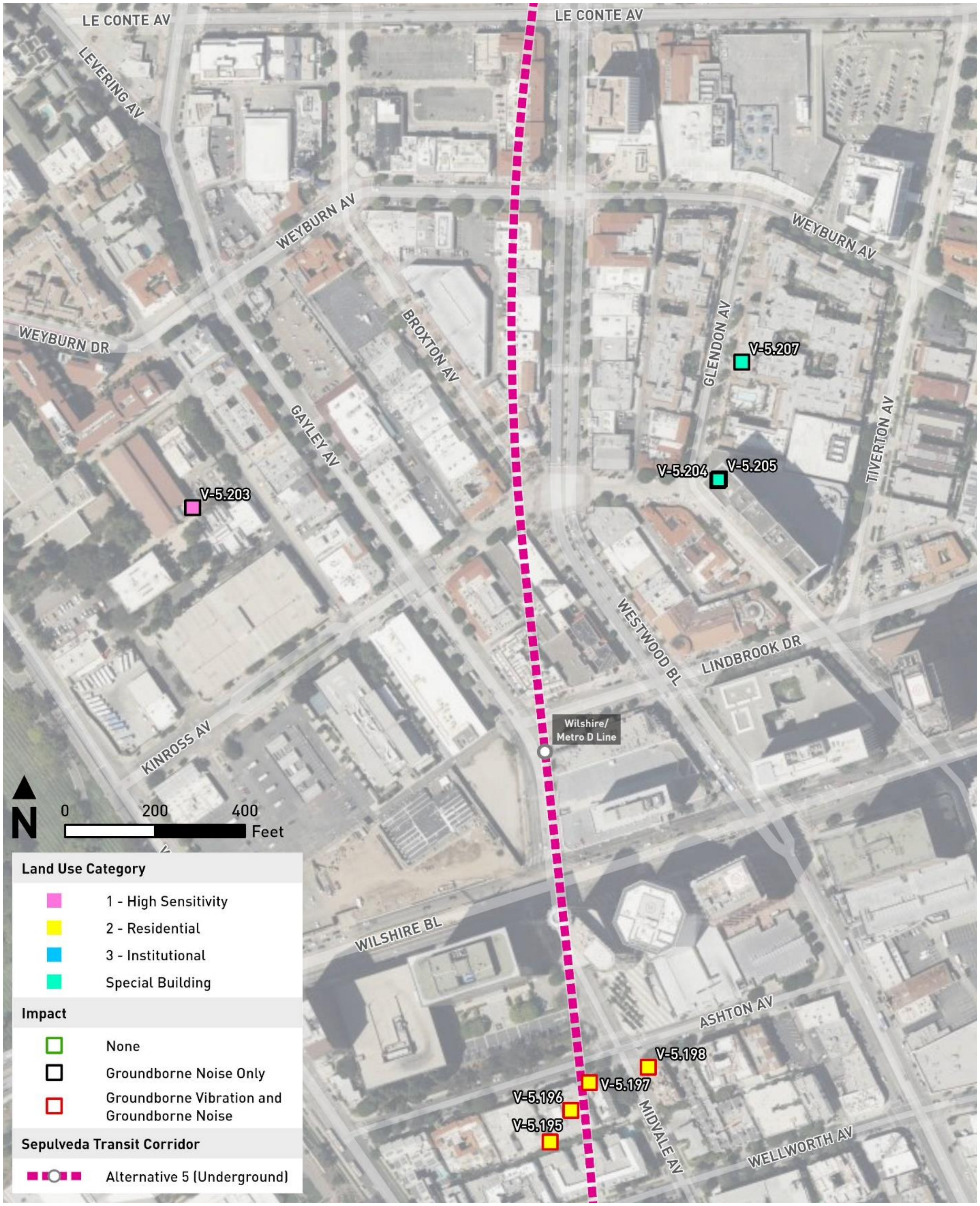
Figure 9-11. Alternative 5: Operational Vibration Impacts – Impact Areas 1, 2, and 3 Bentley Corridor, Pico Boulevard to Mississippi Avenue

Source: HTA, 2024

**Figure 9-12. Alternative 5: Operational Vibration Impacts – Impact Area 4
Bentley Corridor, Mississippi Avenue to Santa Monica Boulevard Station**

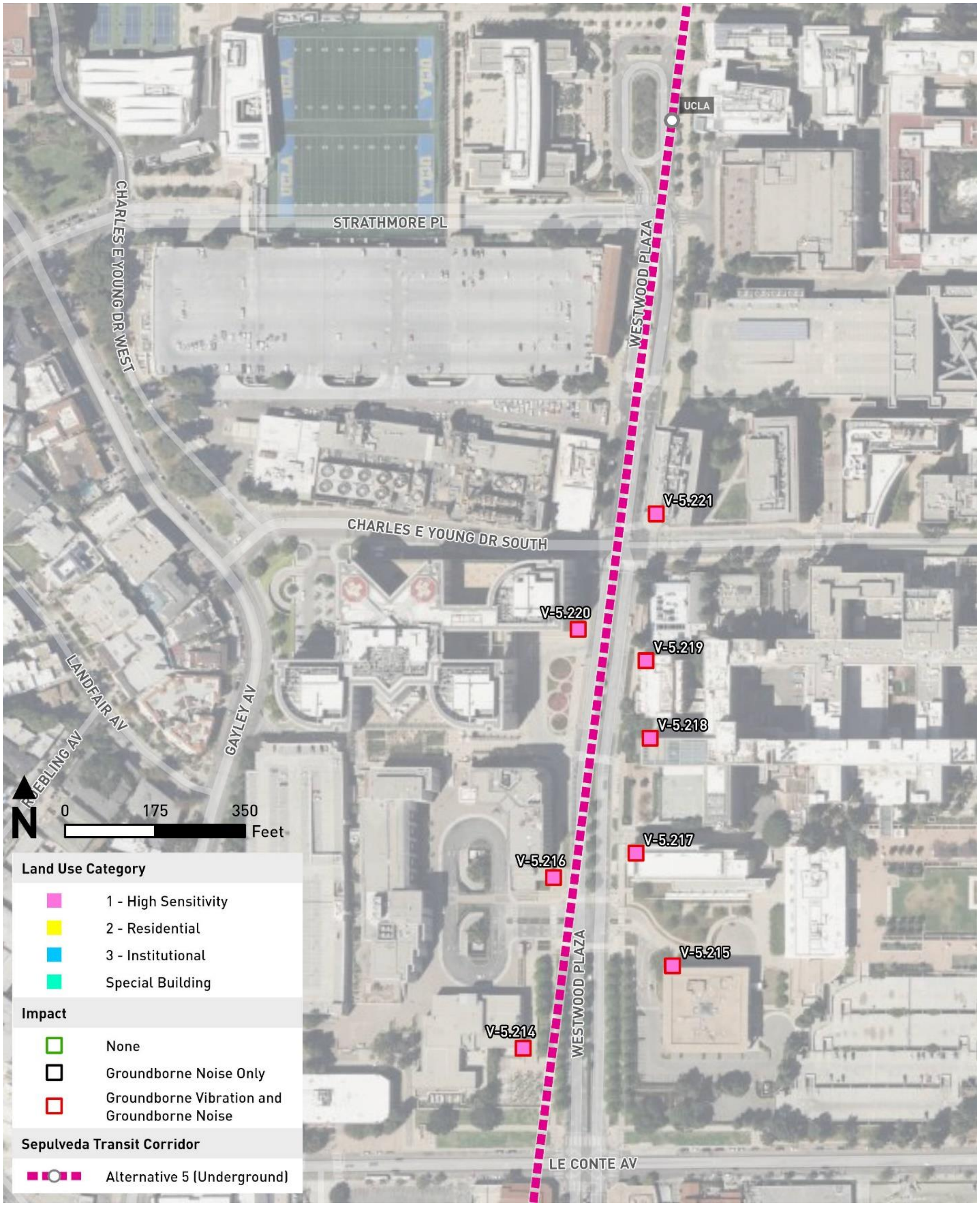
Source: HTA, 2024

Figure 9-13. Alternative 5: Operational Vibration Impacts – Impact Areas 5 and 6 Westwood Area, Veteran Avenue to Le Conte Avenue



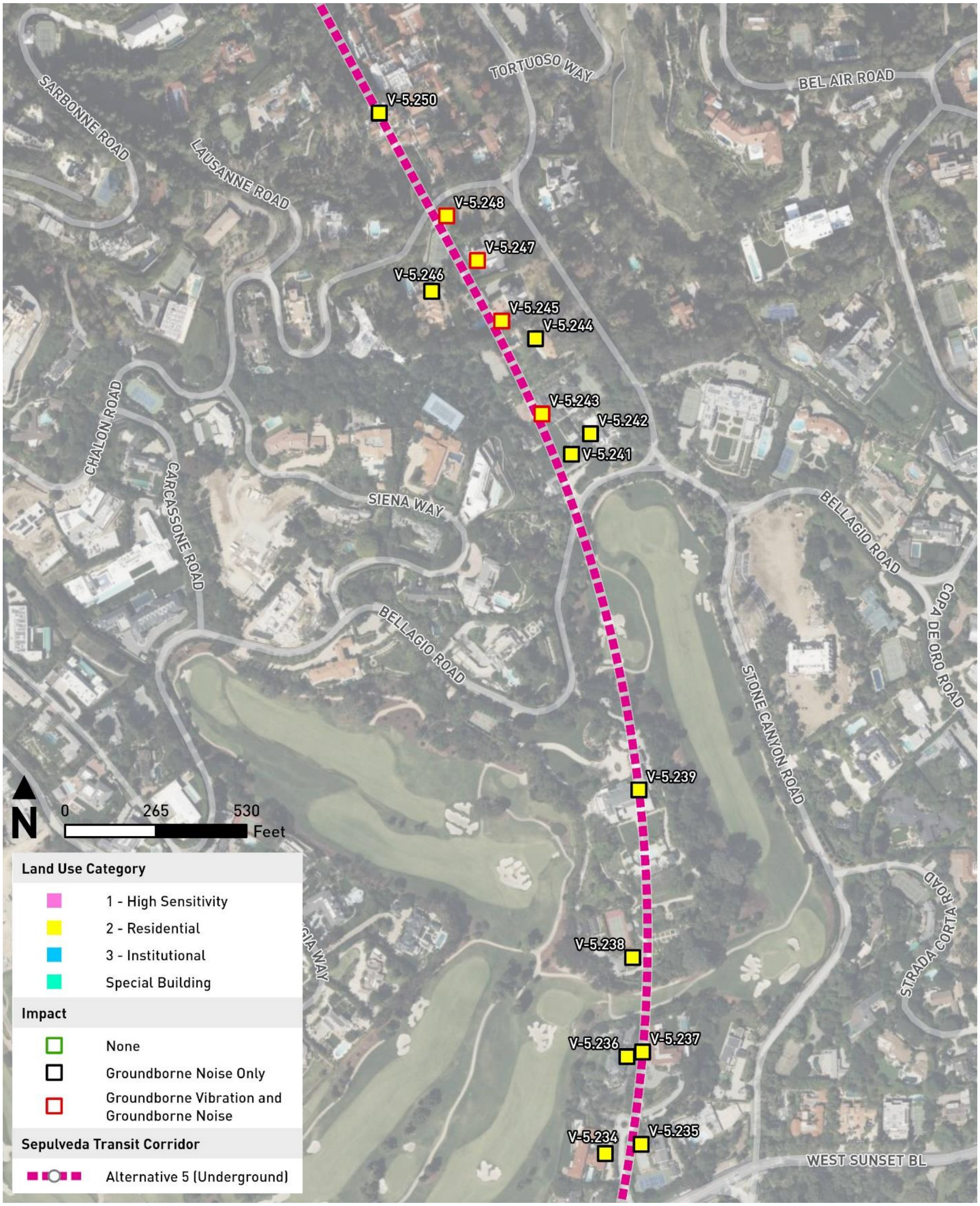
Source: HTA, 2024

**Figure 9-14. Alternative 5: Operational Vibration Impacts – Impact Area 7
Westwood Area, Le Conte Avenue to UCLA Gateway Plaza Station**



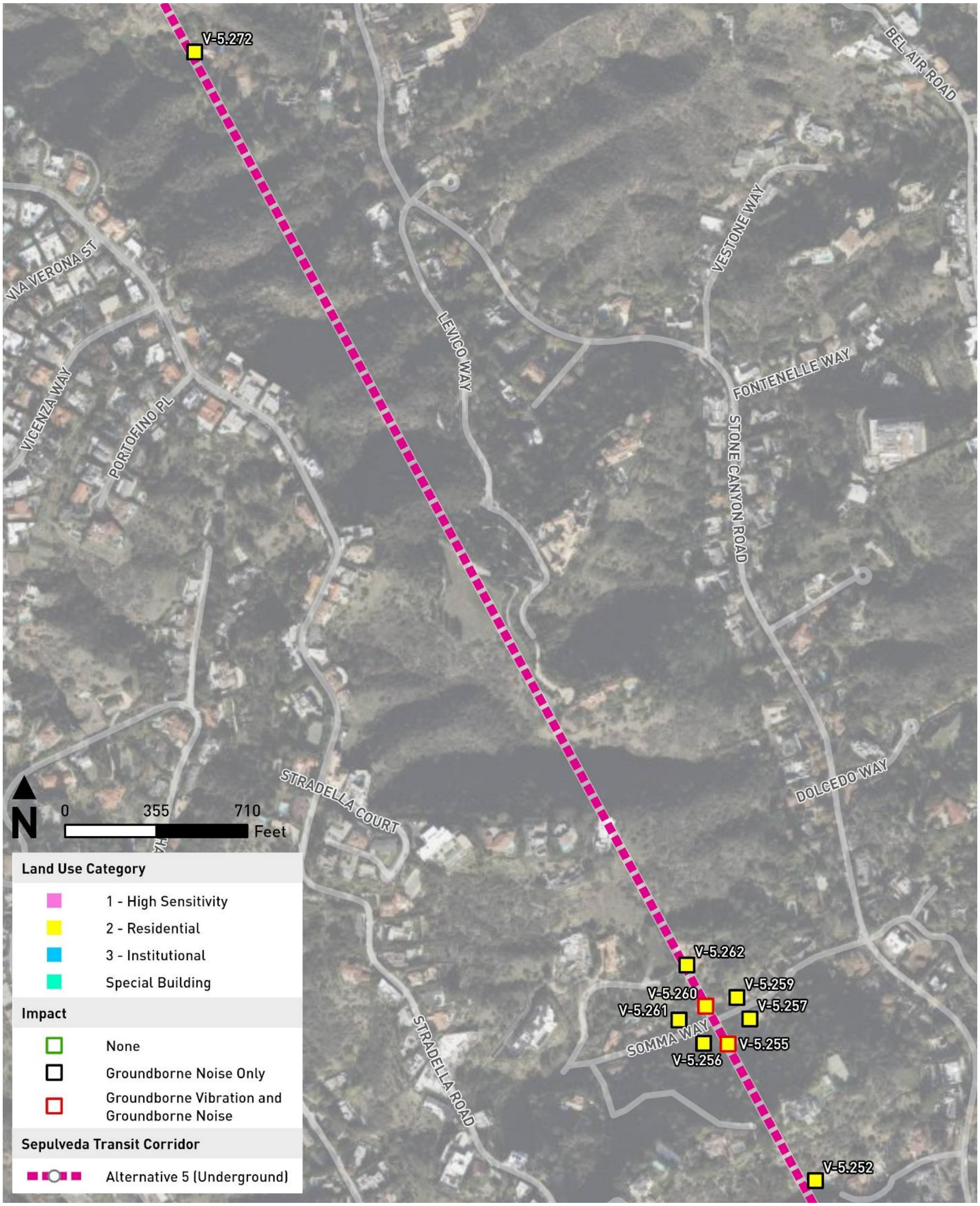
Source: HTA, 2024

**Figure 9-15. Alternative 5: Operational Vibration Impacts – Impact Area 8a
Southern Santa Monica Mountains North of Sunset Boulevard**



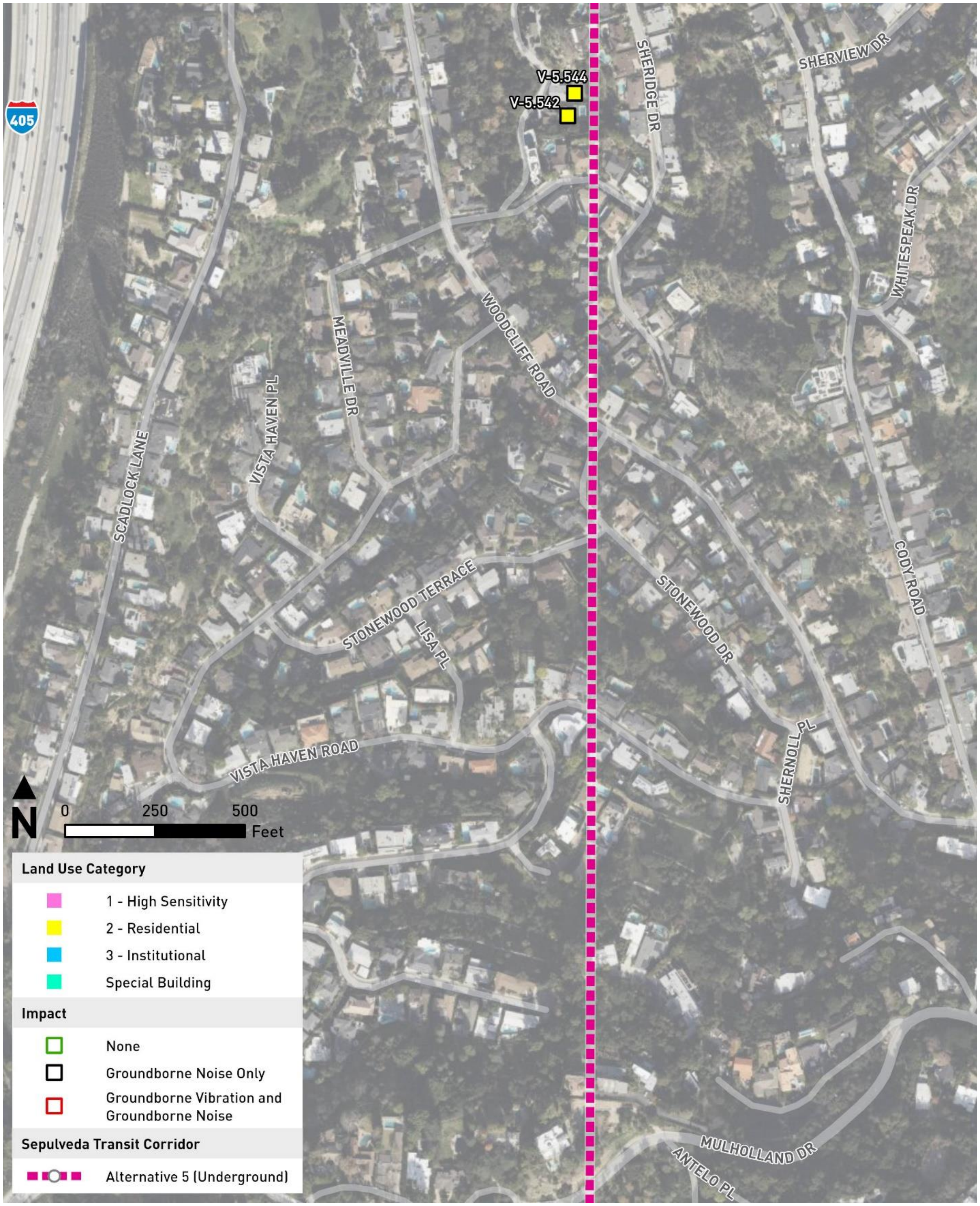
Source: HTA, 2024

Figure 9-16. Alternative 5: Operational Vibration Impacts – Impact Area 8b Southern Santa Monica Mountains



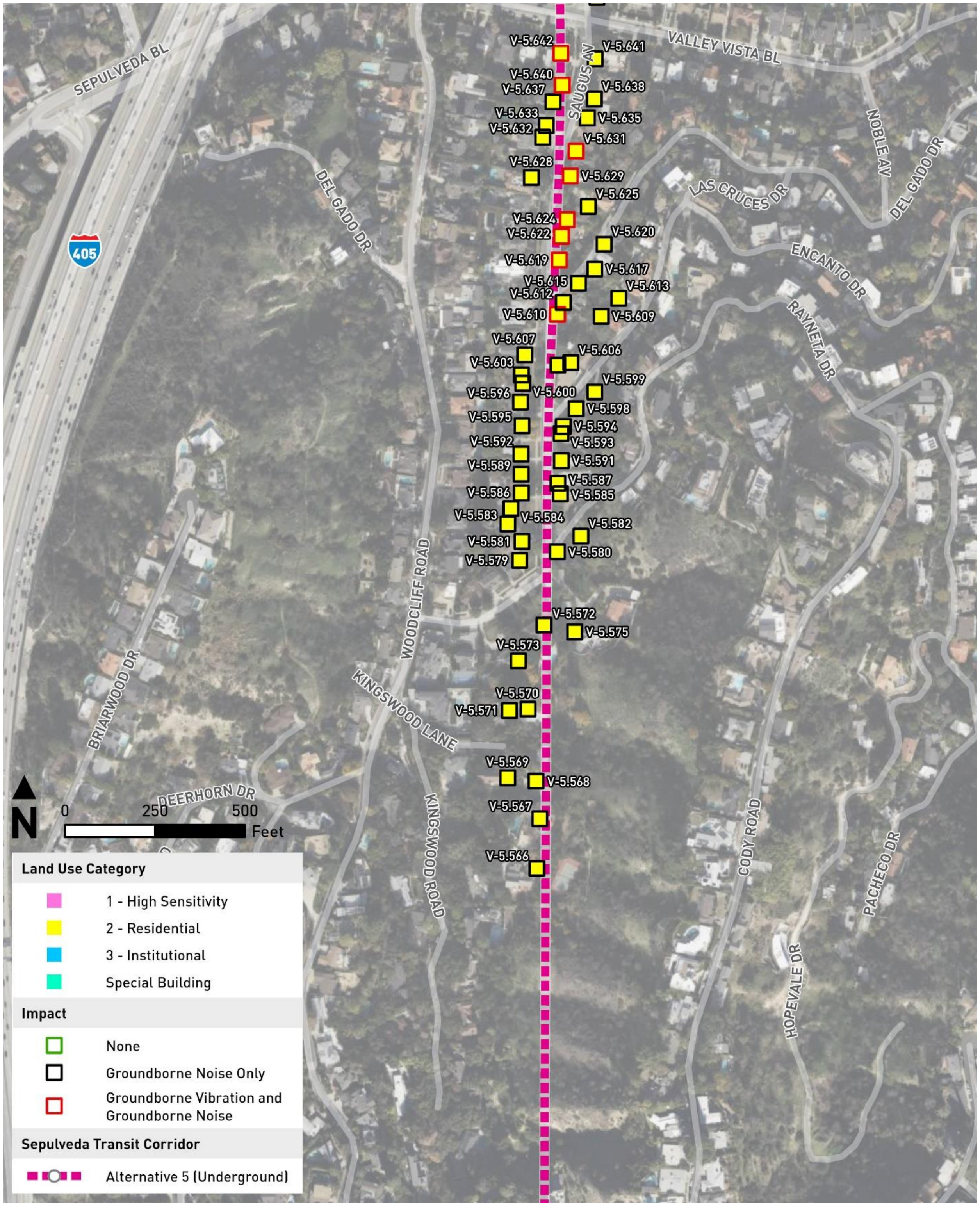
Source: HTA, 2024

Figure 9-17. Alternative 5: Operational Vibration Impacts – Impact Area 9a
Central Santa Monica Mountains North of Mulholland Drive



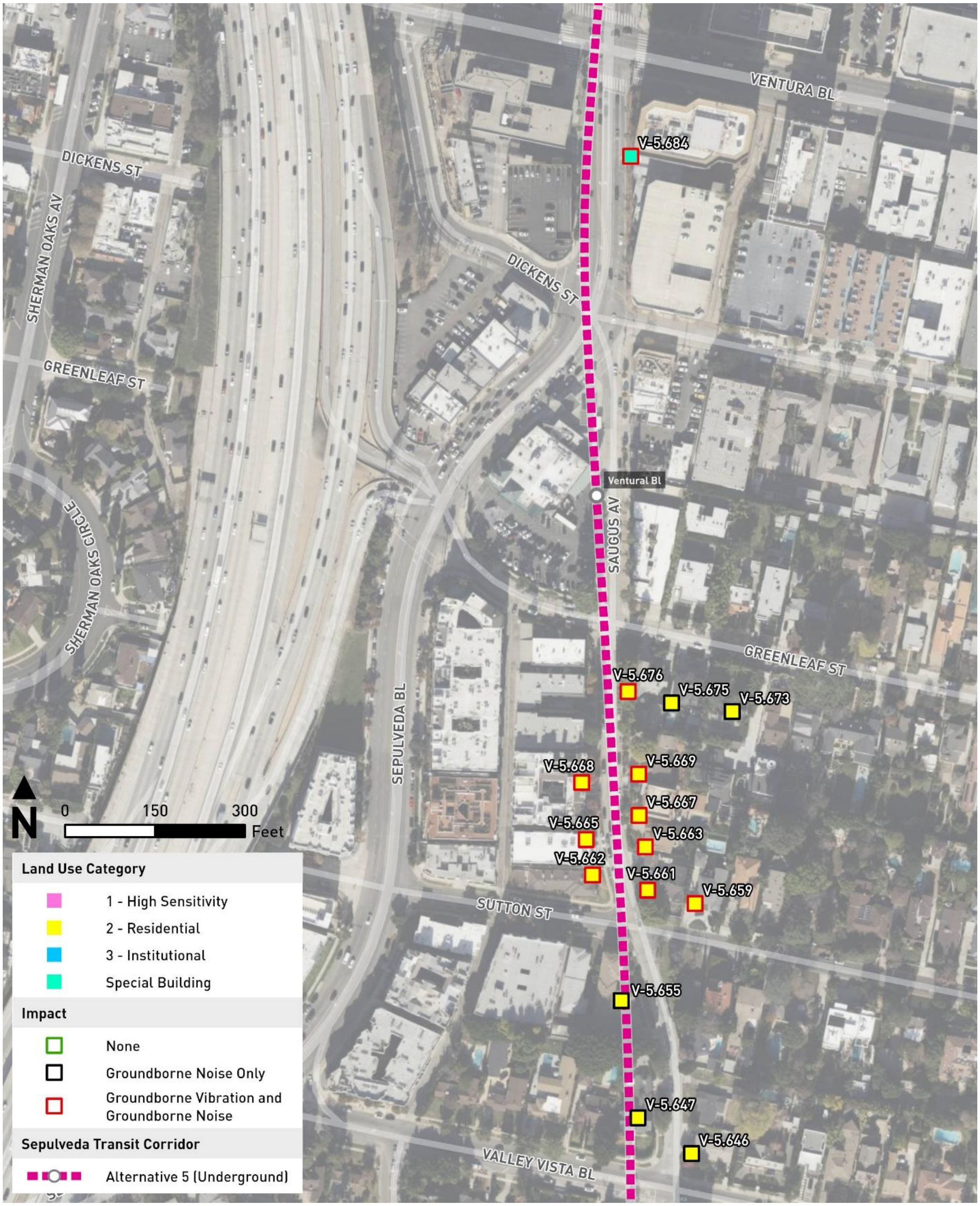
Source: HTA, 2024

Figure 9-18. Alternative 5: Operational Vibration Impacts – Impact Area 9b Northern Santa Monica Mountains South of Valley Vista Boulevard



Source: HTA, 2024

Figure 9-19. Alternative 5: Operational Vibration Impacts – Impact Area 10 Valley Vista Boulevard to Ventura Boulevard



Source: HTA, 2024

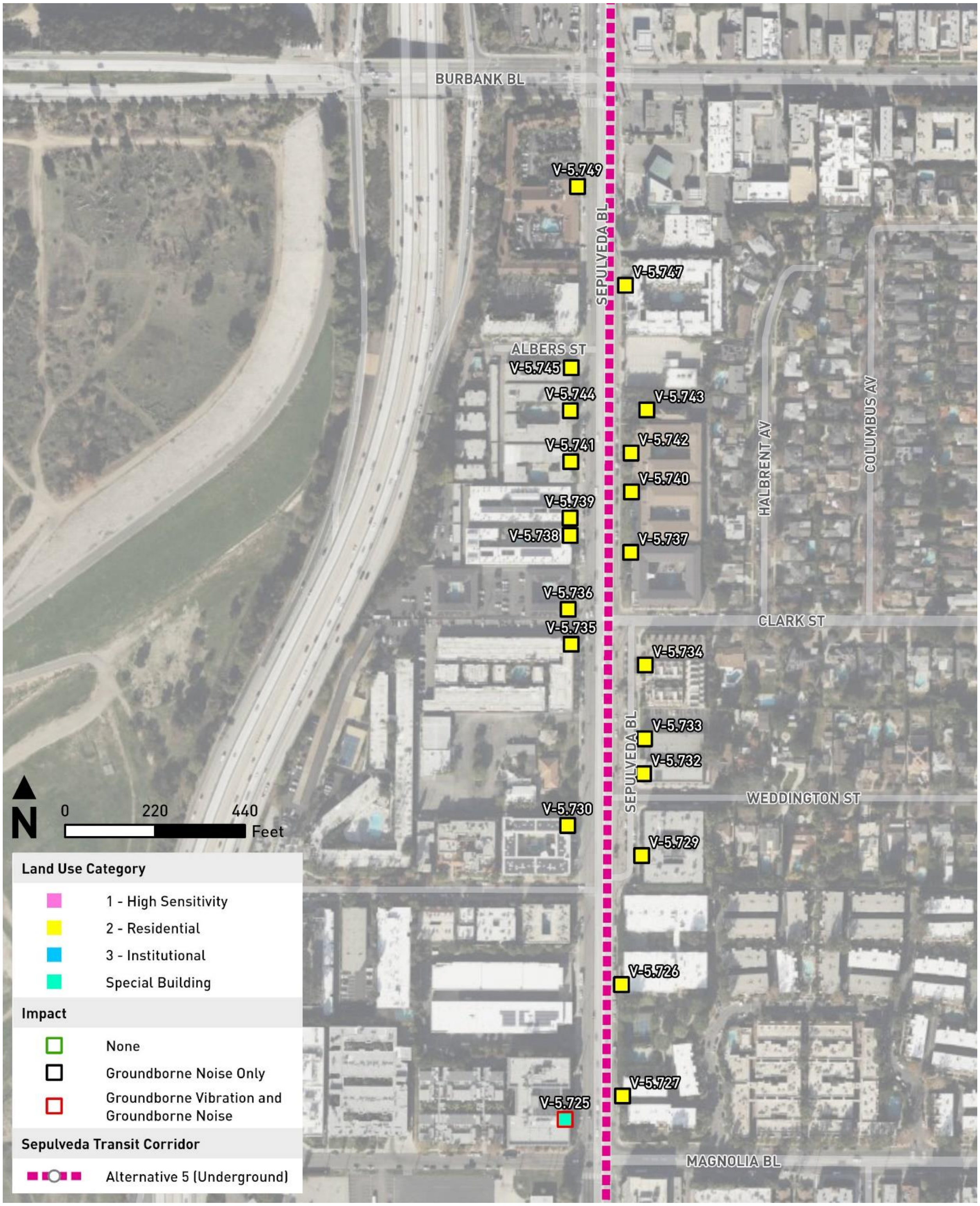
**Figure 9-20. Alternative 5: Operational Vibration Impacts – Impact Area 11
Ventura Boulevard to US Highway 101**

Source: HTA, 2024

**Figure 9-21. Alternative 5: Operational Vibration Impacts – Impact Area 12
US Highway 101 to Magnolia Boulevard**

Source: HTA, 2024

Figure 9-22. Alternative 5: Operational Vibration Impacts – Impact Area 13 Magnolia Boulevard to Burbank Boulevard

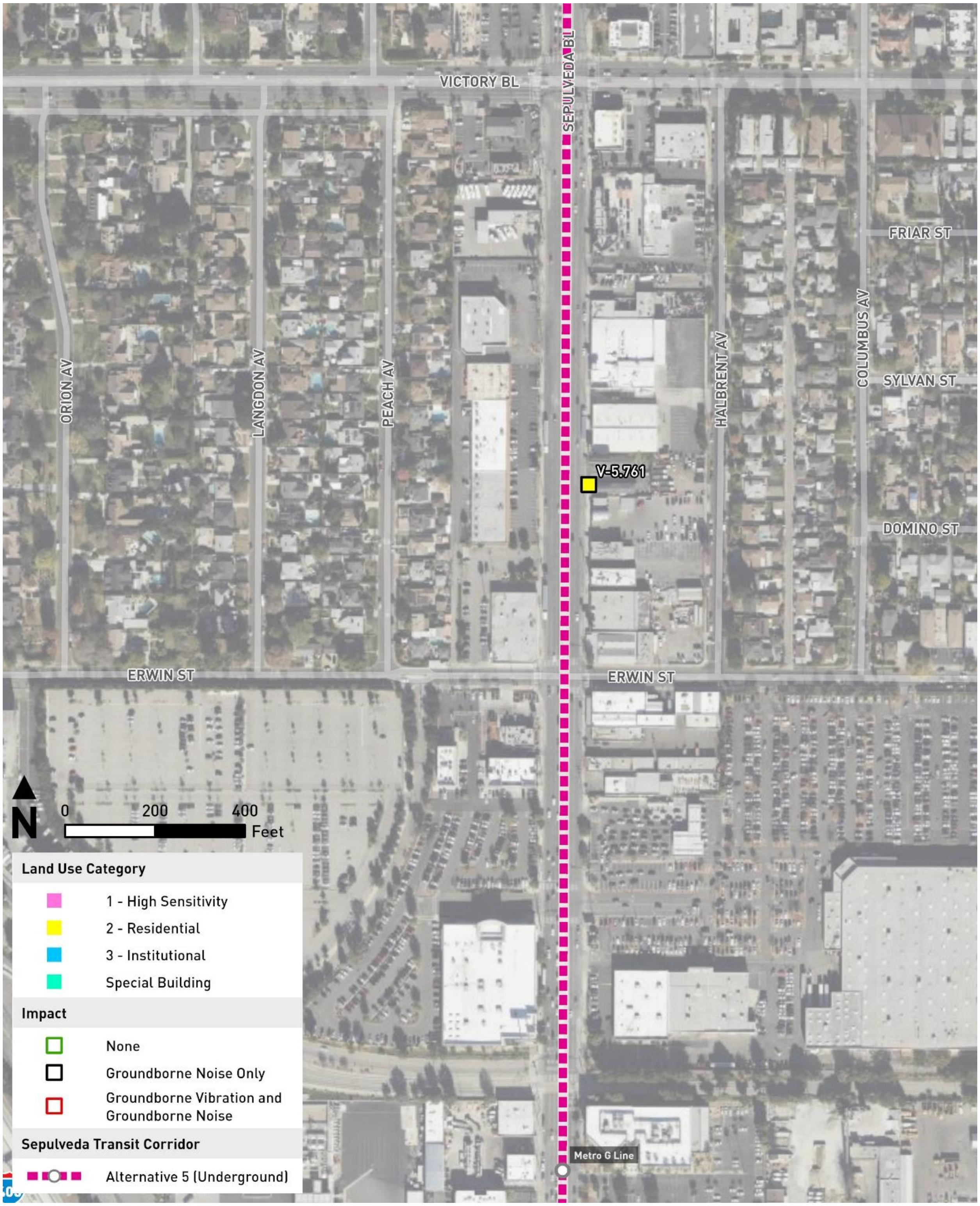


Source: HTA, 2024

Figure 9-23. Alternative 5: Operational Vibration Impacts – Impact Area 14 Burbank Boulevard to Metro G Line

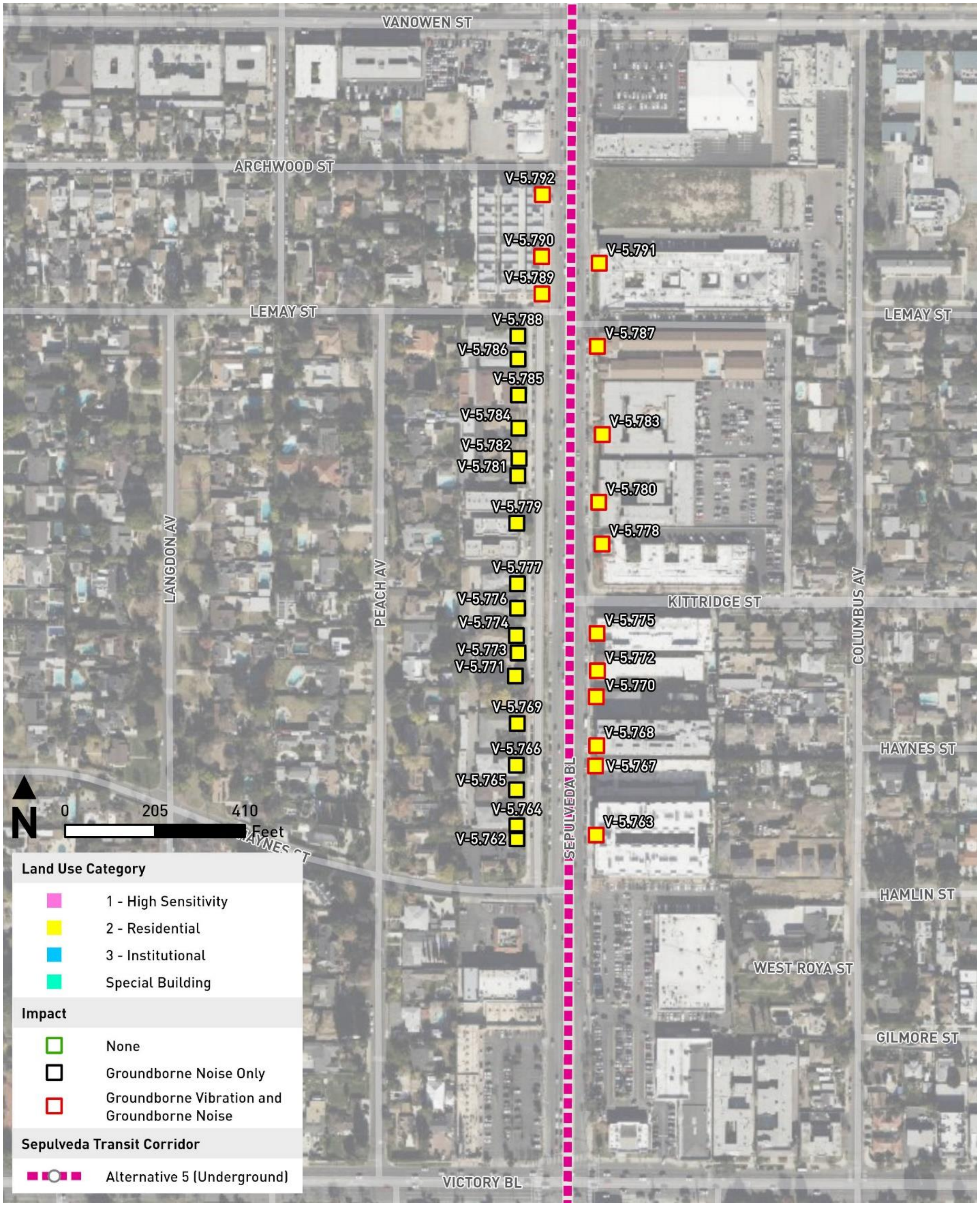
Source: HTA, 2024

**Figure 9-24. Alternative 5: Operational Vibration Impacts – Impact Area 15
Metro G Line to Victory Boulevard**



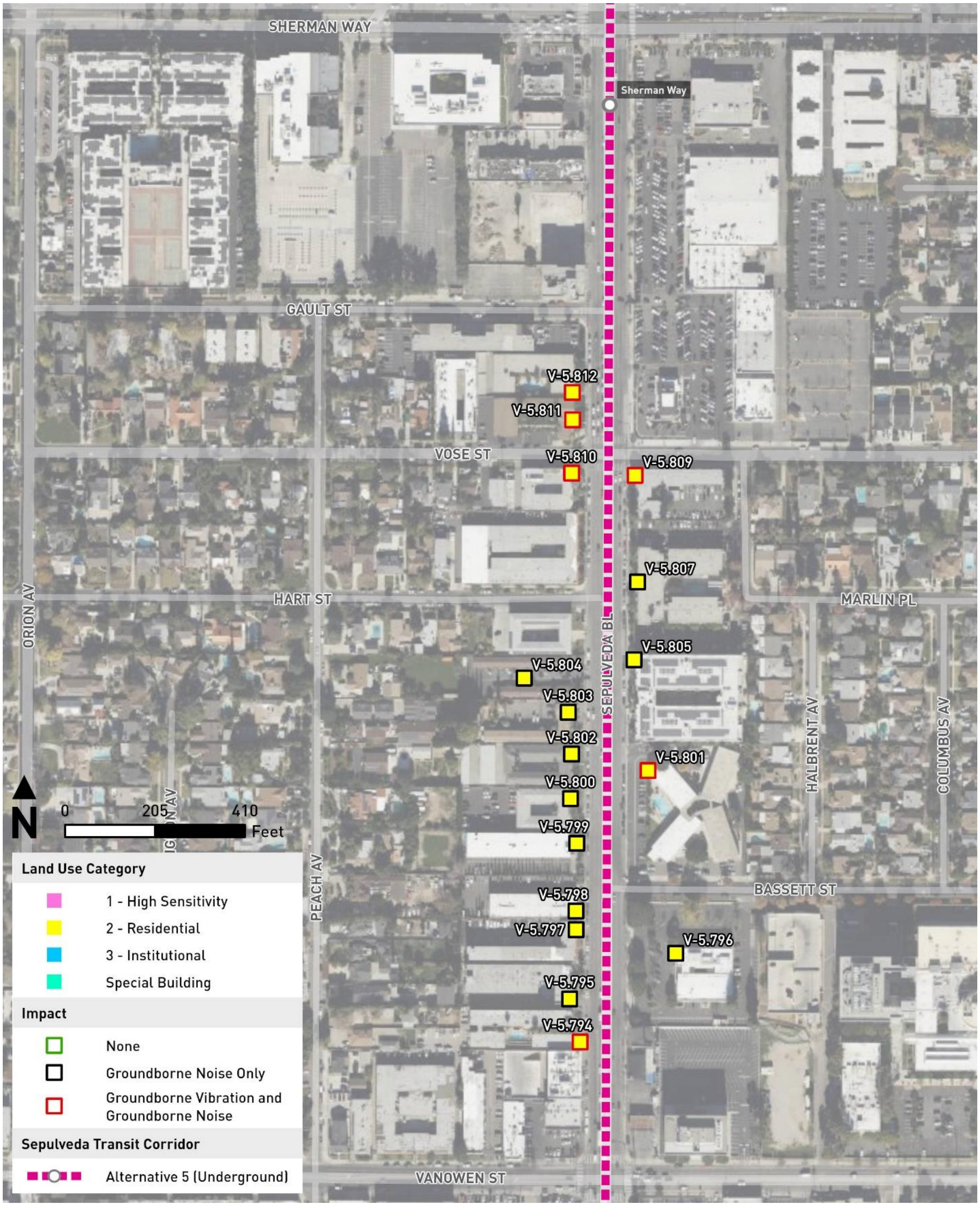
Source: HTA, 2024

Figure 9-25. Alternative 5: Operational Vibration Impacts – Impact Area 16 Victory Boulevard to Vanowen Street



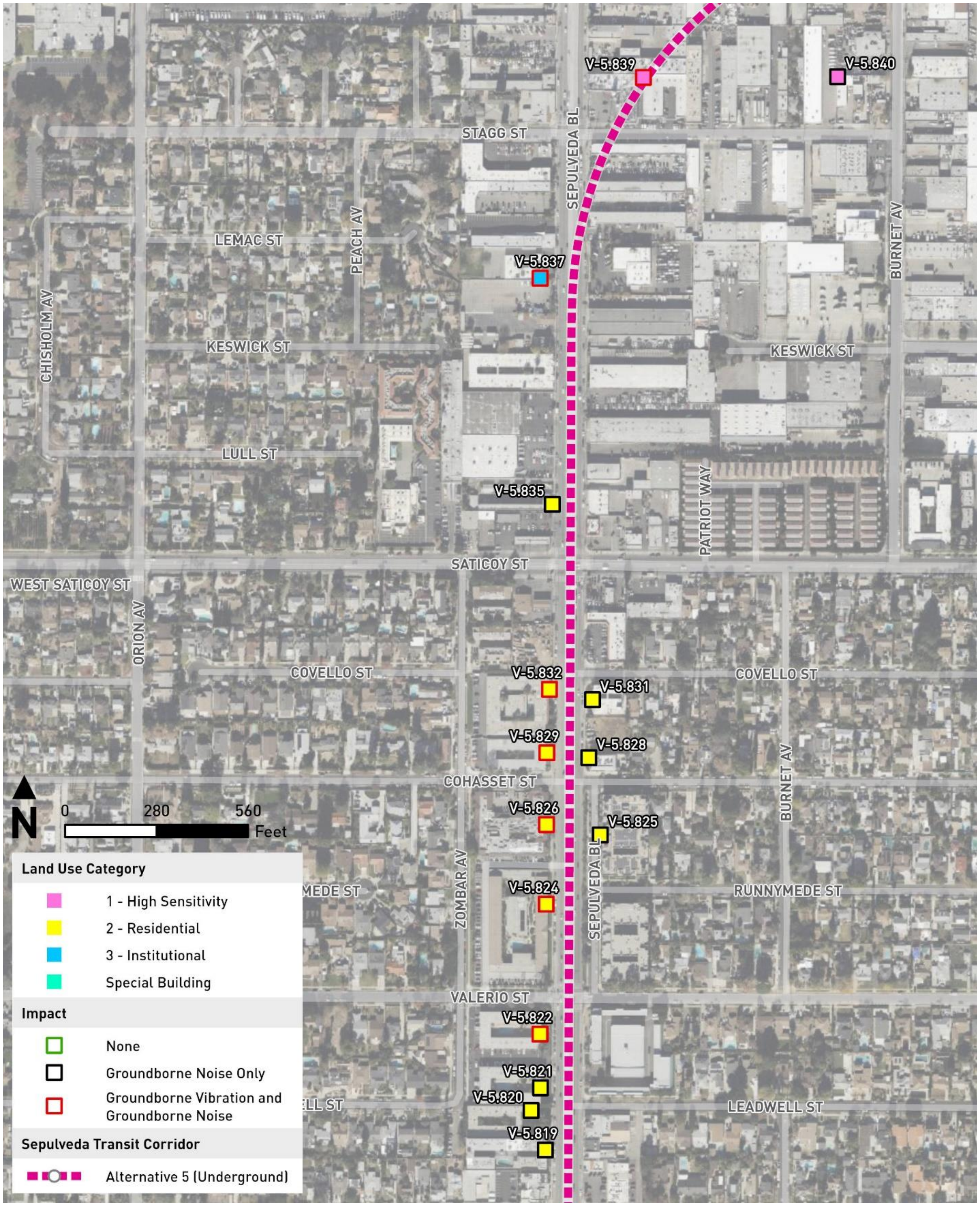
Source: HTA, 2024

Figure 9-26. Alternative 5: Operational Vibration Impacts – Impact Area 17
Vanowen Street to Sherman Way



Source: HTA, 2024

Figure 9-27. Alternative 5: Operational Vibration Impacts – Impact Areas 18 and 19 Sherman Way to Stagg Street



Source: HTA, 2024

Maintenance and Storage Facility Vibration

The MSF for Alternative 5 would be located east of the Van Nuys Metrolink Station. Trains would access the site from the fixed guideway's tail tracks at the northwest corner of the site. Trains would then travel southeast to maintenance facilities and storage tracks. Vibration levels from trains heading towards the maintenance facility and storage tracks along the curved tracks, where they come closest to the residential buildings south of the MSF, were evaluated. The MSF vibration analysis assumed that HRT vehicles would be traveling at speeds of 10 mph along the MSF tracks. Increases in GBV levels due to presence of rail switches were also taken into account. Predicted MSF vibration levels at the nearest residential structures south of the yard are between 59 VdB and 61 VdB. These levels are below the FTA impact criterion of 72 dBA for Category 2 land uses. Therefore, operation of Alternative 5 MSF would result in a less than significant impact related to MSF GBV or GBN.

9.3.2.2 Construction Vibration Impacts

The primary concern related to vibration during construction is the potential to damage structures. Some construction activities, such as pile driving, use of drill rigs, pavement breaking, and the use of tracked vehicles (e.g., bulldozers) and hoe rams, could result in perceptible levels of GBV at sensitive buildings located in close proximity to construction sites. These activities would typically be limited in duration and their vibration levels are likely to be well below thresholds for minor cosmetic building damage.

The planned project construction would include a limited number of activities expected to generate vibration that approaches the lowest building damage limit of 0.12 inch per second (in/sec) peak particle velocity (PPV) (refer to Table 2-7). Table 9-12 shows the distances at which the 0.12 in/sec PPV, 0.2 in/sec PPV, and 0.3 in/sec PPV thresholds would not be exceeded. For example, use of a drilling rig, hoe ram, or large bulldozer would be safe at distances greater than 22 feet from Category IV buildings. A vibratory roller would be safe at distances greater than 22 feet from Category IV buildings and typical impact pile driver operation would be safe at distances of 79 feet or greater. Typical building construction in an urban setting consists of buildings that are Category II engineered concrete and masonry that have a 0.3 in/sec PPV threshold or Category III non-engineered timber and masonry buildings that have a 0.2 in/sec PPV threshold. Typical construction equipment, such as a large bulldozer, would not exceed the 0.2 in/sec PPV building damage criterion at distances of 18 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 13 feet or greater. A vibratory roller would not exceed the 0.2 in/sec PPV building damage criterion at distances of 32 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 23 feet or greater. An impact pile driver would not exceed the 0.2 in/sec PPV building damage criterion at distances of 67 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 47 feet or greater.

Table 9-12. Construction Equipment Vibration Damage Potential by Distance

Equipment	Reference Vibration Level PPV (inches/second)	Distance to not Exceed 0.12 PPV Damage (feet)	Distance to not Exceed 0.2 PPV Damage (feet)	Distance to not Exceed 0.3 PPV Damage (feet)
Drill (CIDH)	0.089	22	18	13
Impact Pile Driver	0.644 (typical vibration level)	79	67	47
	1.518 (upper range vibration level)	140	117	84

Equipment	Reference Vibration Level PPV (inches/second)	Distance to not Exceed 0.12 PPV Damage (feet)	Distance to not Exceed 0.2 PPV Damage (feet)	Distance to not Exceed 0.3 PPV Damage (feet)
Large Bulldozer	0.089	22	18	13
Vibratory Pile Driver	0.17 (typical vibration level)	33	28	20
	0.734 (upper range vibration level)	87	73	52
Vibratory Roller	0.210	38	32	23

Source: HTA, 2024

PPV = peak particle velocity

Vibration annoyance is another concern during construction. In rare instances, when vibration-intensive construction activities occur close to sensitive structures (within 25 feet), such as residential buildings, or special use buildings like laboratories or recording studios, Vibration could exceed the FTA vibration annoyance criteria shown in Table 2-5 and Table 2-6. Significant GBV could occur when certain construction activities would occur at close distances to sensitive receptors. Therefore, Alternative 5 would result in a significant impact related to construction vibration.

Along the underground alignment of Alternative 5, the TBM and other tunnel construction activities would be potential sources of GBVs. However, the TBM is slow moving and causes very little vibration and related GBN to the surrounding area when operating at full tunnel depths. The Alternative 5 underground tunnel would be at depths of approximately 30 feet to over 750 feet from the aboveground buildings along the tunnel alignment. In some residential areas, GBV from the TBM may be felt for a short period (approximately two days) while the machine passes under the receptor locations. In residential areas in the mountain region between Sunset Boulevard and Valley View Boulevard, GBV from the TBM would not be perceptible because the tunnel would be very deep underground. Expected TBM vibration levels would be well below the strictest building damage threshold of 0.12 in/sec along the entire underground alignment.

Construction of Metro E Line, Santa Monica Boulevard, Wilshire/Metro D Line, UCLA, Ventura Boulevard, Metro G Line, and Sherman Way stations along the underground alignment would likely be cut-and-cover construction, which could at times occur within 25 feet of structures potentially resulting in excessive vibration. The alignment would surface near the intersection of Raymer Street and Burnett Avenue. Nearby structures are primarily industrial and would be most similar to engineered and concrete masonry buildings with a 0.3 in/sec vibration damage threshold. Vibration annoyance impacts are unlikely to occur in this area, as the uses are not vibration sensitive. However, due to the proximity of nearby buildings there is potential for vibration damage to occur. East of the tunnel portal, construction activity would primarily occur in the rail ROW surrounded by industrial buildings which would have limited potential for vibration damage and annoyance.

Maintenance and Storage Facility Construction Vibration

The nearest existing buildings to the construction of the proposed MSF are buildings within the residential properties along Cohasset Street south of the MSF site. The closest structures within the residential properties are as close as 17 feet from the proposed construction activities. The highest vibration levels from construction of the MSF at the closest off-site building would be 0.375 in/sec PPV from the use of a vibratory roller during paving and 0.16 in/sec PPV from a large bulldozer during the grading phase. Estimated vibration levels from ballast tamper and caisson drilling would be less than the applicable damage risk criterion for the building type in this area, which is 0.2 in/sec PPV (Building Type

III in Table 2-7). Therefore, vibration impacts due to use of a vibratory roller at the southern edges of the proposed MSF would be significant without mitigation. The minimum distance from the south property line of the MSF site at which large vibratory rollers must operate is 26 feet during the construction of the proposed MSF. This mitigation measure would be a part of Mitigation Measure (MM) VIB-5.2 (Vibration Control Plan).

Construction Vibration Impacts on Historic Buildings

Construction under Alternative 5 would have the potential to damage buildings in close proximity to vibration-intensive construction activities. Using the reference levels in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018), vibration levels from project construction activities were estimated at historic buildings or structures eligible for the National Register of Historic Places along the Alternative 5alignment. Such buildings are generally classified as extremely susceptible to vibration damage (Building Type IV in Table 2-7).

Findings of the construction vibration assessment at historic structures are as follows:

- The following historic buildings are very close to the proposed project construction areas. Most vibration-intensive construction activities at these locations would likely result in levels exceeding the damage criterion of 0.12 in/sec PPV. Special consideration should be made for these buildings in MM VIB-5.2 outlined in Section 9.4.
  - Gayley Center located at 1101 Gayley Avenue, adjoining the proposed Wilshire Boulevard/Metro D Line Station
  - Linde Medical Building located at 10921 Wilshire Boulevard, adjacent to the proposed Wilshire Boulevard/Metro D Line Station
  - Tishman Building located at 10950 Wilshire Boulevard, adjacent to the proposed Wilshire Boulevard/Metro D Line Station
  - UCLA Ackerman Hall, 308 Westwood Plaza, Los Angeles
- Pile driving at locations along the alignment in the vicinity of the following historic properties would potentially result in GBV levels exceeding the damage criterion of 0.12 in/sec PPV. Therefore, these locations must be addressed in the Vibration Control Plan if pile driving is to occur within 150 feet of the buildings:
  - Historic buildings located at 4506 Saugus Street, Sherman Oaks
  - Historic building located at 14746 Raymer Street, Van Nuys

9.3.3 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 2 miles of a public airport or public use airport, would the project expose people residing or working in the Project Study Area to excessive noise levels?

The Santa Monica Airport and Van Nuys Airport are located within 2 miles of Alternative 5. However, Alternative 5 is a transit project that is not sensitive to noise. Transit riders would not dwell at one location for an extended period of time that would result in exposure to excessive airport noise. Construction workers working on Alternative 5 would utilize ear protection as required while working on Alternative 5. Therefore, no impacts related to airport noise would occur.

9.4 Mitigation Measures

9.4.1 Operational

The following mitigation measures are recommended to reduce operational vibration impacts from train movements along the Alternative 5 alignment:

MM VIB-5.1: ***Trackwork Isolation Methods:***

- *Metro shall implement trackwork isolation to reduce groundborne vibration levels to below the Federal Transit Administration groundborne vibration impact criteria for frequent events at the locations where exceedance of the groundborne vibration impact criteria are anticipated to occur. Metro will isolate trackwork using one of the following four methods:*
  - *High Resilience Direct Fixation Rail Fasteners (HRDF): HRDF attaches the rail directly to the fastener body. HRDF is used to attach the rails to the first concrete pour and then the space around the tacks is filled with precast concrete panels. There are several models of highly resilient direct fixation fasteners available that can be effective at controlling vibration.*
  - *Low-Impact or Spring Frogs: Wheel impacts at crossovers could increase vibration levels up to 10 VdB at sensitive buildings near the crossovers. Where vibration impact occurs at the crossovers along the project alignment, the impact vibration can be reduced through the use of low-impact frogs.*
  - *Floating Slab Track: This approach typically provides the highest reduction in GBV levels and is employed near Category 1 buildings where thresholds of impact are more stringent. Under this method, the track is constructed on a concrete slab that is supported by either resilient pads or a continuous resilient mat.*
  - *Resiliently Supported Ties: The resiliently supported tie system consists of concrete ties supported by rubber pads resting on top of a slab track or subway invert. The rails are fastened directly to the concrete ties using standard rail clips. This type of system has been shown to reduce GBV levels by up to 10 VdB.*
- *Locations where mitigation is required are identified in Table 9-13 and will be verified during final design.*

Table 9-13. Alternative 5: MM VIB-5.1 – Trackwork Isolation Methods Locations

Mitigation Measure Type	Civil Station Limits (From - To)		Location Description
High Resilience Direct Fixation Rail Fasteners	519+00	520+50	between 2355 S Bentley Avenue and 2345 S Bentley Avenue
Resiliently Supported Ties	520+50	525+50	2337 S Bentley Avenue to Tennessee Avenue
High Resilience Direct Fixation Rail Fasteners	525+50	549+00	Tennessee Avenue to 1921 S Bentley Avenue

Mitigation Measure Type	Civil Station Limits (From - To)		Location Description
Resiliently Supported Ties	549+00	551+00	1921 S Bentley Avenue to Missouri Avenue
High Resilience Direct Fixation Rail Fasteners	551+00	555+50	Missouri Avenue to 1835 S Bentley Avenue
Spring Frogs at Double Crossover	599+73	602+31	crossovers north of Ashton Avenue
High Resilience Direct Fixation Rail Fasteners	611+50	616+00	1101 Westwood Boulevard to 1045 Westwood Boulevard
Resiliently Supported Ties	625+50	633+00	North of Le Conte Avenue to 710 Westwood Plaza
Resiliently Supported Ties	633+00	639+00	710 Westwood Plaza to south of 570 Westwood Plaza
High Resilience Direct Fixation Rail Fasteners	673+50	711+00	south side of 121 Udine Way to north side of Hotel Bel-Air
High Resilience Direct Fixation Rail Fasteners	721+00	722+50	residence located at 10651 Capello Way
High Resilience Direct Fixation Rail Fasteners	727+00	733+00	10650 Somma Way to 10687 Somma Way
High Resilience Direct Fixation Rail Fasteners	771+00	773+00	residence located at 1545 Tanner Bridge Road
High Resilience Direct Fixation Rail Fasteners	907+00	909+00	3671 Meadville Drive to 3677 Meadville Drive
High Resilience Direct Fixation Rail Fasteners	910+00	911+50	3721 Meadville Drive to 3719 Meadville Drive
High Resilience Direct Fixation Rail Fasteners	918+00	950+00	South end of Kingswood Road to 15259 Valley Vista Boulevard
High Resilience Direct Fixation Rail Fasteners	952+50	954+00	4321 Saugus Avenue to Sutton Street
Resiliently Supported Ties	954+00	958+00	Sutton Street to Ventura Boulevard/Sepulveda Boulevard Station
Low-Impact Frogs at Double Crossover	957+70	960+30	Crossovers south of Ventura Boulevard/Sepulveda Boulevard Station
Resiliently Supported Ties	965+50	967+00	Television and radio studios located at 15260 Ventura Boulevard
Resiliently Supported Ties	970+00	972+00	3 Ball Entertainment video production located at 15301 Ventura Boulevard
High Resilience Direct Fixation Rail Fasteners	973+00	987+00	4650 Sepulveda Boulevard to U.S. Highway 101southbound onramp
High Resilience Direct Fixation Rail Fasteners	990+00	1005+00	south of U.S. Highway 101northbound offramp to Hartsook Street
Resiliently Supported Ties	1008+00	1011+00	LA Live Stream film production at 15315 Magnolia Boulevard
High Resilience Direct Fixation Rail Fasteners	1011+00	1034+00	5225 Sepulveda Boulevard to south side of Burbank Boulevard
High Resilience Direct Fixation Rail Fasteners	1038+00	1048+00	5638 Sepulveda Boulevard to Hatteras Street
High Resilience Direct Fixation Rail Fasteners	1078+00	1079+00	Cinema Motel located at 6242 Sepulveda Boulevard
High Resilience Direct Fixation Rail Fasteners	1094+50	1111+00	Haynes Street to north side of Archwood Street
High Resilience Direct Fixation Rail Fasteners	1117+00	1129+00	6831 Sepulveda Boulevard to north side of 7007 Sepulveda Boulevard

Mitigation Measure Type	Civil Station Limits (From - To)		Location Description
Resiliently Supported Ties	1129+00	1134+00	north side of 7007 Sepulveda Boulevard to Sherman Way Station
Low-Impact Frogs at Double Crossovers	1131+30	1133+87	crossovers south of Sherman Way Station
High Resilience Direct Fixation Rail Fasteners	1148+00	1164+00	north of Wyandotte Street to north of Covello Street
High Resilience Direct Fixation Rail Fasteners	1168+00	1170+00	La Posada Motel located at 7615 Sepulveda Boulevard
Resiliently Supported Ties	1175+00	1177+00	7721 Sepulveda Boulevard and 7735 Sepulveda Boulevard
Resiliently Supported Ties	1181+00	1183+00	Third Encore Annex Studios – Stagg 15239 Stagg Street
High Resilience Direct Fixation Rail Fasteners	1186+00	1189+00	Stagg Street Studio 15147 Stagg Street

Source: HTA, 2024

9.4.2 Construction

The following mitigation measures would be needed to reduce construction noise and vibration levels to below the applicable limits:

MM NOI-5.1: ***No*****ise Control Plan:**

- *Prior to the initiation of localized construction activities, the Project contractor shall develop a Noise Control Plan demonstrating how the Federal Transit Administration 8-hour $L_{eq.equip}$ (equivalent noise level of equipment) noise criteria would be achieved during construction. The Noise Control Plan shall be prepared by a board-certified acoustical engineer. The Federal Transit Administration 8-hour $L_{eq.equip}$ construction noise standards are as follows: Residential daytime standard of 80 dBA 8-hour $L_{eq.equip}$ and nighttime standard of 70 dBA 8-hour $L_{eq.equip}$, Commercial daytime and nighttime standard of 85 dBA 8-hour $L_{eq.equip}$, and Industrial daytime and nighttime standard of 90 dBA 8-hour $L_{eq.equip}$. The Noise Control Plan shall be designed to follow Metro requirements, and shall include measurements of existing noise, a list of the major pieces of construction equipment that would be used, predictions of the noise levels at the closest noise-sensitive receptors (residences, hotels, schools, religious facilities, and similar facilities), and noise mitigation measures to be implemented to achieve compliance with the Federal Transit Administration 8-hour $L_{eq.equip}$ construction noise standards to the degree feasible. The Noise Control Plan must be approved by Metro prior to initiating noise-generating construction activities. The Project contractor shall conduct continuous noise monitoring to demonstrate compliance with the Federal Transit Administration 8-hour $L_{eq.equip}$ noise limits. If the Federal Transit Administration 8-hour $L_{eq.equip}$ criteria are exceeded, the Project contractor shall implement measures to reduce construction noise as much as feasible. The Project contractor shall establish a public information and complaint system. The Project contractor shall respond to and provide corrective action for complaints within 24-hours. In addition, the Project shall comply with local noise ordinances when applicable, including by obtaining a variance(s) from the applicable local* *jurisdiction when nighttime work is required. Noise reducing methods that may be implemented by the Project contractor include:*

- *If nighttime construction is planned, a noise variance may be prepared by the Project contractor, if required by the jurisdiction, that demonstrates the implementation of control measures to maintain noise levels below the applicable Federal Transit Administration and local standards.*
- *Where nighttime construction would exceed the FTA nighttime criteria, avoid nighttime construction to the degree feasible.*
- *Utilize specialty equipment equipped with enclosed engines and/or high performance mufflers as feasible. The Project contractor shall locate equipment and staging areas as far from noise-sensitive receptors as possible.*
- *Limit unnecessary idling of equipment.*
- *Install temporary noise barriers as needed where feasible.*
- *Reroute construction related truck traffic away from residential streets to the extent permitted by the relevant municipality.*
- *Avoid impact pile driving where possible. Drilled piles or vibratory pile drivers would be required where feasible.*
- *Where Project construction cannot be performed in accordance with the requirements of the applicable noise limits, the Project contractor should be required to investigate alternative construction methods that would result in lower sound levels. Also, the Project contractor should be required to conduct noise monitoring to demonstrate compliance with noise limits outlined in the Noise Control Plan.*

MM VIB-5.2: Vibration Control Plan:

- *Prior to construction, the Project contractor shall prepare a Vibration Control Plan demonstrating how the Federal Transit Administration building damage risk criteria and the Federal Transit Administration vibration annoyance criteria would be achieved. The Vibration Control Plan must be approved by Metro prior to initiating vibration-generating construction activities. The Vibration Control Plan would include a list of the major pieces of construction equipment that would be used, and the predictions of the vibration levels at the closest sensitive receivers. The Project contractor would conduct vibration monitoring to demonstrate compliance with the vibration limits during construction activity. Where the construction cannot be performed to meet the vibration criteria, the Project contractor shall implement alternative means and methods of construction measures to reduce vibration levels as much as feasible. Vibration reducing methods that may be implemented by the Project contractor include:*
  - *When feasible, use construction equipment or less vibration intensive techniques near vibration sensitive locations.*

   - *Use as small an impact device (i.e., hoe ram, pile driver) as possible to accomplish necessary tasks.*
   - *Avoid impact pile driving where possible. Drilled piles or vibratory pile drivers would be required where feasible.*
   - *When feasible, in construction areas close to sensitive buildings, select non-impact demolition and construction methods such as saw or torch cutting and removal for off-site demolition, and use chemical splitting, or hydraulic jack splitting, instead of high impact methods.*
- *The Project contractor shall monitor construction vibration levels at structures identified as a "historic" resource within the meaning of CEQA Guidelines Section 15064.5(a)to ensure the vibration damage threshold of 0.12 in/sec PPV shall not be exceeded. The vibration monitoring shall be conducted by a qualified professional for real-time vibration monitoring for construction work at the Project construction site requiring heavy equipment or ground compaction devices. A pre-construction and post-construction survey of these buildings shall be conducted by a qualified structural engineer. Any damage shall be noted. All vibration monitors used for these measurements shall be equipped with an "alarm" feature to provide advanced notification that vibration impact criteria have been approached. Documented damage in the post-construction survey shall be repaired as required by the Secretary of the Interior's (SOI's) Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. The following historic resources shall be included in the Vibration Control Plan.*
   - *Gayley Center located at 1101 Gayley Avenue, adjoining the proposed Wilshire Boulevard/Metro D Line Station*
   - *Linde Medical Building located at 10921 Wilshire Boulevard, adjacent to the proposed Wilshire Boulevard/Metro D Line Station*
   - *Tishman Building located at 10950 Wilshire Boulevard, adjacent to the proposed Wilshire Boulevard/Metro D Line Station*
   - *UCLA Ackerman Hall, 308 Westwood Plaza, Los Angeles*
   - *Historic buildings located at 4506 Saugus Street, Sherman Oaks*
   - *Historic building located at 14746 Raymer Street, Van Nuys*

9.4.3 Impacts After Mitigation

9.4.3.1 Construction Noise

The proposed Alternative 5 alignment would result in temporary and periodic increases in ambient noise levels due to construction activity that would exceed FTA's criteria, and, where applicable, the standards established by the local noise ordinances. While MM NOI-5.1 would be implemented, which would include noise-reducing measures, there may still be temporary or periodic increases in ambient noise levels that exceed FTA construction impact criteria. There are no feasible mitigation measures to completely eliminate all anticipated instances of construction noise levels above the FTA criteria. Therefore, impacts related to construction noise would be significant and unavoidable.

9.4.3.2 Operational Vibration

As shown in Table 9-11, there would be operational GBV and GBN impacts at Category 1 and Category 2 land uses along the Alternative 5 alignment. Vibration impacts after implementation of mitigation are shown on Figure 9-28 through Figure 9-44. Results of implementation of MM VIB-5.1 are shown in Table 9-14. Therefore, operational GBV and GBN impacts would be less than significant after mitigation.

Table 9-14. Alternative 5: Summary of Groundborne Vibration and Groundborne Noise Impacts After Mitigation

Impact Area	Description of Impacted Area	Civil Station Limits		Calculated GBV (VdB)	Calculated GBN (dBA)	Number of Impacts After Mitigation	
		Start	End			Category 1	Category 2
1	Pico Boulevard to Tennessee Avenue	519+00	525+00	57-69	22-34	0	0
2	Tennessee Avenue to Olympic Boulevard	525+00	532+00	65-69	30-34	0	0
3	Olympic Boulevard to Mississippi Avenue	532+00	538+00	66-68	31-33	0	0
4	Mississippi Avenue to Santa Monica Station	538+00	555+50	58-66	21-33	0	0
5	South of Ashton Avenue and Midvale Avenue	599+73	602+31	67-69	32-34	0	0
6	Wilshire/Westwood Station to Le Conte Avenue	611+50	616+00	56-57	21-22	0	0
7	Le Conte Avenue to UCLA Gateway Plaza Station	625+50	639+00	52-59	17-24	0	0
8a/8b	Sunset Boulevard to Stone Canyon Road	673+50	711+00	65-67	30-32	0	0
9a/9b	Mulholland Drive to Valley Vista Boulevard	907+00	948+00	65-67	30-32	0	0
10	Valley Vista Boulevard to Ventura Boulevard/ Sepulveda Boulevard Station	949+00	958+00	65-69	30-34	0	0
11	Ventura Boulevard/Sepulveda Boulevard Station to US-101	965+90	987+00	55-67	20-32	0	0
12	US-101 to Magnolia Boulevard	990+70	1007+80	65-66	30-31	0	0
13	Magnolia Boulevard to Burbank Boulevard	1008+50	1034+00	55-65	20-30	0	0
14	Burbank Boulevard to Metro G-Line/Sepulveda Station	1038+00	1047+50	66	31	0	0
15	Metro G-Line/Sepulveda Station to Victory Boulevard	1078+30	1078+60	65	30	0	0
16	Victory Boulevard to Vanowen Street	1094+50	1110+30	66-68	31-33	0	0
17	Vanowen Street to Sepulveda/Sherman Way Station	1117+00	1133+00	65-71	30-36	0	0
18	Sepulveda/Sherman Way Station to Saticoy Street	1148+30	1163+50	65-67	30-32	0	0
19	Saticoy Street to Van Nuys Metrolink Station	1168+50	1188+00	57-66	22-31	0	0

Impact Area	Description of Impacted Area	Civil Station Limits		Calculated GBV (VdB)	Calculated GBN (dBA)	Number of Impacts After Mitigation	
		Start	End			Category 1	Category 2
Total Number of Impacts						**0**	**0**

Source: HTA, 2024

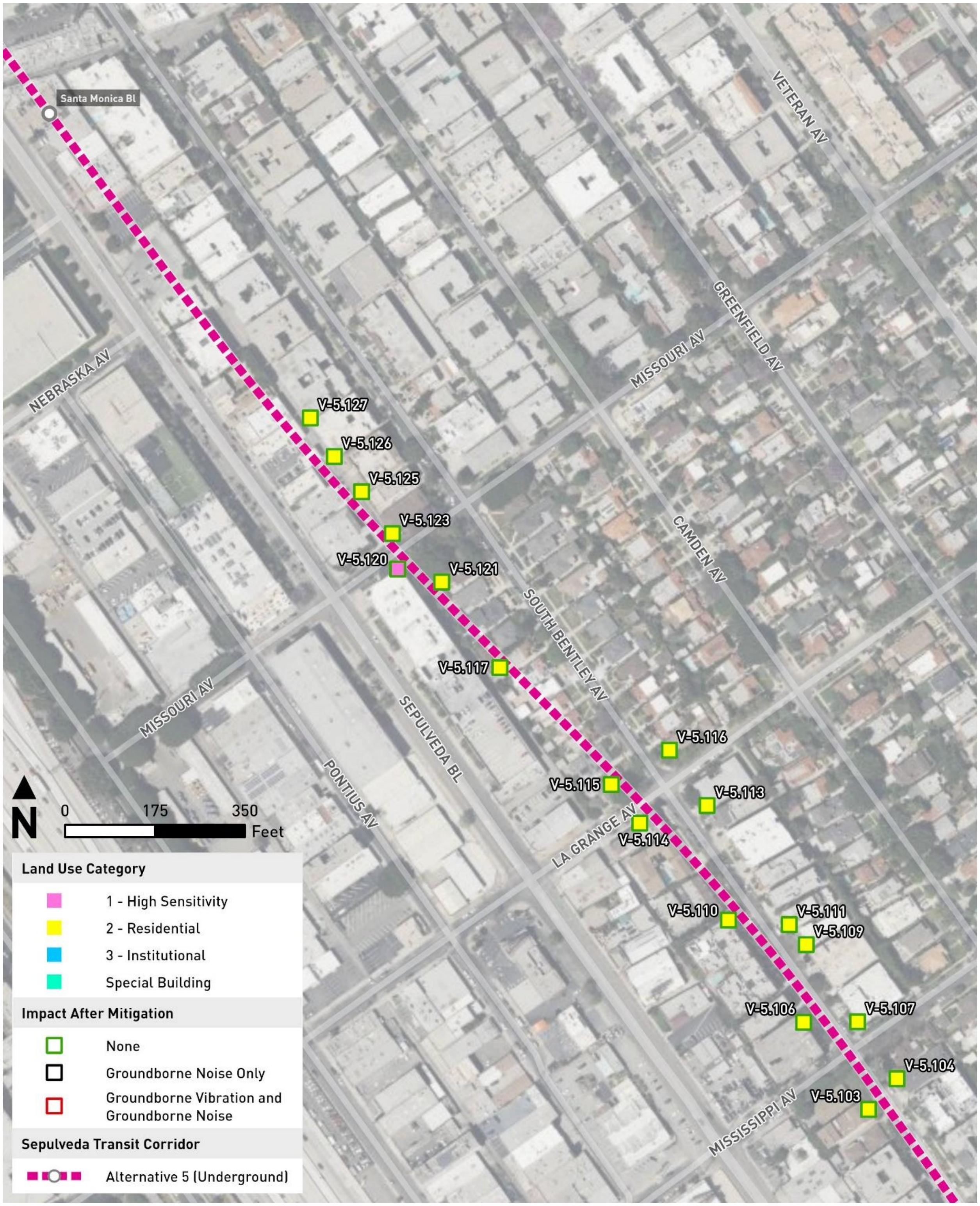
9.4.3.3 Construction Vibration

The proposed Alternative 5 alignment would result in temporary and periodic increases in ambient vibration levels due to construction activity that would exceed FTA's criteria. While MM VIB-5.2 would be implemented, which would include vibration-reducing measures, there may still be temporary or periodic increases in vibration levels that exceed FTA construction vibration impact criteria. Historic resources have been identified in MM VIB-5.2 that would require vibration monitoring and pre-construction and post-construction surveys. The mitigation would also require a pre-construction and post construction survey to be prepared, and any damage noted and restored per the requirements of SOI Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. Therefore, impacts related to construction vibration at historic resources would be less than significant with mitigation. Regarding construction vibration at non-historic structures, in some instances it may not be possible to reduce vibration by using less vibration intensive equipment due to geological conditions or physical constraints of the construction site. There are no feasible mitigation measures to completely eliminate all anticipated incidents of construction vibration levels exceeding the FTA criteria. Therefore, impacts related to construction vibration would be significant and unavoidable for both damage and annoyance.

Figure 9-28. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Areas 1, 2, and 3 Bentley Corridor, Pico Boulevard to Mississippi Avenue

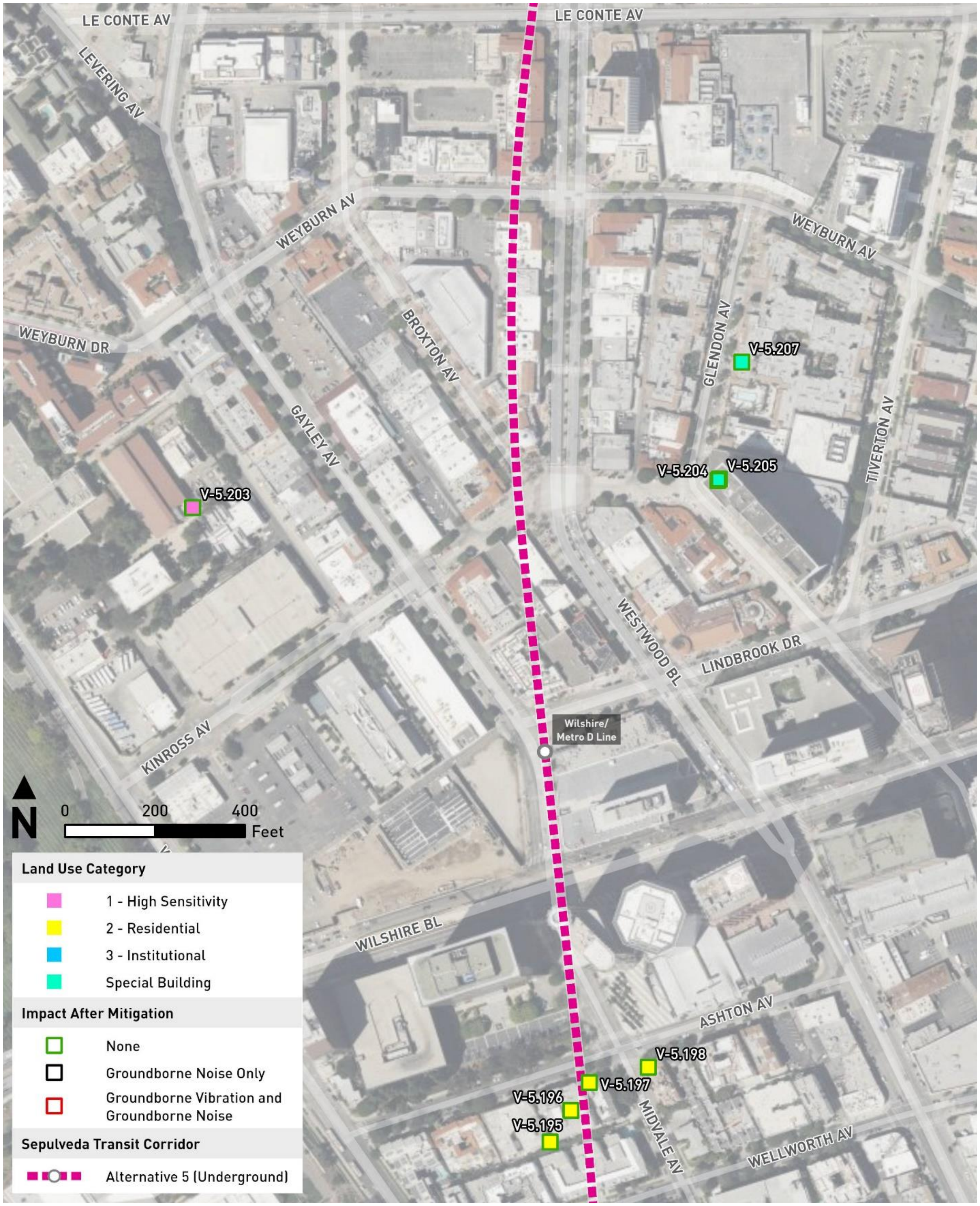
Source: HTA, 2024

Figure 9-29. Alternative 5 – Mitigated Operational Vibration Impacts– Impact Area 4 Bentley Corridor, Mississippi Avenue to Santa Monica Boulevard Station



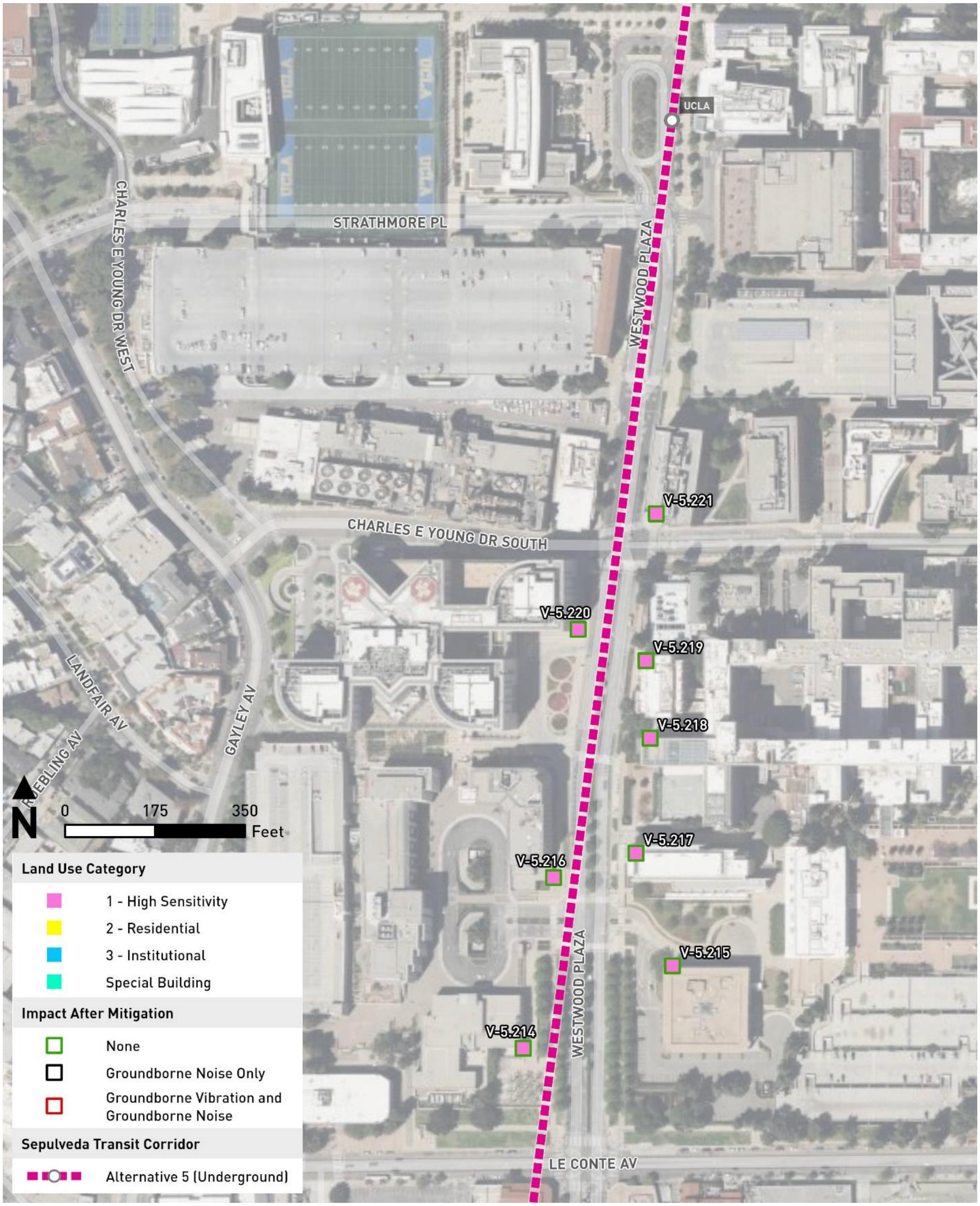
Source: HTA, 2024

Figure 9-30. Alternative 5 – Mitigated Operational Vibration Impacts – impact Areas 5 and 6 Westwood Area, Veteran Avenue to Le Conte Avenue



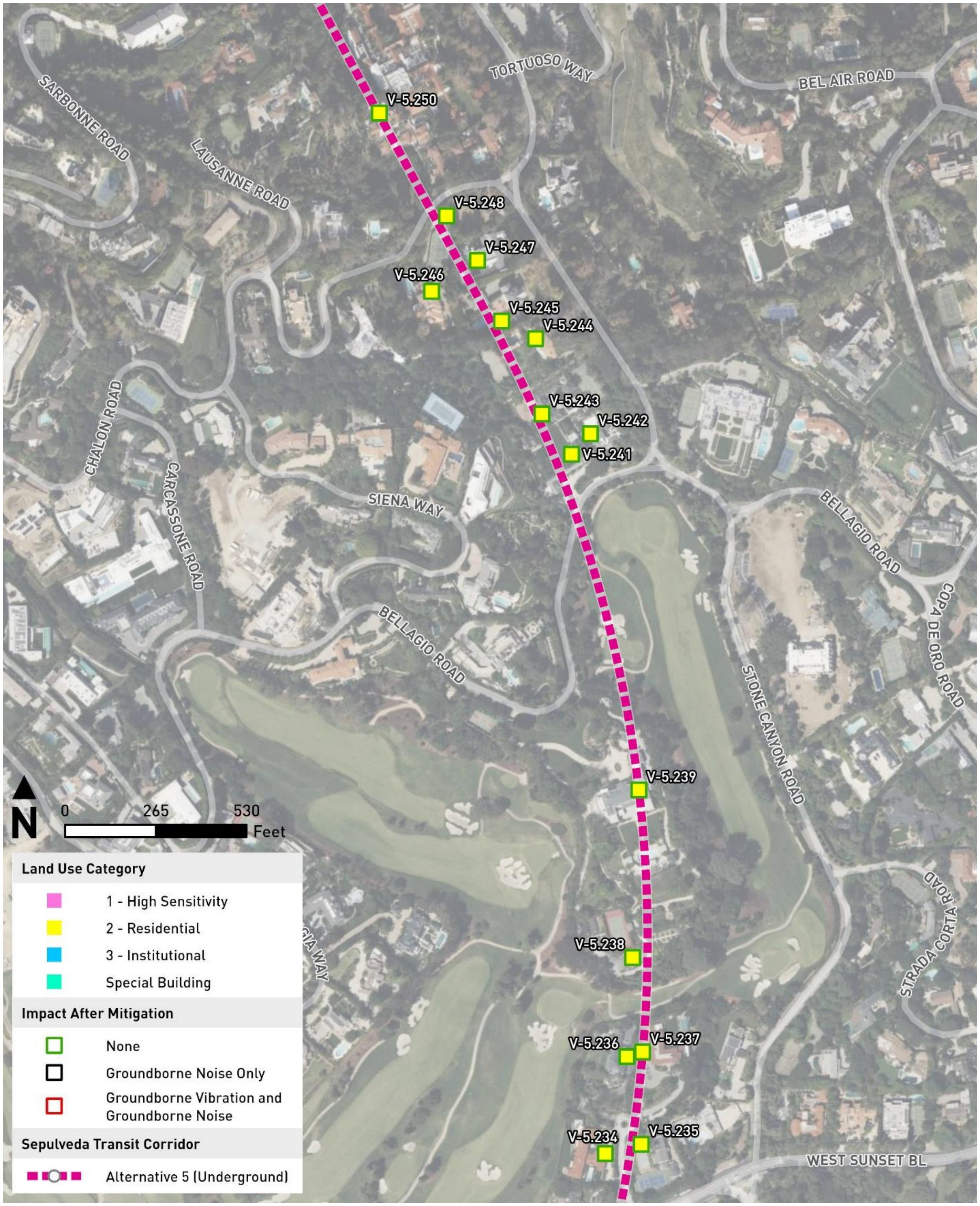
Source: HTA, 2024

Figure 9-31. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Area 7 Westwood Area, Le Conte Avenue to UCLA Gateway Plaza Station



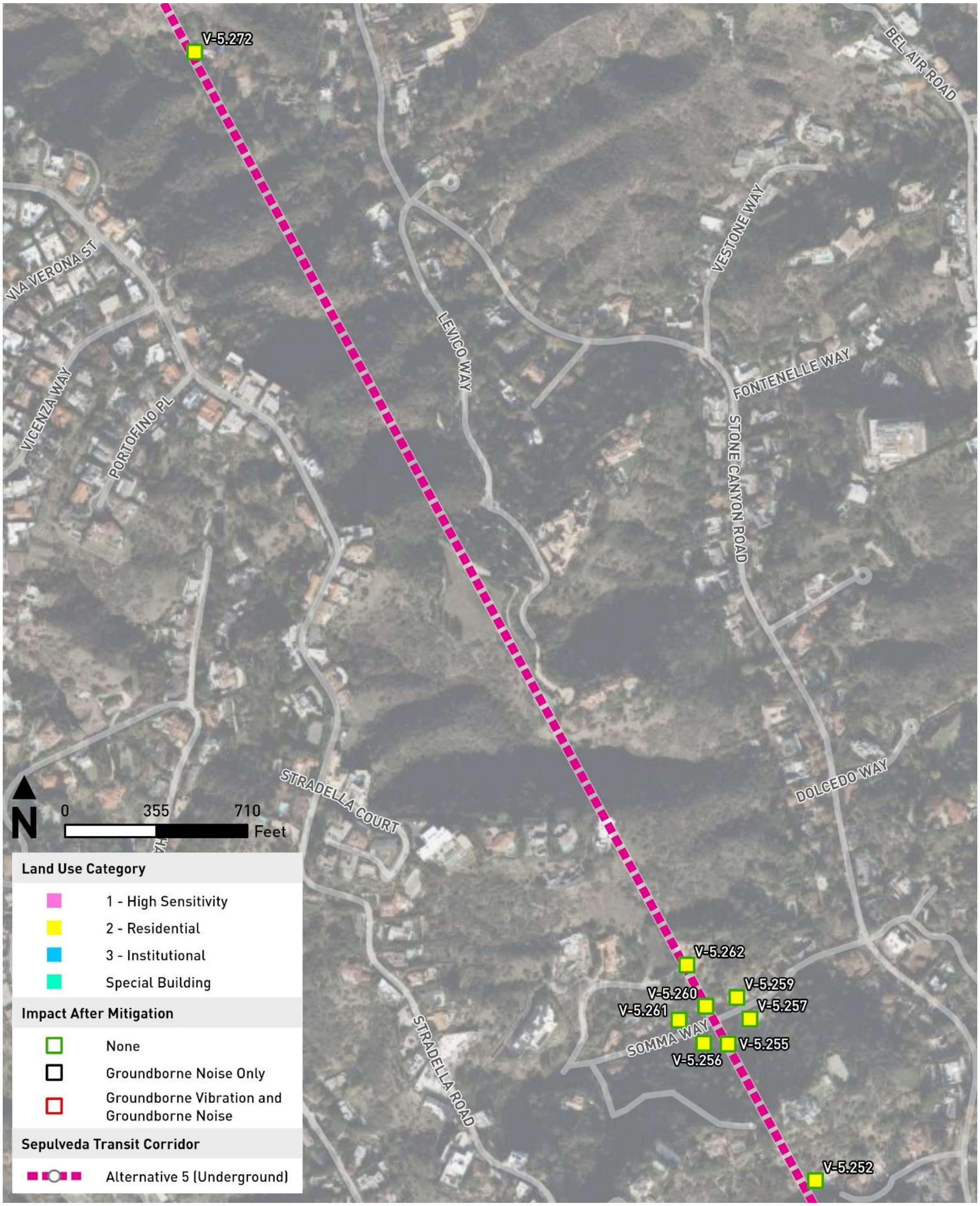
Source: HTA, 2024

Figure 9-32. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Area 8a Southern Santa Monica Mountains North of Sunset Boulevard



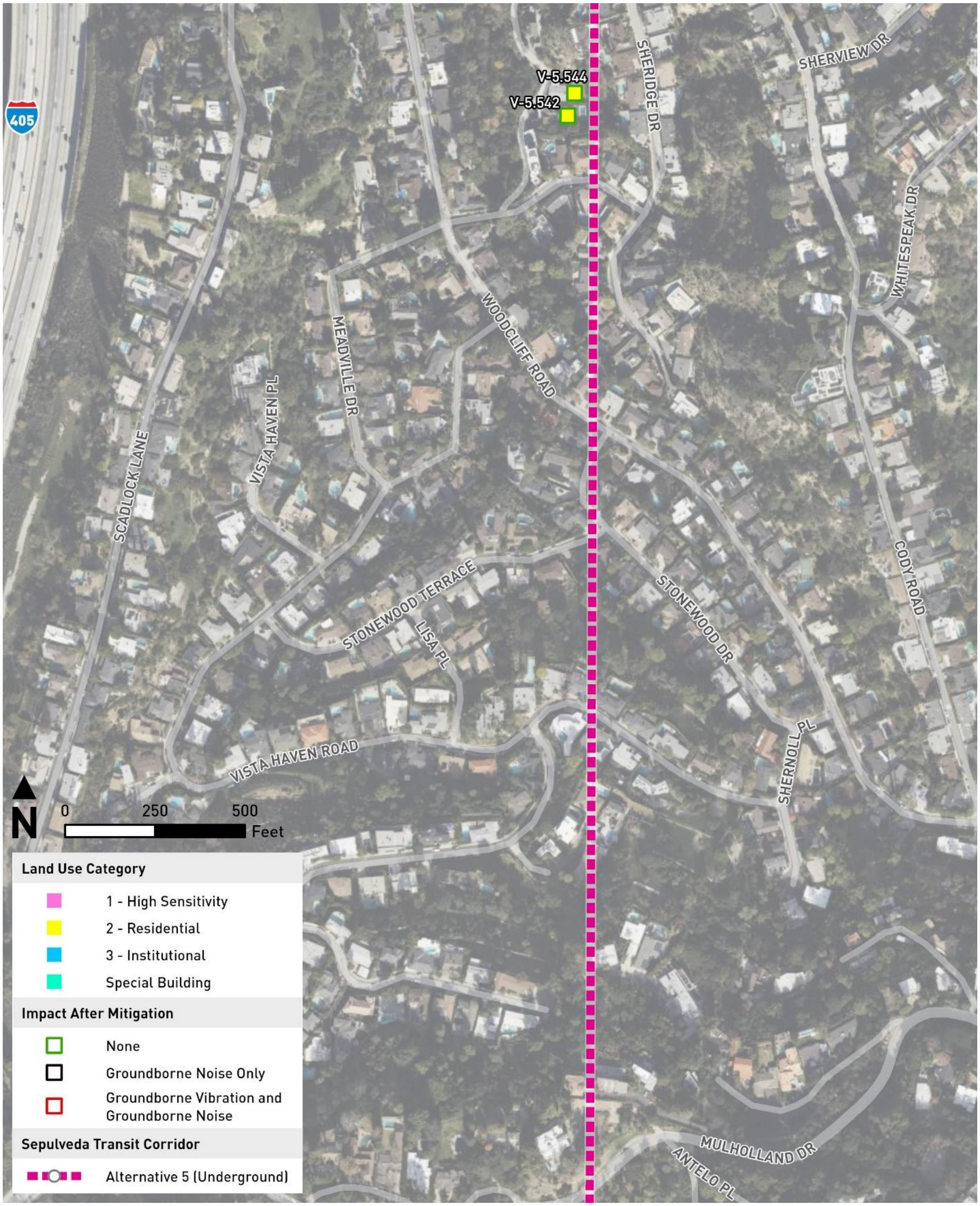
Source: HTA, 2024

Figure 9-33. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Area 8b Southern Santa Monica Mountains



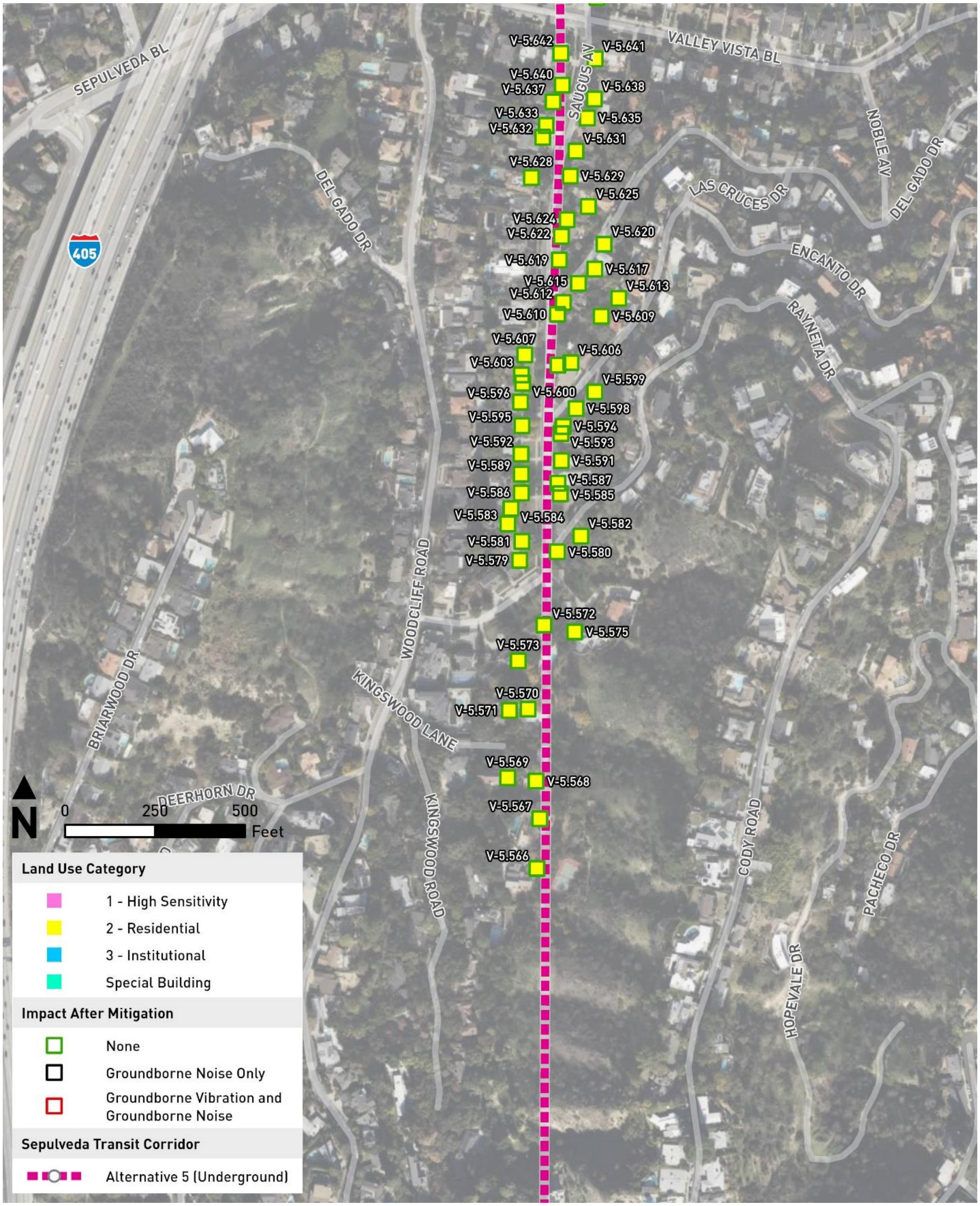
Source: HTA, 2024

Figure 9-34. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Area 9a Central Santa Monica Mountains North of Mulholland Drive



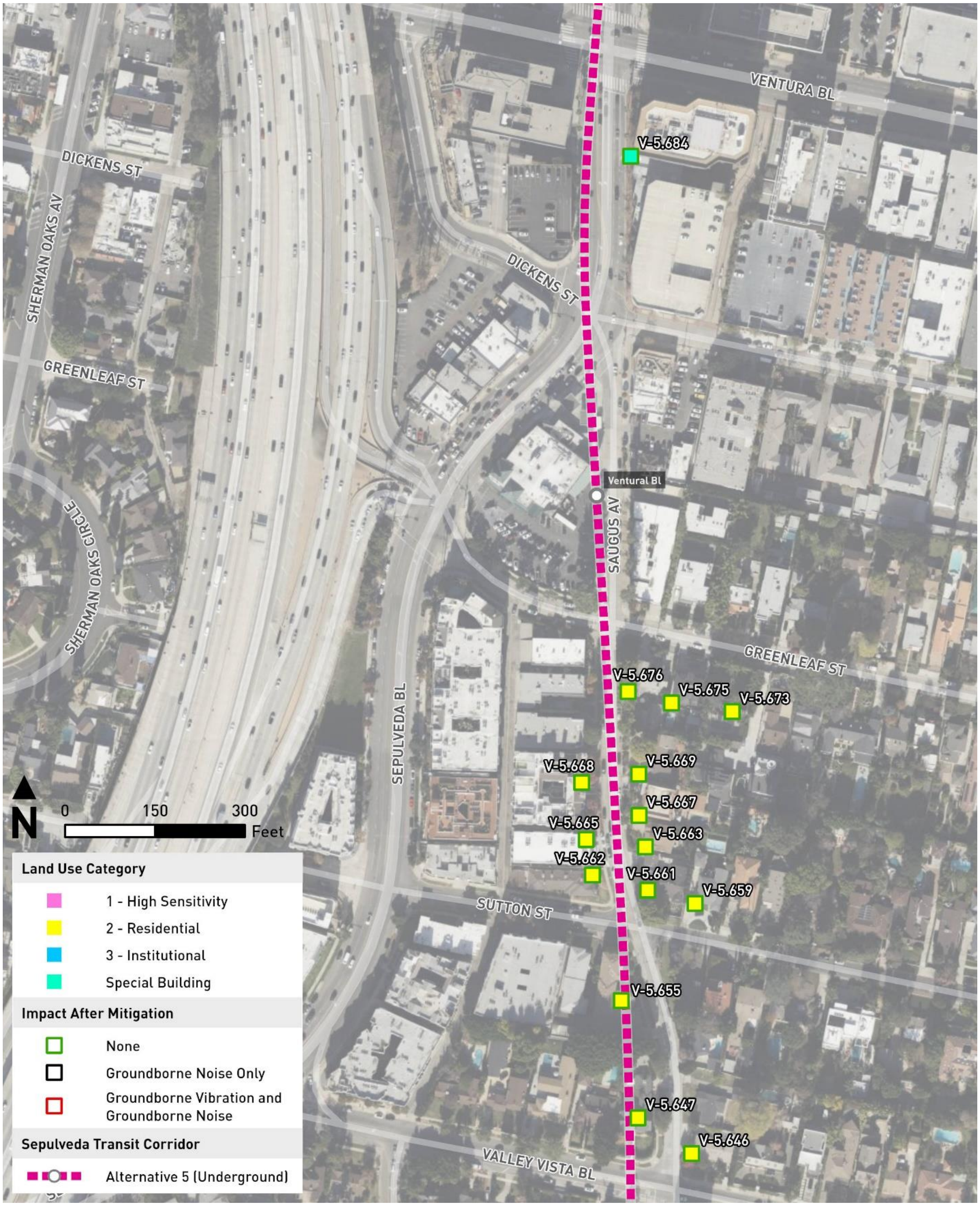
Source: HTA, 2024

Figure 9-35. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Area 9b Northern Santa Monica Mountains South of Valley Vista Boulevard



Source: HTA, 2024

Figure 9-36. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Area 10 Valley Vista Boulevard to Ventura Boulevard

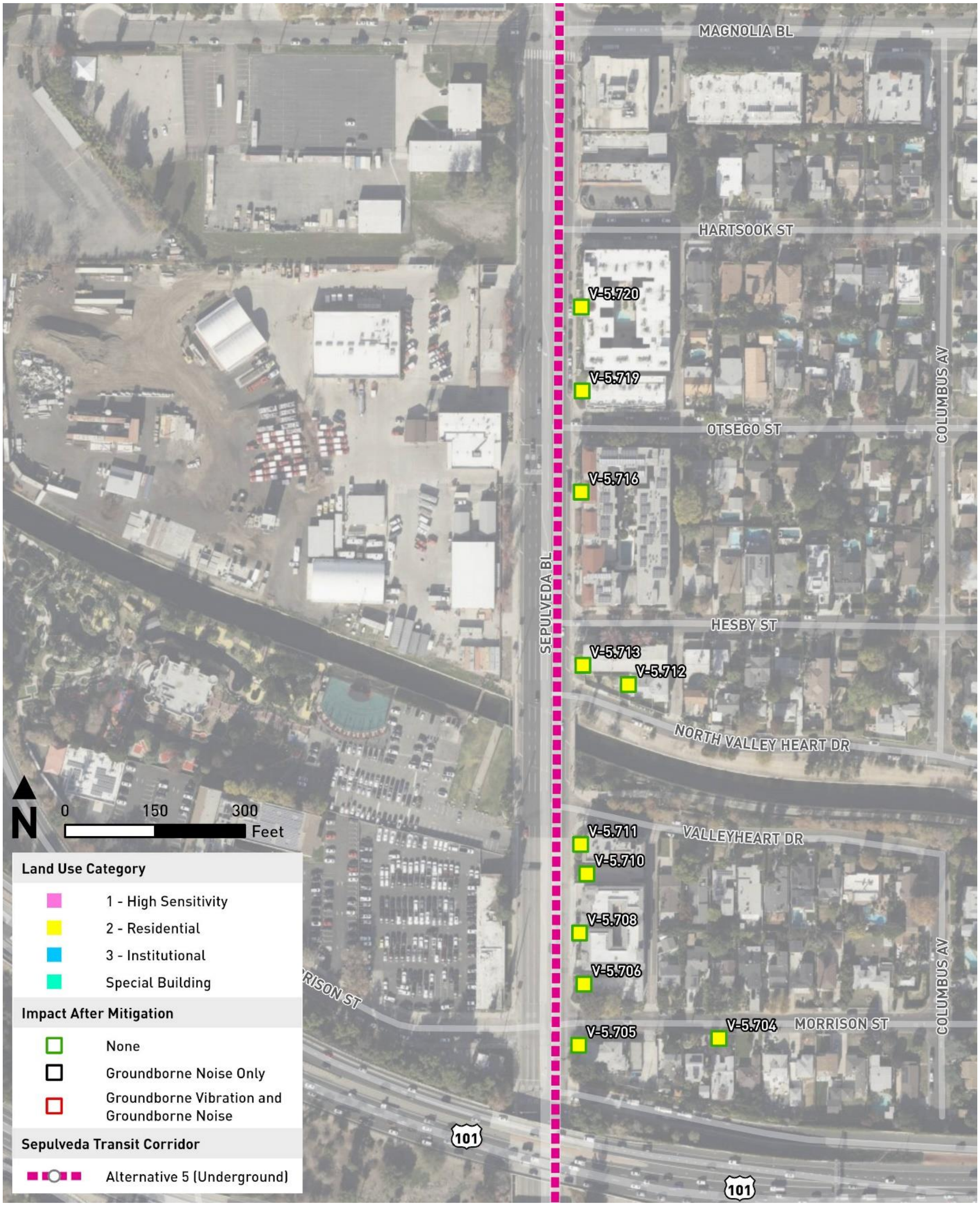


Source: HTA, 2024

Figure 9-37. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Area 11 Ventura Boulevard to US Highway 101

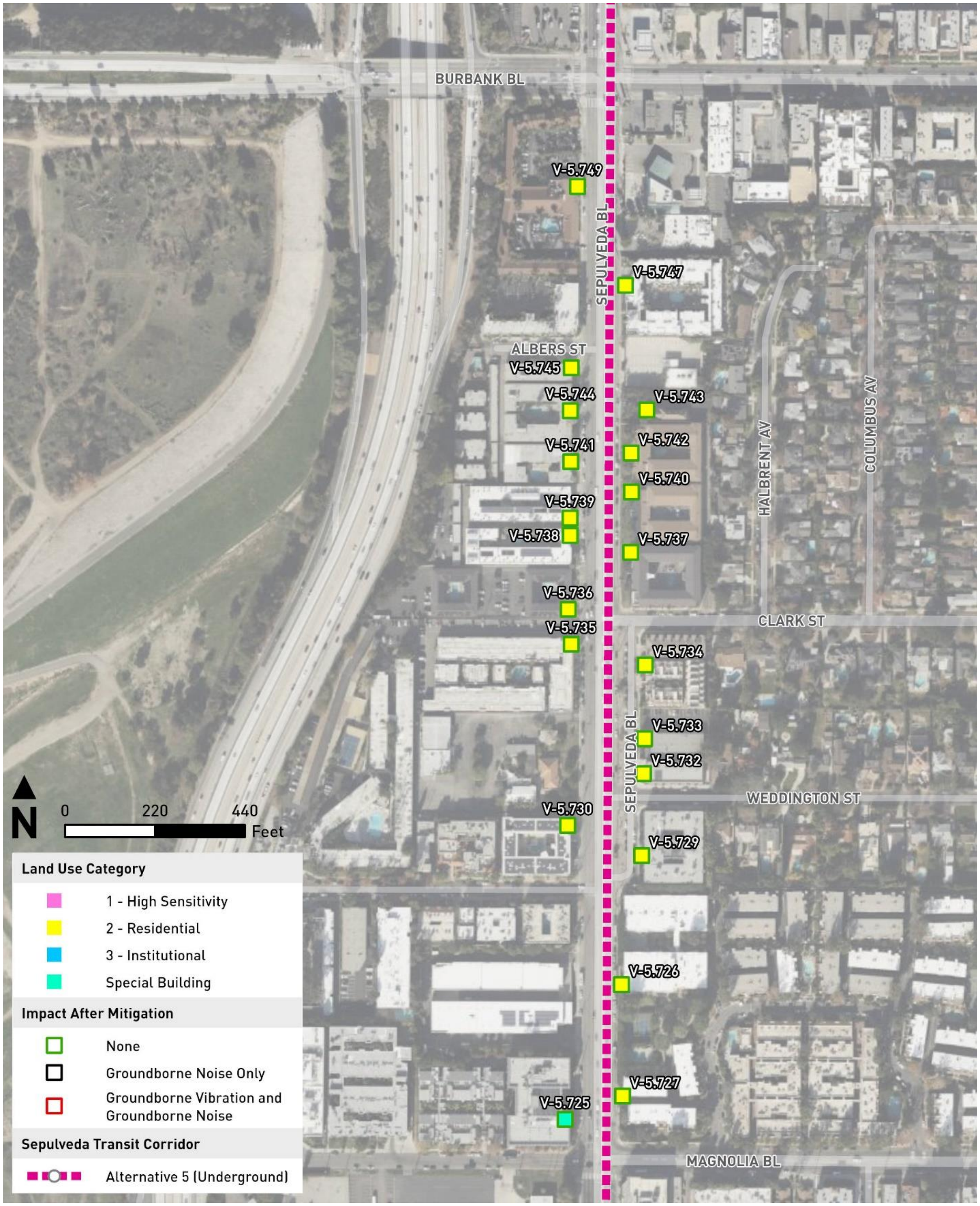
Source: HTA, 2024

**Figure 9-38. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Area 12
US Highway 101 to Magnolia Boulevard**



Source: HTA, 2024

Figure 9-39. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Area 13 Magnolia Boulevard to Burbank Boulevard

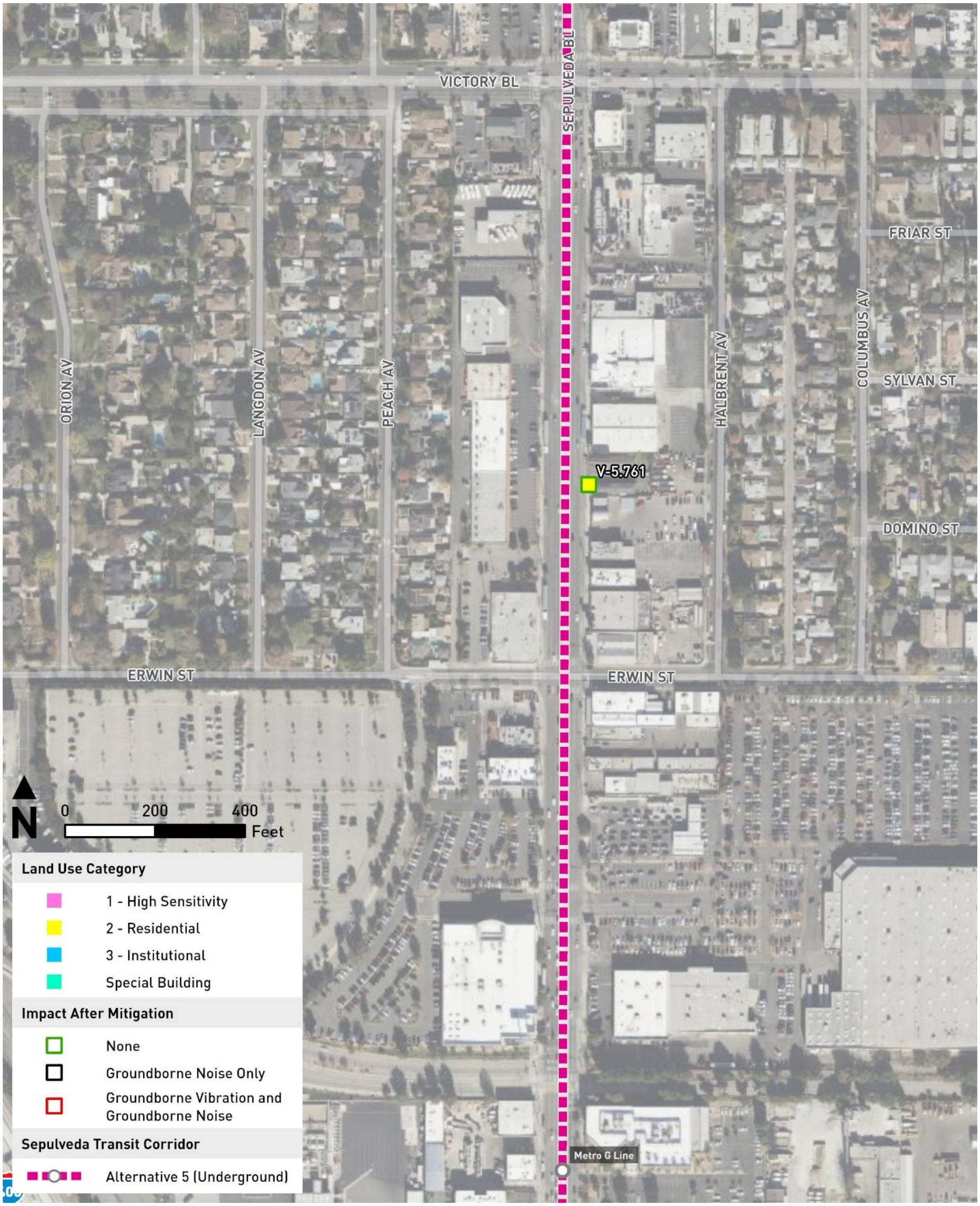


Source: HTA, 2024

Figure 9-40. Alternative 5 – Mitigated Operational Vibration Impacts– Impact Area 14 Burbank Boulevard to Metro G Line

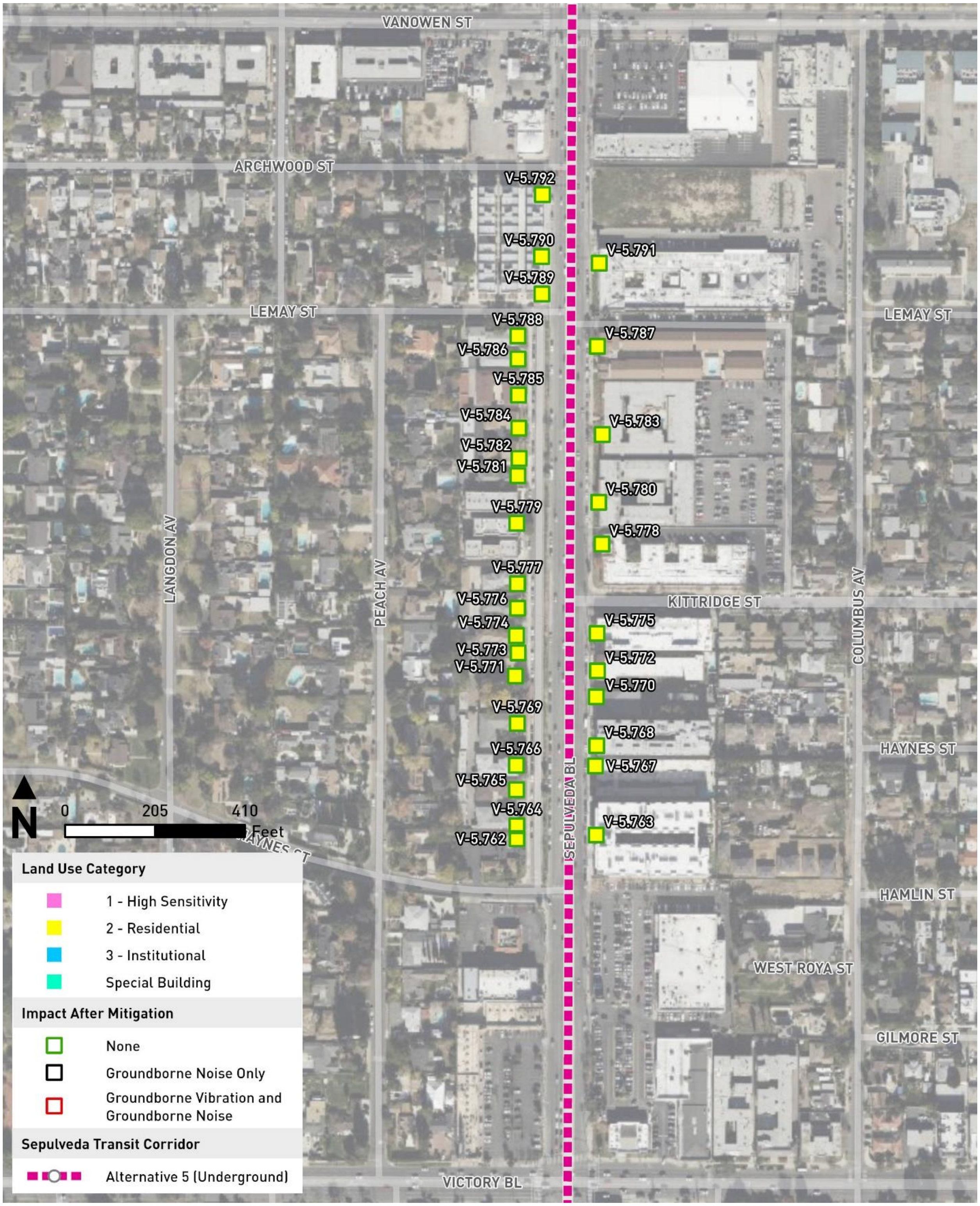
Source: HTA, 2024

Figure 9-41. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Area 15 Metro G Line to Victory Boulevard



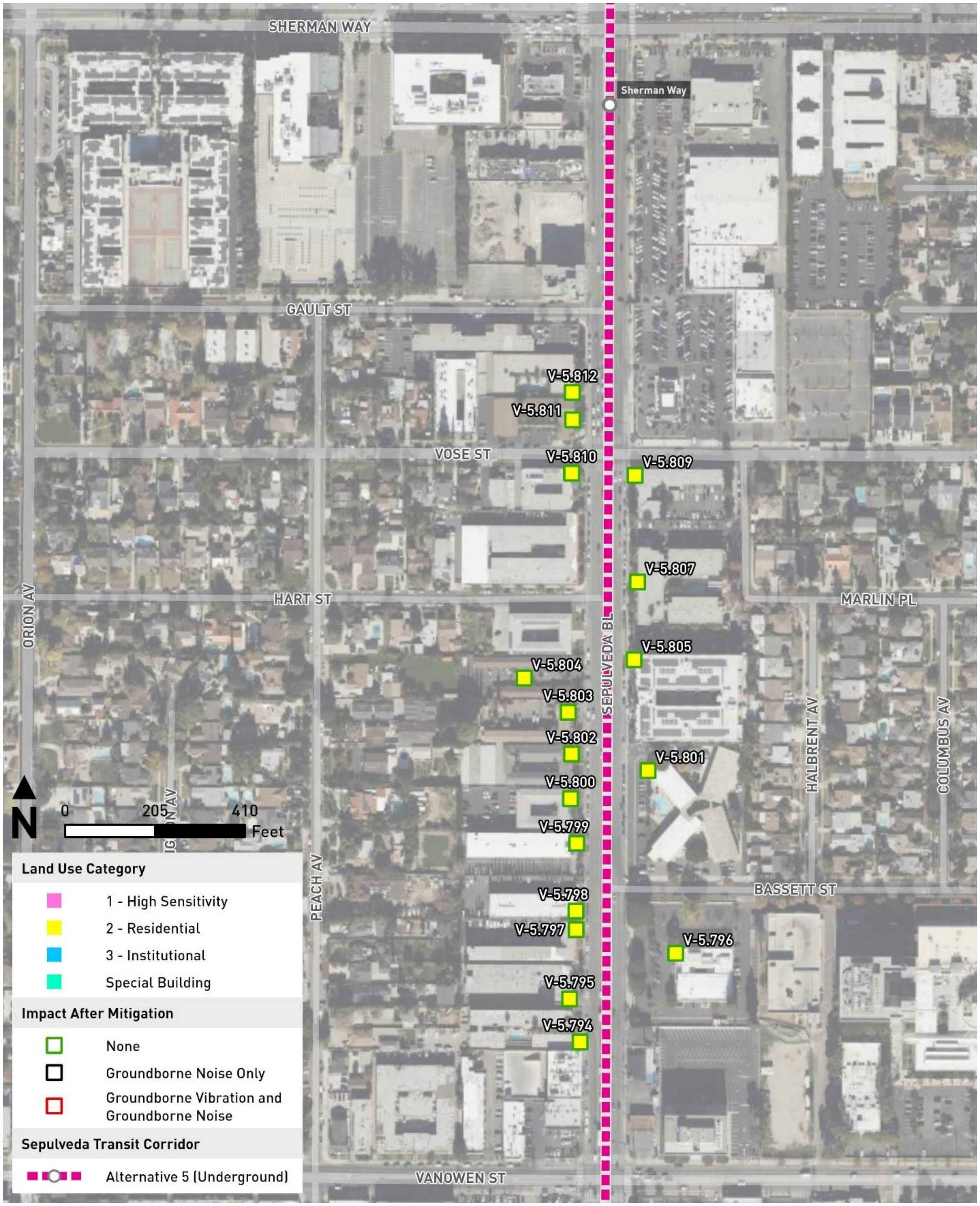
Source: HTA, 2024

Figure 9-42. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Area 16 Victory Boulevard to Vanowen Street



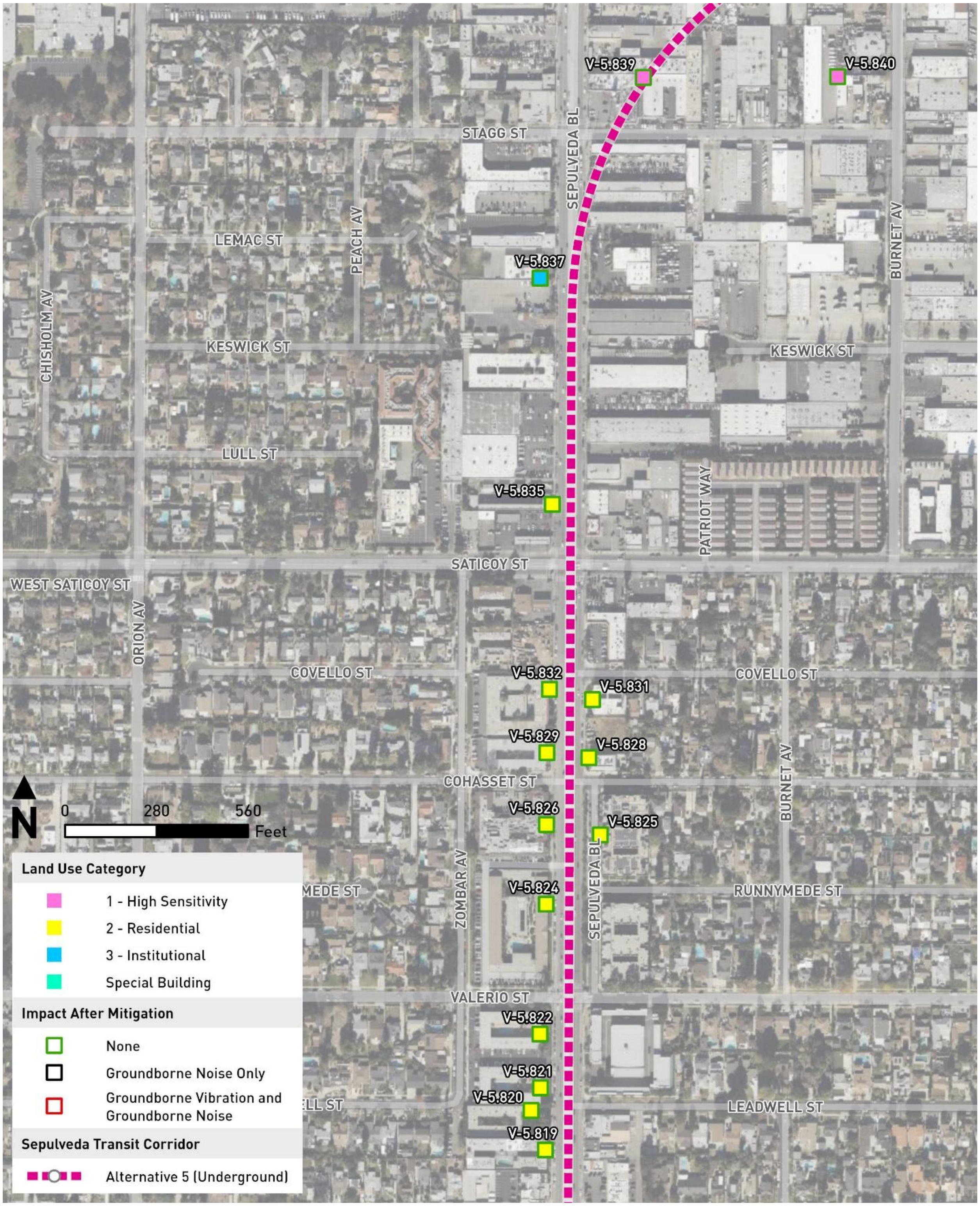
Source: HTA, 2024

Figure 9-43. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Area 17 Vanowen Street to Sherman Way



Source: HTA, 2024

Figure 9-44. Alternative 5 – Mitigated Operational Vibration Impacts – Impact Areas 18 and 19 Sherman Way to Stagg Street



Source: HTA, 2024

10 ALTERNATIVE 6

10.1 Alternative Description

Alternative 6 is a heavy rail transit (HRT) system with an underground track configuration. This alternative would provide transfers to five high-frequency fixed guideway transit and commuter rail lines, including the Los Angeles County Metropolitan Transportation Authority's (Metro) E, Metro D, and Metro G Lines, East San Fernando Valley Light Rail Transit Line, and the Metrolink Ventura County Line. The length of the alignment between the terminus stations would be approximately 12.9 miles.

The seven underground HRT stations would be as follows:

1. Metro E Line Expo/Bundy Station (underground)
2. Santa Monica Boulevard Station (underground)
3. Wilshire Boulevard/Metro D Line Station (underground)
4. UCLA Gateway Plaza Station (underground)
5. Ventura Boulevard/Van Nuys Boulevard Station (underground)
6. Metro G Line Van Nuys Station (underground)
7. Van Nuys Metrolink Station (underground)

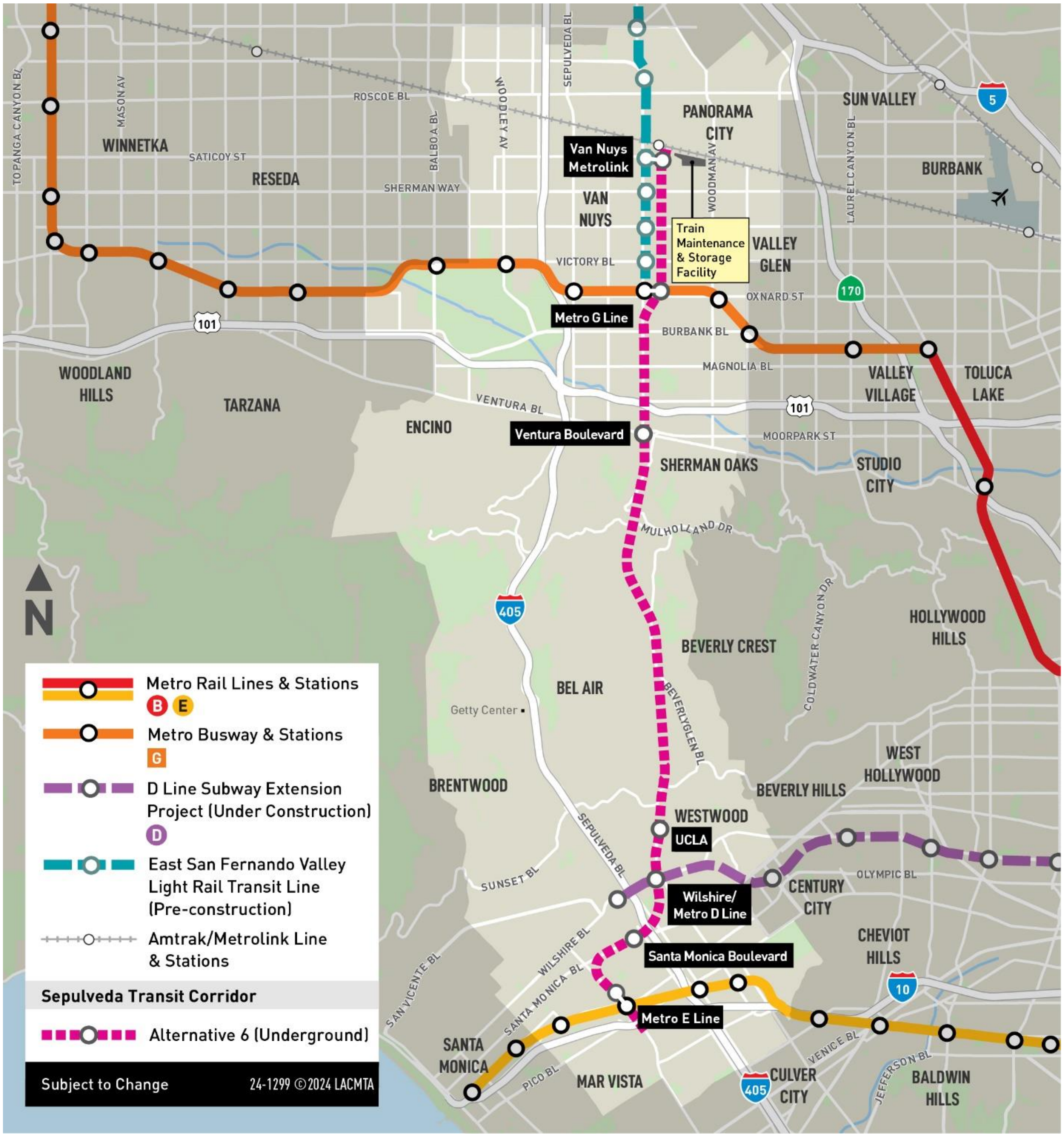
10.1.1 Operating Characteristics

10.1.1.1 Alignment

As shown on Figure 10-1, from its southern terminus station at the Metro E Line Expo/Bundy Station, the alignment of Alternative 6 would run underground through the Westside of Los Angeles (Westside), the Santa Monica Mountains, and the San Fernando Valley (Valley) to the alignment's northern terminus adjacent to the Van Nuys Metrolink/Amtrak Station.

The proposed southern terminus station would be located beneath the Bundy Drive and Olympic Boulevard intersection. Tail tracks for vehicle storage would extend underground south of the station along Bundy Drive for approximately 1,500 feet, terminating just north of Pearl Street. The alignment would continue north beneath Bundy Drive before turning to the east near Iowa Avenue to run beneath Santa Monica Boulevard. The Santa Monica Boulevard Station would be located between Barrington Avenue and Federal Avenue. After leaving the Santa Monica Boulevard Station, the alignment would turn to the northeast and pass under Interstate 405 (I-405) before reaching the Wilshire Boulevard/Metro D Line Station beneath the Metro D Line Westwood/UCLA Station, which is currently under construction as part of the Metro D Line Extension Project. From there, the underground alignment would curve slightly to the northeast and continue beneath Westwood Boulevard before reaching the UCLA Gateway Plaza Station.

Figure 10-1. Alternative 6: Alignment



Source: HTA, 2024

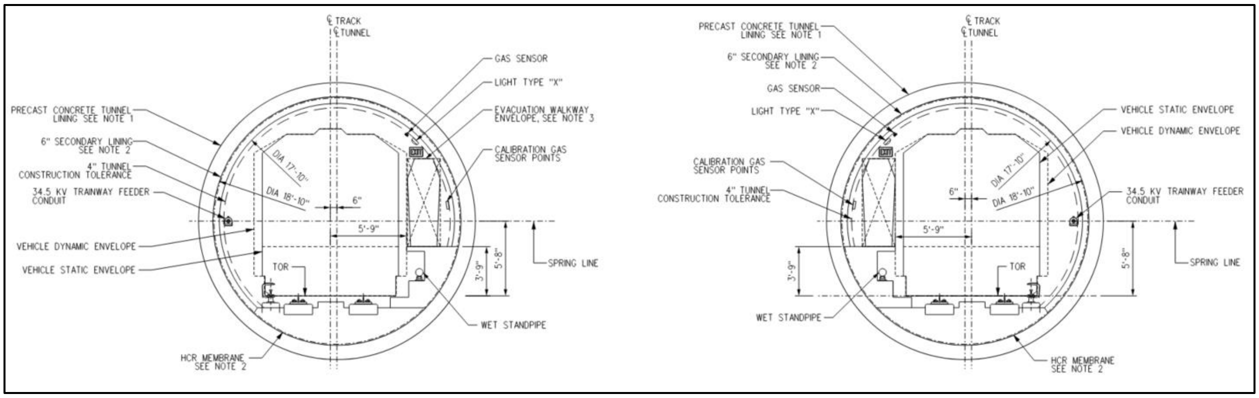
After leaving the UCLA Gateway Plaza Station, the alignment would continue to the north and travel under the Santa Monica Mountains. While still under the mountains, the alignment would shift slightly to the west to travel under the City of Los Angeles Department of Water and Power (LADWP) Stone Canyon Reservoir property to facilitate placement of a ventilation shaft on that property east of the reservoir. The alignment would then continue to the northeast to align with Van Nuys Boulevard at Ventura Boulevard as it enters the San Fernando Valley. The Ventura Boulevard Station would be beneath Van Nuys Boulevard at Moorpark Street. The alignment would then continue under Van Nuys

Boulevard before reaching the Metro G Line Van Nuys Station just south of Oxnard Street. North of the Metro G Line Van Nuys Station, the alignment would continue under Van Nuys Boulevard until reaching Sherman Way, where it would shift slightly to the east and run parallel to Van Nuys Boulevard before entering the Van Nuys Metrolink Station. The Van Nuys Metrolink Station would serve as the northern terminus station and would be located between Saticoy Street and Keswick Street. North of the station, a yard lead would turn sharply to the southeast and transition to an at-grade configuration and continue to the proposed maintenance and storage facility (MSF) east of the Van Nuys Metrolink Station.

10.1.1.2 Guideway Characteristics

The alignment of Alternative 6 would be underground using Metro's standard twin-bore tunnel design. Figure 10-2 shows a typical cross-section of the underground guideway. Cross-passages would be constructed at regular intervals in accordance with Metro Rail Design Criteria. Each of the tunnels would have a diameter of 19 feet (not including the thickness of wall). Each tunnel would include an emergency walkway that measures a minimum of 2.5 feet wide for evacuation.

Figure 10-2. Typical Underground Guideway Cross-Section



Source: HTA, 2024

10.1.1.3 Vehicle Technology

Alternative 6 would utilize driver-operated steel-wheel HRT trains, as used on the Metro B and D Lines, with planned peak headways of 4 minutes and off-peak-period headways ranging from 8 to 20 minutes. Trains would consist of four or six cars and are expected to consist of six cars during the peak period. The HRT vehicle would have a maximum operating speed of 67 miles per hour; actual operating speeds would depend on the design of the guideway and distance between stations. Train cars would be 10.3 feet wide with three double doors on each side. Each car would be approximately 75 feet long with capacity for 133 passengers. Trains would be powered by a third rail.

10.1.1.4 Stations

Alternative 6 would include seven underground stations with station platforms measuring 450 feet long. The southern terminus underground station would be adjacent to the existing Metro E Line Expo/Bundy Station, and the northern terminus underground station would be located south of the existing Van Nuys Metrolink/Amtrak Station. Except for the Wilshire Boulevard/Metro D Line, UCLA Gateway Plaza, and Metro G Line Van Nuys Stations, all stations would have a 30-foot-wide center platform. The Wilshire/Metro D Line Station would have a 32-foot-wide platform to accommodate the anticipated passenger transfer volumes, and the UCLA Gateway Plaza Station would have a 28-foot-wide platform because of the width constraint between the existing buildings. At the Metro G Line Van Nuys Station, the track separation would increase significantly in order to straddle the future East San Fernando Valley Light Rail Transit Line Station piles. The platform width at this station would increase to 58 feet.

The following information describes each station, with relevant entrance, walkway, and transfer information. Bicycle parking would be provided at each station.

Metro E Line Expo/Bundy Station

- This underground station would be located under Bundy Drive at Olympic Boulevard.
- Station entrances would be located on either side of Bundy Drive between the Metro E Line and Olympic Boulevard, as well as on the northeast corner of Bundy Drive and Mississippi Avenue.
- At the existing Metro E Line Expo/Bundy Station, escalators from the plaza to the platform level would be added to improve inter-station transfers.
- An 80-space parking lot would be constructed east of Bundy Drive and north of Mississippi Avenue. Passengers would also be able to park at the existing Metro E Line Expo/Bundy Station parking facility, which provides 217 parking spaces.

Santa Monica Boulevard Station

- This underground station would be located under Santa Monica Boulevard between Barrington Avenue and Federal Avenue.
- Station entrances would be located on the southwest corner of Santa Monica Boulevard and Barrington Avenue and on the southeast corner of Santa Monica Boulevard and Federal Avenue.
- No dedicated station parking would be provided at this station.

Wilshire Boulevard/Metro D Line Station

- This underground station would be located under Gayley Avenue between Wilshire Boulevard and Lindbrook Drive.
- A station entrance would be provided on the northwest corner of Midvale Avenue and Ashton Avenue. Passengers would also be able to use the Metro D Line Westwood/UCLA Station entrances to access the station platform.
- Direct internal station transfers to the Metro D Line would be provided at the south end of the station.
- No dedicated station parking would be provided at this station.

UCLA Gateway Plaza Station

- This underground station would be located underneath Gateway Plaza on the University of California, Los Angeles (UCLA) campus.
- Station entrances would be provided on the north side of Gateway Plaza, north of the Luskin Conference Center, and on the east side of Westwood Boulevard across from Strathmore Place.
- No dedicated station parking would be provided at this station.

Ventura Boulevard/Van Nuys Boulevard Station

- This underground station would be located under Van Nuys Boulevard at Moorpark Street.
- The station entrance would be located on the northwest corner of Van Nuys Boulevard and Ventura Boulevard.
- Two parking lots with a total of 185 parking spaces would be provided on the west side of Van Nuys Boulevard between Ventura Boulevard and Moorpark Street.

Metro G Line Van Nuys Station

- This underground station would be located under Van Nuys Boulevard south of Oxnard Street.
- The station entrance would be located on the southeast corner of Van Nuys Boulevard and Oxnard Street.
- Passengers would be able to park at the existing Metro G Line Van Nuys Station parking facility, which provides 307 parking spaces. No additional automobile parking would be provided at the proposed station.

Van Nuys Metrolink Station

- This underground station would be located immediately east of Van Nuys Boulevard between Saticoy Street and Keswick Street.
- Station entrances would be located on the northeast corner of Van Nuys Boulevard and Saticoy Street and on the east side of Van Nuys Boulevard just south of the Los Angeles-San Diego-San Luis Obispo (LOSSAN) rail corridor.
- Existing Metrolink Station parking would be reconfigured, maintaining approximately the same number of spaces. Metrolink parking would not be available to Metro transit riders.

10.1.1.5 Station-to-Station Travel Times

Table 10-1 presents the station-to-station distance and travel times for Alternative 6. The travel times include both run time and dwell time. Dwell time is 30 seconds for stations anticipated to have higher passenger volumes and 20 seconds for other stations. Northbound and southbound travel times vary slightly because of grade differentials and operational considerations at end-of-line stations.

Table 10-1. Alternative 6: Station-to-Station Travel Times and Station Dwell Times

From Station	To Station	Distance (miles)	Northbound Station-to-Station Travel Time (seconds)	Southbound Station-to-Station Travel Time (seconds)	Dwell Time (seconds)
Metro E Line Station					*20*
Metro E Line	Santa Monica Boulevard	1.1	111	121	—
Santa Monica Boulevard Station					*20*
Santa Monica Boulevard	Wilshire/Metro D Line	1.3	103	108	—
Wilshire/Metro D Line Station					*30*
Wilshire/Metro D Line	UCLA Gateway Plaza	0.7	69	71	—
UCLA Gateway Plaza Station					*30*
UCLA Gateway Plaza	Ventura Boulevard	5.9	358	358	—
Ventura Boulevard Station					*20*
Ventura Boulevard	Metro G Line	1.8	135	131	—

From Station	To Station	Distance (miles)	Northbound Station-to-Station Travel Time (seconds)	Southbound Station-to-Station Travel Time (seconds)	Dwell Time (seconds)
Metro G Line Station					*30*
Metro G Line	Van Nuys Metrolink	2.1	211	164	—
Van Nuys Metrolink Station					*30*

Source: HTA, 2024

— = no data

10.1.1.6 Special Trackwork

Alternative 6 would include seven double crossovers within the revenue service alignment, enabling trains to cross over to the parallel track with terminal stations having an additional double crossover beyond the end of the platform.

10.1.1.7 Maintenance and Storage Facility

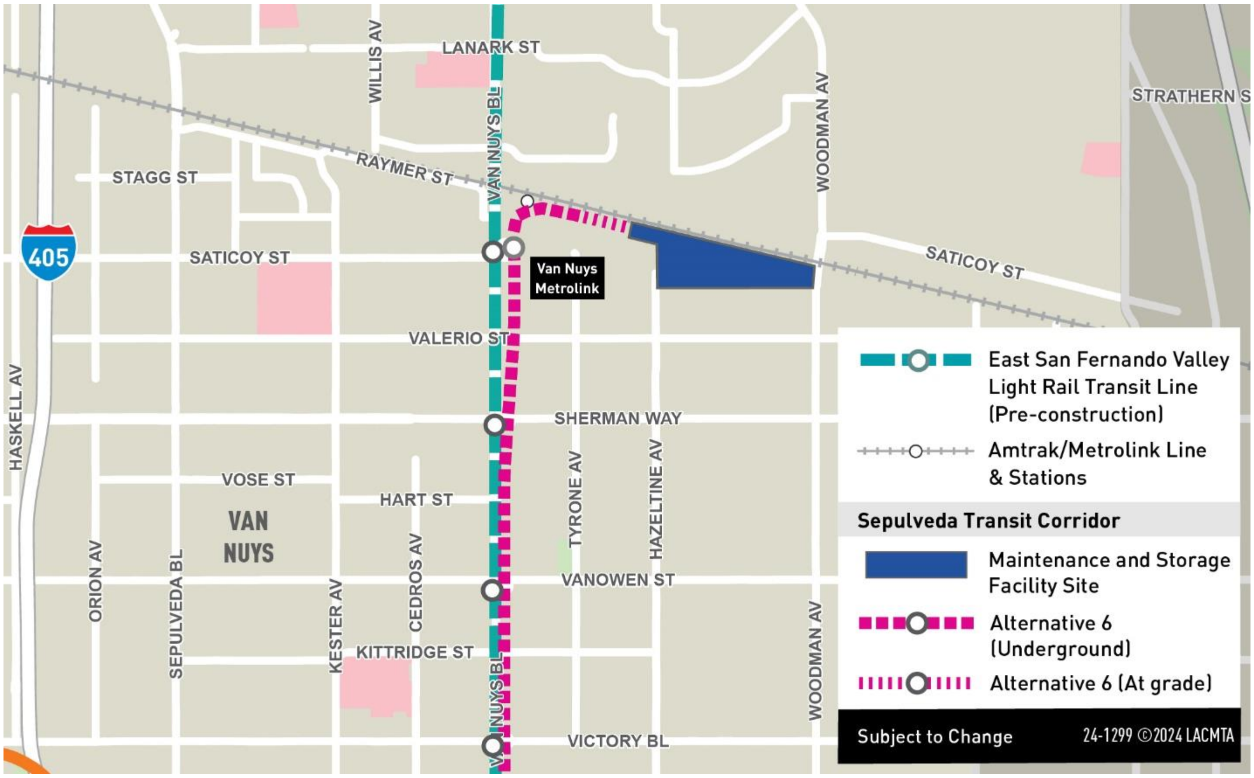
The MSF for Alternative 6 would be located east of the Van Nuys Metrolink Station and would encompass approximately 41 acres. The MSF would be designed to accommodate 94 vehicles and would be bounded by single-family residences to the south, the LOSSAN rail corridor to the north, Woodman Avenue to the east, and Hazeltine Avenue and industrial manufacturing enterprises to the west. Heavy rail trains would transition from underground to an at-grade configuration near the MSF, the northwest corner of the site. Trains would then travel southeast to maintenance facilities and storage tracks.

The site would include the following facilities:

- Two entrance gates with guard shacks
- Maintenance facility building
- Maintenance-of-way facility
- Storage tracks
- Carwash
- Cleaning platform
- Administrative offices
- Pedestrian bridge connecting the administrative offices to employee parking
- Two traction power substations (TPSS)

Figure 10-3 shows the location of the MSF for Alternative 6.

Figure 10-3. Alternative 6: Maintenance and Storage Facility Site



Source: HTA, 2024

10.1.1.8 Traction Power Substations

TPSSs transform and convert high voltage alternating current supplied from power utility feeders into direct current suitable for transit operation. Twenty-two TPSS facilities would be located along the alignment and would be spaced approximately 1 mile apart except within the Santa Monica Mountains. Each at-grade TPSS along the alignment would be approximately 5,000 square feet. Table 10-2 lists the TPSS locations for Alternative 6.

Figure 10-4 shows the TPSS locations along the Alternative 6 alignment.

Table 10-2. Alternative 6: Traction Power Substation Locations

TPSS No.	TPSS Location Description	Configuration
1 and 2	TPSSs 1 and 2 would be located immediately north of the Bundy Drive and Mississippi Avenue intersection.	Underground (within station)
3 and 4	TPSSs 3 and 4 would be located east of the Santa Monica Boulevard and Stoner Avenue intersection.	Underground (within station)
5 and 6	TPSSs 5 and 6 would be located southeast of the Kinross Avenue and Gayley Avenue intersection.	Underground (within station)
7 and 8	TPSSs 7 and 8 would be located at the north end of the UCLA Gateway Plaza Station.	Underground (within station)
9 and 10	TPSSs 9 and 10 would be located east of Stone Canyon Reservoir on LADWP property.	At-grade
11 and 12	TPSSs 11 and 12 would be located at the Van Nuys Boulevard and Ventura Boulevard intersection.	Underground (within station)
13 and 14	TPSSs 13 and 14 would be located immediately south of Magnolia Boulevard and west of Van Nuys Boulevard.	At-grade
15 and 16	TPSSs 15 and 16 would be located along Van Nuys Boulevard between Emelita Street and Califa Street.	Underground (within station)
17 and 18	TPSSs 17 and 18 would be located east of Van Nuys Boulevard and immediately north of Vanowen Street.	At-grade
19 and 20	TPSSs 19 and 20 would be located east of Van Nuys Boulevard between Saticoy Street and Keswick Street.	Underground (within station)
21 and 22	TPSSs 21 and 22 would be located south of the Metrolink tracks and east of Hazeltine Avenue.	At-grade (within MSF)

Source: HTA, 2024

Figure 10-4. Alternative 6: Traction Power Substation Locations

Source: HTA, 2024

10.1.1.9 Roadway Configuration Changes

In addition to the access road described in the following section, Alternative 6 would require reconstruction of roadways and sidewalks near stations.

10.1.1.10 Ventilation Facilities

Tunnel ventilation for Alternative 6 would be similar to existing Metro ventilation systems for light and heavy rail underground subways. In case of emergency, smoke would be directed away from trains and extracted through the use of emergency ventilation fans installed at underground stations and crossover locations adjacent to the stations. In addition, a mid-mountain ventilation facility for the extraction of air would be located on LADWP property east of Stone Canyon Reservoir in the Santa Monica Mountains. An access road from the Stone Canyon Reservoir access road would be constructed to the location of the facility, requiring grading of the hillside along its route.

10.1.1.11 Fire/Life Safety – Emergency Egress

Each tunnel would include an emergency walkway that measures a minimum of 2.5 feet wide for evacuation. Cross-passages would be provided at regular intervals to connect the two tunnels to allow for safe egress to a point of safety (typically at a station) during an emergency. Access to tunnel segments for first responders would be through stations.

10.1.2 Construction Activities

Temporary construction activities for Alternative 6 would include construction of ancillary facilities, as well as guideway and station construction and construction staging and laydown areas, which would be co-located with future MSF and station locations. Construction of the transit facilities through substantial completion is expected to have a duration of 7½ years. Early works, such as site preparation, demolition, and utility relocation, could start in advance of construction of the transit facilities.

For the guideway, twin-bore tunnels would be constructed using two tunnel boring machines (TBM). The tunnel alignment would be constructed over three segments—including the Westside, Santa Monica Mountains, and Valley—using a different pair of TBMs for each segment. For the Westside segment, the TBMs would be launched from the Metro E Line Station and retrieved at the UCLA Gateway Plaza Station. For the Santa Monica Mountains segment, the TBMs would operate from the Ventura Boulevard Station in a southerly direction for retrieval from UCLA Gateway Plaza Station. In the Valley, TBMs would be launched from the Van Nuys Metrolink Station and retrieved at the Ventura Boulevard Station.

The distance from the surface to the top of the tunnels would vary from approximately 50 feet to 130 feet in the Westside, between 120 feet and 730 feet in the Santa Monica Mountains, and between 40 feet and 75 feet in the Valley.

Construction work zones would also be co-located with future MSF and station locations. All work zones would comprise the permanent facility footprint with additional temporary construction easements from adjoining properties. In addition to permanent facility locations, TBM launch at the Metro E Line Station would require the closure of Interstate 10 (I-10) westbound off-ramps at Bundy Drive for the duration of the Sepulveda Transit Corridor Project (Project) construction.

Alternative 6 would include seven underground stations. All stations would be constructed using a “cut-and-cover” method whereby the station structure would be constructed within a trench excavated from the surface that is covered by a temporary deck and backfilled during the later stages of station construction. Traffic and pedestrian detours would be necessary during underground station excavation until decking is in place and the appropriate safety measures have been taken to resume cross traffic. In addition, portions of the Wilshire Boulevard/Metro D Line Station crossing underneath the Metro D Line Westwood/UCLA Station and underneath a mixed-use building at the north end of the station would be constructed using sequential excavation method as it would not be possible to excavate the station from the surface.

Construction of the MSF site would begin with demolition of existing structures, followed by earthwork and grading. Building foundations and structures would be constructed, followed by yard improvements and trackwork, including paving, parking lots, walkways, fencing, landscaping, lighting, and security systems. Finally, building mechanical, electrical, and plumbing systems, finishes, and equipment would be installed. The MSF site would also be used as a staging site.

Station and MSF sites would be used for construction staging areas. A construction staging area, shown on Figure 10-5, would also be located off Stone Canyon Road northeast of the Upper Stone Canyon Reservoir. In addition, temporary construction easements outside of the station and MSF footprints would be required along Bundy Drive, Santa Monica Boulevard, Wilshire Boulevard, and Van Nuys Boulevard. The westbound to southbound loop off-ramp of the I-10 interchange at Bundy Drive would also be used as a staging area and would require extended ramp closure. Construction staging areas would provide the necessary space for the following activities:

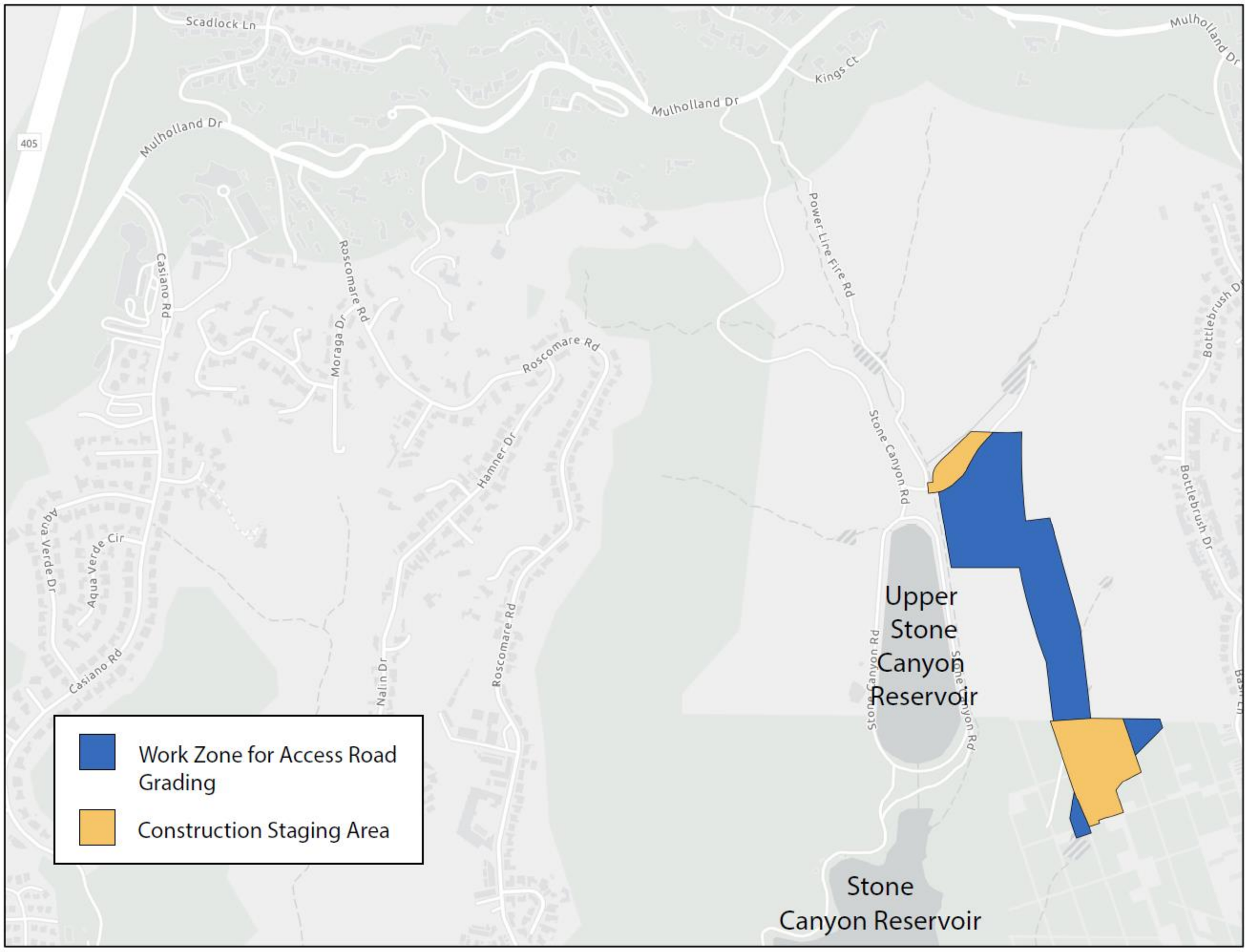
- Contractors’ equipment
- Receiving deliveries
- Testing of soils for minerals or hazards
- Storing materials
- Site offices
- Work zone for excavation
- Other construction activities (including parking and change facilities for workers, location of construction office trailers, storage, staging and delivery of construction materials and permanent plant equipment, and maintenance of construction equipment)

The size of proposed construction staging areas for each station would depend on the level of work to be performed for a specific station and considerations for tunneling, such as TBM launch or extraction. Staging areas required for TBM launching would include areas for launch and access shafts, cranes, material and equipment, precast concrete segmental liner storage, truck wash areas, mechanical and electrical shops, temporary services, temporary power, ventilation, cooling tower, plants, temporary construction driveways, storage for spoils, and space for field offices.

Alternative 6 would also include several ancillary facilities and structures, including TPSS structures, a deep vent shaft structure at Stone Canyon Reservoir, as well as additional vent shafts at stations and crossovers. TPSSs would be co-located with MSF and station locations, except for two TPSSs at the Stone Canyon Reservoir vent shaft and four along Van Nuys Boulevard in the Valley. The Stone Canyon Reservoir vent shaft would be constructed using a vertical shaft sinking machine that uses mechanized shaft sinking equipment to bore a vertical hole down into the ground. Operation of the machine would be controlled and monitored from the surface. The ventilation shaft and two TPSSs in the Santa Monica Mountains would require an access road within the LADWP property at Stone Canyon Reservoir. Construction of the access road would require grading east of the reservoir. Construction of all mid-mountain facilities would take place within the footprint shown on Figure 10-5.

Additional vent shafts would be located at each station with one potential intermediate vent shaft where stations are spaced apart. These vent shafts would be constructed using the typical cut-and-cover method, with lateral bracing as the excavation proceeds. During station construction, the shafts would likely be used for construction crew, material, and equipment access.

Figure 10-5. Alternative 6: Mid-Mountain Construction Staging Site



Source: HTA, 2024

Alternative 6 would utilize precast tunnel lining segments in the construction of the transit tunnels. These tunnel lining segments would be similar to those used in recent Metro underground transit projects. Therefore, it is expected that the tunnel lining segments would be obtained from an existing casting facility in Los Angeles County and no additional permits or approvals would be necessary specific to the facility.

10.2 Existing Conditions

10.2.1 Noise

The noise environment in the Project Study Area is dominated by traffic noise, including freeways and arterial roads, such as I-405, U.S. Highway 101, Santa Monica Boulevard, Wilshire Boulevard, and Van Nuys Boulevard. Aircraft flyovers are also contributors to the existing noise environment in most areas along the Alternative 6 alignment. Land uses found along the alignment include single- and multi-family residential uses, hotels/motels, religious facilities, educational facilities, public facilities, public and commercial office buildings, various types of commercial uses, institutional uses, theaters, recording or video production studios, surface parking facilities, and parking structures.

Noise-sensitive land uses were identified using a geographic information systems (GIS), assessor's parcel maps, aerial photographs, and field surveys. Land use data were obtained from the Southern California Association of Governments (SCAG) 2019 regional land use data set for Los Angeles County (SCAG, 2019). Sensitive land uses were classified into one of the three Federal Transit Administration (FTA) sensitive land use categories (FTA, 2018). Refer to Table 2-1 for a detailed description of each category.

- Category 1 noise-sensitive land uses identified along the Alternative 6 alignment include existing television, broadcast, and film production studios along Bundy Drive, The Village Studios (recording studio) on Butler Avenue south of Santa Monica Boulevard, Stray Angel Films (a film production studio) on Santa Monica Boulevard, an animal hospital at the crossing of the alignment with Sepulveda Boulevard, Fox Sports studios on Sepulveda Boulevard, scientific/research laboratories and medical facilities in and near the UCLA campus along Westwood Boulevard, music and video production outfits on Glendon Avenue, and three film or music production studios along Van Nuys Boulevard.
- Category 2 noise-sensitive land uses include single- and multi-family residential, hotels/motels, and a convalescent home located along the Alternative 6 alignment.
- Category 3 noise-sensitive land uses along the Alternative 6 alignment include religious facilities, schools of various types, and medical buildings scattered throughout the Project Study Area.

Some uses in the UCLA area include multiple noise-sensitive land use categories. For instance, UCLA dorms and medical bedding are Category 2 noise-sensitive land uses, while classrooms are Category 3, and medial operating rooms or scientific and engineering education or research laboratories are Category 1 land uses.

The existing noise conditions along the Alternative 6 alignment were documented through noise monitoring performed at representative noise-sensitive locations along the proposed alignment. This section provides a summary of the noise measurement results.

Representative noise-sensitive locations were identified by using preliminary alignment maps, aerial photographs, visual surveys, and proximity to aboveground noise sources associated with Alternative 6. Long-term (24-hour) noise measurements were conducted at a total of seven locations representing Category 1 land uses. Short-term noise measurements (two one-hour measurements) were obtained at two locations representing exterior areas of Category 3 land uses. Figure 10-6 and Figure 10-7 show the locations of noise monitoring sites along the Alternative 1,3,4,5, and 6 alignments. Refer to Attachment 1 and Attachment 2 of this report for the detailed results of 24-hour and short-term measurements, respectively. The appendix material also depicts photographic exhibits of the measurement locations.

Table 10-3 presents a summary of long-term (24-hour) noise measurements taken at Category 2 locations that are representative of the residential and lodging land uses and hospitals along the Alternative 6 alignment. The noise monitors were programmed to continuously collect data for a minimum of 24 hours. The microphones were generally placed on tripods approximately 5 feet above the ground at locations near the setback of habitable buildings, between the buildings and the proposed Alternative 6 alignment.

Table 10-3. Alternative 6: Summary of Existing 24-hour Noise Measurements for Category 2 Land Uses

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{dn} (dBA)
			Date	Time	
10	UCLA Luskin Conference Center	Local traffic	5/25/2023	3:00pm	62.2
19	10615 Bellagio Road	Bellagio Road	6/2/2023	12:00pm	63.4
31	2607 Basil Lane	Distant aircraft	6/7/2023	12:00pm	47.4
47	14520 Magnolia Boulevard	Van Nuys Boulevard, Shell car wash	4/3/2024	7:00am	64.0
58	14419 Vanowen Street	Sepulveda Boulevard, Vanowen Street	3/25/2024	2:00pm	59.6
61	13917 Cohasset Street	LOSSAN Corridor, distant traffic	6/13/2023	10:00am	52.8
62	7467 Sylmar Avenue	Van Nuys Boulevard	6/14/2023	9:00am	55.1

Source: HTA, 2024

dBA = A-weighted decibel
L_{dn} = day-night noise level

Short-term noise measurements for two one-hour periods were also taken at Category 3 (institutional) land uses along the Alternative 6 alignment segments with planned aboveground noise sources. The general locations of the short-term measurement sites are shown on Figure 10-6. Table 10-4 gives the summarized results of each individual short-term measurement. The details of short-term measurements are included in Attachment 2.

Table 10-4. Alternative 6: Summary of Existing Short-Term (1-Hour) Noise Measurements for Category 3 Land Uses

Site No.	Location	Primary Noise Source(s)	Measurement Start		Measured Existing L_{eq} (dBA)
			Date	Time	
8	UCLA Williams Institute, southwest corner of building	Local traffic, fire station activities	5/26/2023	9:29am	63.9
			5/30/2023	1:41pm	61.3
9	UCLA Computer Science/ Engineering IV building	Local traffic, students' chatter	5/25/2023	1:04pm	57.9
			5/26/2023	3:36pm	58.8

Source: HTA, 2024

L_{eq} = equivalent noise level

Figure 10-6. Alternative 6: Noise Monitoring Sites - South

Source: HTA, 2024

Figure 10-7. Alternative 6: Noise Monitoring Sites - North

Source: HTA, 2024

10.2.2 Vibration

Alternative 6 is located in an urban environment. Primary existing sources of groundborne vibration (GBV) include trucks traveling along roadways and construction sites using heavy equipment. According to FTA guidance, the background vibration decibels (VdB) levels are expected to range from 50 to 65 (FTA, 2018). Ambient vibration levels were not measured during this stage of Alternative 6. However, measurement of vibration levels is not necessary to complete the general assessment procedure for vibration analysis. The FTA vibration impact assessment is based on FTA vibration impact criteria. These criteria were used to identify vibration-sensitive receivers along the Alternative 6 alignment where potential impacts may occur, based on existing land use activities.

Vibration-sensitive land uses were identified using GIS, assessor's parcel maps, aerial photographs, and field surveys. Vibration-sensitive land uses in the Project Study Area include residences, hotel/motels, medical facilities, schools, and museums.

Sensitive land uses were classified as one of the following three FTA vibration-sensitive land use categories. Table 2-5 presents details of criteria pertaining to each category:

- Category 1 – Buildings where vibration would interfere with interior operations
- Category 2 – Residences and buildings where people normally sleep
- Category 3 – Institutional land uses with primarily daytime use

Category 1 vibration-sensitive land uses identified along the Alternative 6 alignment include existing television, broadcast, and film production studios along Bundy Drive, The Village Studios (recording studio) on Butler Avenue south of Santa Monica Boulevard, Stray Angel Films (a film production studio) on Santa Monica Boulevard, an animal hospital at the crossing of the alignment with Sepulveda Boulevard, Fox Sports studios on Sepulveda Boulevard, scientific/research laboratories and medical facilities in and near the UCLA campus along Westwood Boulevard, music and video production outfits on Glendon Avenue, and three film or music production studios along Van Nuys Boulevard.

Category 2 vibration-sensitive land uses include single- and multi-family residences and hotels/motels, which are located along the Alternative 6 alignment.

Category 3 vibration-sensitive land uses found along the Alternative 6 alignment include schools, religious facilities, and medical buildings.

10.3 Impact Evaluation

10.3.1 Impact NOI-1: Would the project cause 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?

10.3.1.1 Operational Impacts

Rail Operations Noise

As described in Section 10.1, Alternative 6 consists of an HRT system with two underground tunnel configurations, including seven underground stations. Train movements along the Alternative 6 alignment would not result in any airborne noise impacts at sensitive receptors located above the underground tunnels. Therefore, rail operations associated with Alternative 6 would result in a less than significant impact related to rail operations airborne noise.

Ancillary Facilities Noise

Noise generated by ancillary facilities associated with Alternative 6 would be due to ventilation system fans at TPSS facilities along the Alternative 6 alignment. Eleven TPSS sites would be required, of which four would be located aboveground. Each TPSS site would consist of two TPSS units. Of the four at-grade TPSS sites, two would be near noise-sensitive receptors. Table 10-2 presents descriptions of TPSS sites associated with Alternative 6. Table 10-5 shows a summary of Alternative 6 TPSS noise impact assessments. Assuming that the noise-generating fans associated with TPSS units would be placed at the closest ends of the units to the adjoining noise-sensitive receptors, the two TPSS facilities located at Magnolia Boulevard and Vanowen Street would result in moderate noise impacts at adjoining sensitive receptors. Impacted noise-sensitive receptors are shown on Figure 10-8 and Figure 10-9. Therefore, operation of Alternative 6 would result in a significant impact related to ancillary facilities noise.

Table 10-5. Alternative 6: Ancillary Facility Noise Impacts by Traction Power Substation Site

TPSS Site	Nearest Noise-Sensitive Land Use	Distance (feet)	Existing Sound Level (dBA, L_{dn})	TPSS Noise Level (dBA, L_{dn})	Noise Impact Thresholds		Level of Impact
					Moderate	Severe	
5	No nearby sensitive land uses	NA	NA	NA	NA	NA	**No Impact**
7	TPSS 6.7: Magnolia Terrace Apartments 14520 Magnolia Boulevard, Sherman Oaks	25	63	62	60-65	>65	**Moderate**
9	TPSS 6.9a: HFL Vanowen Apartments 14419 Vanowen Street, Van Nuys TPSS 6.9b: Multi-Family Residential 6822 Van Nuys Boulevard, Van Nuys	30	60	61	58-63	>63	**Moderate**
11	No nearby sensitive land uses	NA	NA	NA	NA	NA	**No Impact**

Source: HTA, 2024

Note: Under Alternative 6, TPSS Sites 1 through 4, 6, 8, and 10 are proposed to be located underground.

Tunnel ventilation for Alternative 6 would be similar to existing Metro ventilation systems for light and heavy rail underground subways. In case of emergency, smoke would be directed away from trains and extracted through the use of emergency ventilation fans installed at underground stations and crossover locations adjacent to the stations. In addition, a mid-mountain ventilation facility for the extraction of air would be located on LADWP property east of Stone Canyon Reservoir in the Santa Monica Mountains.

The lateral distance between the mid-mountain facility and nearest residential properties along Basil Lane is approximately 840 feet. In addition, there is an existing ridgeline between the sensitive land uses and the proposed location of the mid-mountain facility. The predicted equivalent noise level (L_{eq}) from the mid-mountain facility at the nearest homes east of its proposed location would be below 25 dBA and would be inaudible when the shielding effect of the ridgeline is considered. Furthermore, existing noise levels at the nearest residence are approximately 63.4 dBA day-night noise level (L_{dn}) (Site 32) and existing sources would mask the mid-mountain facility noise.

Nonetheless, two moderate impacts would occur as a result of TPSS noise. Therefore, operation of Alternative 6 would result in a significant impact related to ancillary facilities noise.

Maintenance and Storage Facility Noise

The MSF for Alternative 6 would be located east of the Van Nuys Metrolink Station and would encompass approximately 41 acres. The MSF would be designed to accommodate 94 vehicles. The site would be bounded by single-family residences to the south, the LOSSAN Corridor ROW to the north, Woodman Avenue on the east, and Hazeltine Avenue and industrial manufacturing enterprises to the west.

Noise sources included in the MSF noise analysis are train movements on lead tracks, including potential wheel squeal noise on tight curve tracks and increased noise at yard switches located near the residential land uses, washing and blowdown activities at the car wash, maintenance shop operations, and TPSS units within the MSF yard. Based on the analysis results, the primary sources of noise from the MSF would be train movements along the lead tracks, on the tight radius curve (causing wheel squeal), and over tracks crossovers. Noise from the maintenance shop, car wash facilities, and TPSS units within the MSF would be secondary due to their greater distances to the residential receptors south of the yard and orientation of the car wash and maintenance shop.

Table 10-6 shows the predicted noise levels from the proposed Alternative 6 MSF layout at representative noise-sensitive receptors in the vicinity of the yard. The proposed MSF would not result in noise exposure levels that exceed the noise impact thresholds at the backyards of adjoining single-family residential properties along Cohasset Street and located immediately south of the proposed MSF. Therefore, operation of Alternative 6 would not result in a significant impact related to MSF noise.

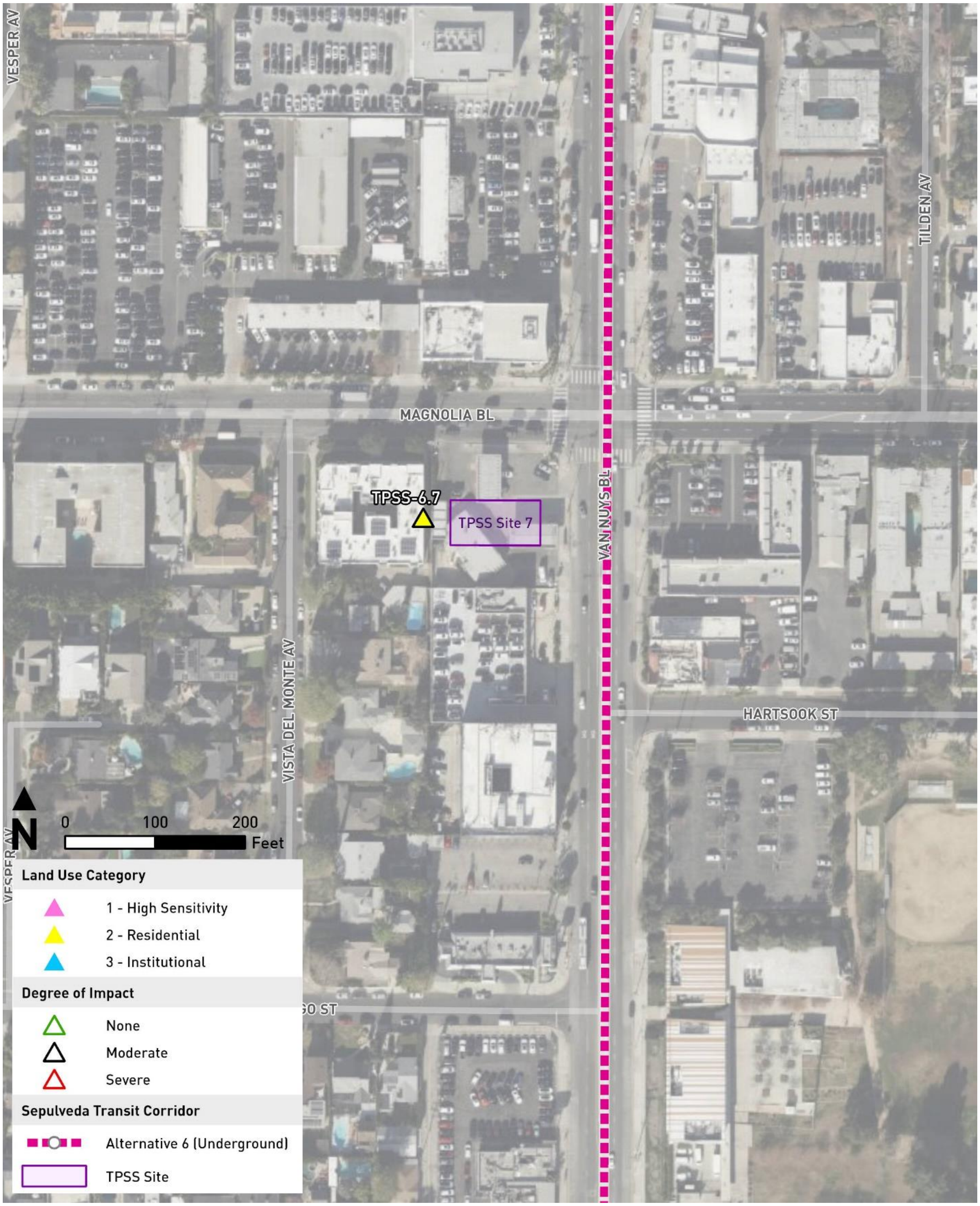
Table 10-6. Alternative 6: Predicted Maintenance and Storage Facility Noise

Receptor ID	Location	Land Use	FTA Category	Existing Sound Level (dBA, L_{dn})	Predicted MSF Noise Level (dBA, L_{dn})	Noise Impact Thresholds		Level of Impact
						Moderate	Severe	
MSF-6.1	14001 Cohasset Street, Van Nuys	SFR	2	53	46	55-60	>60	**No Impact**
MSF-6.2	13827 Cohasset Street, Van Nuys	SFR	2	53	52	55-60	>60	**No Impact**
MSF-6.3	13741 Cohasset Street, Van Nuys	SFR	2	53	41	55-60	>60	**No Impact**

Source: HTA, 2024

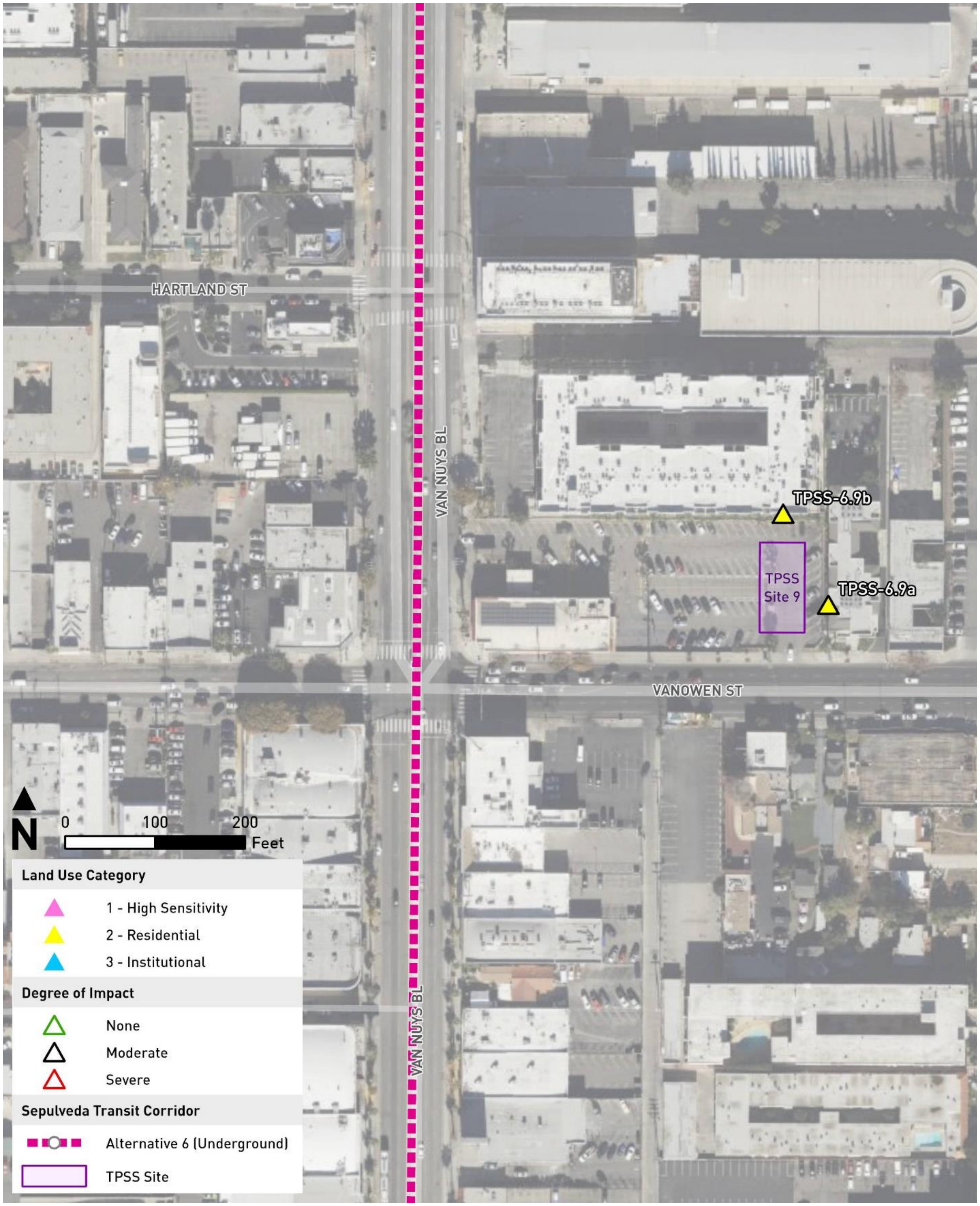
SFR = single-family residential

Figure 10-8. Alternative 6: Ancillary Facility Noise Impacts – Traction Power Substation Site 7



Source: HTA, 2024

Figure 10-9. Alternative 6: Ancillary Facility Noise Impacts – Traction Power Substation Site 9



Source: HTA, 2024

10.3.1.2 Construction Noise Impacts

Construction of Alternative 6 would include various phases that would involve the use of construction equipment at specific locations along the proposed alignment. Construction noise levels from Alternative 6 were estimated in terms of the equipment noise levels ($L_{eq.equip}$) for each phase of construction based upon the number and types of off-road construction equipment to be employed during the given phase. Attachment 14 of this report shows the results of the construction noise estimations at a reference distance of 50 feet from construction activities.

The FTA has provided guidance for assessing construction noise associated with transit projects (FTA, 2018). The criteria are based upon an 8-hour $L_{eq.equip}$, as shown in Table 2-4. For residential uses, the threshold is 80 dBA 8-hour $L_{eq.equip}$ for daytime construction and 70 dBA 8-hour $L_{eq.equip}$ for nighttime construction. Commercial and industrial uses are held to a 85-dBA and 90-dBA 8-hour $L_{eq.equip}$, respectively, for both daytime and nighttime construction noise thresholds. For the purposes of this analysis, the FTA Detailed Analysis construction noise limit criteria of 8-hour $L_{eq.equip}$ have been applied.

Table 10-7 is a summary of expected construction noise levels at a reference distance of 50 feet from construction activities and at locations of nearest noise-sensitive receptors to each construction activity. Construction noise would range from 8-hour $L_{eq.equip}$ noise levels of approximately 59 to 98 dBA at the nearest sensitive receptors. As shown in Table 10-7, construction activities would result in noise levels that exceed the FTA 80-dBA daytime and 70-dBA nighttime 8-hour $L_{eq.equip}$ thresholds for residential land uses.

Alternative 6 construction equipment noise contours are depicted graphically in Attachment 14, which represent the noise levels that could potentially occur along the entirety of the alignment. Construction noise contours are only included for aboveground construction activities as activities such as tunnelling would not generate noise at aboveground receptors. The noisiest phase of construction was used to depict the contours. An interval of 5 dB is used for each contour and each contour was calculated based on the distance at which noise would decrease by 5 dB starting at a noise level of 90 dBA 8-hour $L_{eq.equip}$ to 70 dBA 8-hour $L_{eq.equip}$. The 90 dBA 8-hour $L_{eq.equip}$ noise level is representative of the FTA daytime and nighttime construction noise threshold for industrial uses. The 70 dBA 8-hour $L_{eq.equip}$ contour shows the areas where construction noise levels would exceed the nighttime construction noise threshold for residential uses. The 90 dBA 8-hour $L_{eq.equip}$ contour covers areas within a distance of 63 feet from the nearest construction activity. The 70 dBA 8-hour $L_{eq.equip}$ contour extends to a maximum distance of 630 feet. For TPSS sites, the 90 dBA 8-hour $L_{eq.equip}$ contour covers areas within a distance of 25 feet from the nearest construction activity. The 70 dBA 8-hour $L_{eq.equip}$ contour extends to a maximum distance of 251 feet. For the mid-mountain shaft, the 90 dBA 8-hour $L_{eq.equip}$ contour covers areas within a distance of 35 feet from the nearest construction activity. The 70 dBA 8-hour $L_{eq.equip}$ contour extends to a maximum distance of 354 feet. The construction noise contours do not include noise reductions that may occur as a result of terrain or intervening structures. As an example, to read the contours, the figures show that within the first contour of 63 feet (shown in dark purple), the calculated construction noise levels may be above 90 dBA 8-hour $L_{eq.equip}$. At the next distance of 112 feet (shown in light purple), noise levels would decrease to approximately 85 dBA 8-hour $L_{eq.equip}$.

Table 10-7. Alternative 6: Estimated Construction Noise Levels

Construction Phase	$L_{eq.equip}$ (dBA) at 50 feet	$L_{eq.equip\ (8\text{-}hr)}$ (dBA) at Nearest Receptors	Exceeds 80-dBA $L_{eq.equip\ (8\text{-}hr)}$ Daytime Threshold	Exceeds 70-dBA $L_{eq.equip\ (8\text{-}hr)}$ Nighttime Threshold
Segment 1-Westside, Segment 2-Mountain, and Segment 3-Valley				
Ground Improvements	89	95	Yes	Yes
Tunnel Boring Setup/Assembly	83	89	Yes	Yes
Tunnel Boring/Tunneling	81	87	Yes	Yes
Tunnel Boring Machine Retrieval/Tunnel Prep	81	87	Yes	Yes
Annular Grouting	89	95	Yes	Yes
Invert Construction	77	83	Yes	Yes
Cross Passage	87	93	Yes	Yes
Rail and Plinth	74	80	Yes	Yes
Systems, Testing, Commissioning	86	92	Yes	Yes
Mid Mountain Facility				
Site Preparation/Demolition	83	59	No	No
Access Road	88	64	No	No
Drainage/Utilities	84	60	No	No
Shaft Drilling	87	63	No	No
Cavern and Adit	85	61	No	No
Underground Station Construction				
Utility Relocation	92	98	Yes	Yes
Demolition/Site Preparation	90	96	Yes	Yes
Grading	85	91	Yes	Yes
Drainage/Utilities	86	92	Yes	Yes
Support of Excavation	90	96	Yes	Yes
Station Excavation	92	98	Yes	Yes
Station Construction	87	93	Yes	Yes
Final Roadway Construction	89	95	Yes	Yes
Station Finishes and Testing	84	90	Yes	Yes
Traction Power Substation Construction (Vanowen Street/Van Nuys Boulevard TPSS and Magnolia TPSS)				
Site Preparation-Traction Power Utilities	84	90	Yes	Yes
Foundation Construction	78	84	Yes	Yes
TPSS Installation	80	86	Yes	Yes
Maintenance and Storage Facility Construction				
Site Preparation/Demolition	87	91	Yes	Yes
Grading	87	91	Yes	Yes
Building Construction	90	84	Yes	Yes
Pavements	88	92	Yes	Yes
Drainage/Utilities	86	90	Yes	Yes
Pre-Cast Yard				
Concrete Activity	86	90	Yes	Yes

Source: HTA, 2024

$L_{eq.equip\ (8\text{-}hr)}$ = equivalent noise level from construction equipment over 8-hour workday

Pile driving may be required for installation of retaining walls or potentially at TBM launch locations. Impact or vibratory pile drivers are the most noise intensive construction equipment that could result in elevated noise levels above typical construction methods. It is unknown at this stage of design if pile driving would be the required construction method which is dependent on soil type. Typically, where possible, piles are drilled which is a quieter method of pile installation such as CIDH Impact pile driving generates an hourly noise level of approximately 94.3 dBA L_{eq} at 50 feet, vibratory pile driving generates an hourly noise level of 93.8 dBA $L_{eq,}$ at 50 feet and CIDH generates an hourly noise level of approximately 77.4 dBA L_{eq} at 50 feet. Vibratory pile driving is approximately 0.5 dBA quieter than impact pile driving and CIDH is approximately 16.9 dBA quieter. To reduce noise levels where piles may be required, impact pile driving should be avoided where possible and drilled or vibratory pile driving should be used where feasible. Soil improvements such as grouting injection would be required for cut-and-cover construction to stabilize soils. Soil improvement activity would typically require drilling equipment and pumping equipment to inject the grout into the soil. A noise level of 90 dBA 8-hour $L_{eq.equip}$ at 50 feet reflects equipment required for cut-and-cover construction, which is shown in Table 10-7 as “Support of Excavation.”

Based on the construction equipment noise analysis, Alternative 6 would result in a significant impact related to construction noise.

Regarding health effects of noise, it is unlikely for construction noise to result in noise-induced hearing loss for persons residing or working near construction zones, as this is an occupational hazard related to working over long periods of time (years) in high noise environments. However, construction noise could increase stress at affected sensitive use locations. Nighttime construction could adversely affect sleep for residents living near active construction sites. As required by MM NOI-6.2, if required by the jurisdiction a noise variance would be prepared that demonstrates the implementation of control measures to maintain noise levels below the applicable Federal Transit Administration and local standards. Nonetheless, construction noise could potentially still exceed the FTA nighttime criteria.

10.3.2 Impact NOI-2: Would the project cause generation of excessive groundborne vibration or groundborne noise levels?

10.3.2.1 Operational Impacts

Rail Operations Vibration

GBV and groundborne noise (GBN) levels from Alternative 6 rail operations were evaluated using the general vibration assessment procedure in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018). Section 3.2 describes the operational vibration assessment methodology.

Alternative 6 would implement the use of high resilient fasteners, pads below the rail, and floating slabs at select locations throughout the Alternative 6 alignment. Therefore, the effects of fasteners on these vibration dampening features were taken into account in the vibration analysis. Attachment 15 of this report shows the details of the Alternative 6 rail operations’ vibration impact assessment at the representative Category 1, 2, and 3 receptors along the Alternative 6 alignment. Based on the results of the vibration analysis, there would be project GBV levels and/or GBN levels that would not meet or exceed the applicable impact thresholds at sensitive receptors along the alignment. Therefore, operation of Alternative 6 would not result in a significant impact related to operational vibration.

Maintenance and Storage Facility Vibration

The MSF for Alternative 6 would be located east of the Van Nuys Metrolink Station. Trains would access the site from the fixed guideway’s tail tracks at the northwest corner of the site. Trains would then travel southeast to maintenance facilities and storage tracks. Vibration levels from trains heading towards the storage tracks along the curved tracks, where they come closest to the residential buildings south of the MSF, were evaluated. The MSF vibration analysis assumed that HRT vehicles would be traveling at speeds of 5 to 10 mph along the tracks. Increases in GBV levels due to presence of rail switches were also taken into account. Predicted MSF vibration levels at the nearest residential structures south of the yard are between 59 VdB and 61 VdB. These levels are below the FTA impact criterion of 72 dBA for Category 2 land uses. Therefore, operation of Alternative 6 MSF would result in a less than significant impact related to MSF GBV or GBN.

10.3.2.2 Construction Vibration Impacts

Some construction activities, such as pile driving, use of drill rigs, pavement breaking, and the use of tracked vehicles (e.g., bulldozers) and hoe rams, could result in perceptible levels of GBV at sensitive buildings located in close proximity to construction sites. These activities would typically be limited in duration and their vibration levels are likely to be well below thresholds for minor cosmetic building damage.

Along the underground alignment of Alternative 6, the TBM would be the main source of GBVs. However, the TBM is slow moving and causes very little vibration and related GBN to the surrounding area when operating at full tunnel depths. In some residential areas, GBV from the TBM may be felt for a short period (about two days) while the machine passes under the receptor locations.

Project construction would include a limited number of activities expected to generate vibration that approaches the lowest building damage limit of 0.12 inch per second (in/sec) peak particle velocity (PPV) (refer to Table 2-7). Table 10-8 shows the distances at which the 0.12 in/sec PPV, 0.2 in/sec PPV, and 0.3 in/sec PPV thresholds would not be exceeded. For example, use of a drilling rig, hoe ram, or large bulldozer would be safe at distances greater than 22 feet from Category IV buildings. A vibratory roller would be safe at distances greater than 22 feet from Category IV buildings and typical impact pile driver operation would be safe at distances of 79 feet or greater. Typical building construction in an urban setting consists of buildings that are Category II engineered concrete and masonry that have a 0.3 in/sec PPV threshold or Category III non-engineered timber and masonry buildings that have a 0.2 in/sec PPV threshold. Typical construction equipment, such as a large bulldozer, would not exceed the 0.2 in/sec PPV building damage criterion at distances of 18 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 13 feet or greater. A vibratory roller would not exceed the 0.2 in/sec PPV building damage criterion at distances of 32 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 23 feet or greater. An impact pile driver would not exceed the 0.2 in/sec PPV building damage criterion at distances of 67 feet or greater and would not exceed the 0.3 in/sec PPV building damage criterion at distances of 47 feet or greater.

Table 10-8. Construction Equipment Vibration Damage Potential by Distance

Equipment	Reference Vibration Level PPV (inches/second)	Distance to not Exceed 0.12 PPV Damage (feet)	Distance to not Exceed 0.2 PPV Damage (feet)	Distance to not Exceed 0.3 PPV Damage (feet)
Drill (CIDH)	0.089	22	18	13
Impact Pile Driver	0.644 (typical vibration level)	79	67	47
	1.518 (upper range vibration level)	140	117	84
Large Bulldozer	0.089	22	18	13
	0.17 (typical vibration level)	33	28	20

Equipment	Reference Vibration Level PPV (inches/second)	Distance to not Exceed 0.12 PPV Damage (feet)	Distance to not Exceed 0.2 PPV Damage (feet)	Distance to not Exceed 0.3 PPV Damage (feet)
Vibratory Pile Driver	0.734 (upper range vibration level)	87	73	52
Vibratory Roller	0.210	38	32	23

Source: HTA, 2024

PPV = peak particle velocity
CIDH = cast-in-drilled-hole

Along the underground alignment of Alternative 6, the TBM would be the main source of GBVs. However, the TBM is slow moving and causes very little vibration and related GBN to the surrounding area when operating at full tunnel depths. The Alternative 6 underground tunnels would be at depths of approximately 40 feet to over 700 feet from the aboveground buildings along the tunnels' alignment. In some residential areas, GBV from the TBM may be felt for a short period (about two days) while the machine passes under the receptor locations. In residential areas in the mountain region between Sunset Boulevard and Mulholland Drive, GBV from the TBM would not be perceptible, because the tunnels would be very deep underground. Expected TBM vibration levels would be well below the strictest building damage threshold of 0.12 in/sec along the entire alignment. In some residential areas, GBV from the TBM may be felt for a short period (about two days) while the machine passes under the receptor locations. Construction of the proposed Metro E Line, Santa Monica Boulevard, Wilshire/Metro D Line, UCLA Gateway Plaza, Ventura Boulevard, Metro G Line, and Van Nuys Metrolink Stations along the underground alignment would likely be cut-and-cover construction, which could at times occur within 25 feet of structures, therefore potentially resulting in excessive vibration. Regarding the mid-mountain shaft, the nearest structures would be located more than 500 feet to the east of construction activity, and there would be no potential for vibration damage or annoyance impacts to occur.

In rare instances, when vibration-intensive construction activities occur close to sensitive structures (within 25 feet), such as residential buildings, or special use buildings like laboratories or recording studios, GBV could exceed the FTA vibration annoyance criteria shown in Table 2-5 and Table 2-6. Significant GBV could occur when certain construction activities would occur at close distances to sensitive receptors. Therefore, Alternative 6 would result in a significant impact related to construction vibration.

Maintenance and Storage Facility Construction Vibration

The nearest existing buildings to the construction of the proposed MSF are buildings within the residential properties along Cohasset Street south of the MSF site. The closest structures within the residential properties are as close as 17 feet from the proposed construction activities. The highest vibration levels from construction of the MSF at the closest off-site building would be 0.375 in/sec PPV from the use of a vibratory roller during paving and 0.16 in/sec PPV from a large bulldozer during the grading phase. Estimated vibration levels from ballast tamper and caisson drilling would be less than the applicable damage risk criterion for the building type in this area (0.2 in/sec PPV) (Building Type III in Table 2-7). Therefore, vibration impacts due to use of a vibratory roller at the southern edges of the proposed MSF would be significant without mitigation. The minimum distance from the south property line of the MSF site at which large vibratory rollers must operate is 26 feet during the construction of the proposed MSF. This mitigation measure would be a part of Mitigation Measure (MM) VIB-6.1 (Vibration Control Plan).

Construction Vibration Impacts on Historic Buildings

Construction under Alternative 6 would have the potential to damage buildings in close proximity to vibration-intensive construction activities. Using the reference levels in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018), vibration levels from project construction activities were estimated at historic buildings or structures eligible for the National Register of Historic Places along the Project alignment. Such buildings are generally classified as extremely susceptible to vibration damage (Building Type IV in Table 2-7).

Findings of the construction vibration assessment at historic structures are as follows:

- The following historic buildings are very close to the proposed project construction areas. Most vibration-intensive construction activities at these locations would likely result in levels exceeding the damage criterion of 0.12 in/sec PPV. Special consideration should be made for these buildings in MM VIB-6.1 outlined in Section 10.4.
  - Gayley Center located at 1101 Gayley Avenue, adjoining the proposed Wilshire Boulevard/Metro D Line Station
  - Linde Medical Building located at 10921 Wilshire Boulevard, adjacent to the proposed Wilshire Boulevard/Metro D Line Station
  - Tishman Building located at 10950 Wilshire Boulevard, adjacent to the proposed Wilshire Boulevard/Metro D Line Station
  - UCLA Ackerman Hall, 308 Westwood Plaza, Los Angeles
- Pile driving at locations along the alignment in the vicinity of the following historic properties would potentially result in GBV levels exceeding the damage criterion of 0.12 in/sec PPV. Therefore, these locations must be addressed in the Vibration Control Plan if pile driving is to occur within 150 feet of the buildings:
  - Historic buildings located at 5958 Van Nuys Boulevard, Sherman Oaks

10.3.3 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 2 miles of a public airport or public use airport, would the project expose people residing or working in the Project Study Area to excessive noise levels?

The Santa Monica Airport is located within 2 miles of Alternative 6. However, Alternative 6 is a transit project that is not sensitive to noise. Transit riders would not dwell at one location for an extended period of time that would result in exposure to excessive airport noise. Construction workers working on Alternative 6 would utilize ear protection as required while working on Alternative 6. Therefore, no impacts related to airport noise would occur.

10.4 Mitigation Measures

10.4.1 Operational

The following mitigation measures are recommended to reduce noise impacts from TPSS at sites 7 and 9:

MM NOI-6.1: ***TPSS Noise Reduction:***

- *The Project shall implement measures including, but not limited to, the following to reduce traction power substation noise:*
  - *Orient cooling fans and HVAC equipment away from sensitive receptors (i.e., At site 7, TPSS fans should be on the sides of units closest to and facing Van Nuys Boulevard. At Site 9, TPSS fans should be nearest to Vanowen Street and away from the nearest buildings north and east of the site.)*
  - *Use quieter cooling fans or heating, ventilation and air conditioning equipment*
  - *Provide a surrounding enclosure around the traction power substation unit.*
  - *Install baffles on the exterior of the cooling fan and heating, ventilation and air conditioning equipment.*
  - *Provide sound insulation of traction power substation unit enclosure or mount sound-isolation materials to minimize transformer hum.*

As the proposed Alternative 6 includes vibration control features, including low-impact frogs, floating slab tracks, and resilient pads under the rails at select locations, no further vibration-reducing measures would be needed to reduce operational GBV or GBN from train movements along the Alternative 6 alignment.

10.4.2 Construction

The following mitigation Measures would be needed to reduce construction noise and vibration levels to below the applicable limits:

MM NOI-6.2: ***N*oise Control Plan:**

- *Prior to the initiation of localized construction activities, the Project contractor shall develop a Noise Control Plan demonstrating how the Federal Transit Administration 8-hour $L_{eq.equip}$ (equivalent noise level of equipment) noise criteria would be achieved during construction. The Noise Control Plan shall be prepared by a board-certified acoustical engineer. The Federal Transit Administration 8-hour $L_{eq.equip}$ construction noise standards are as follows: Residential daytime standard of 80 dBA 8-hour $L_{eq.equip}$ and nighttime standard of 70 dBA 8-hour $L_{eq.equip}$, Commercial daytime and nighttime standard of 85 dBA 8-hour $L_{eq.equip}$, and Industrial daytime and nighttime standard of 90 dBA 8-hour $L_{eq.equip}$. The Noise Control Plan shall be designed to follow Metro requirements, and shall include measurements of existing noise, a list of the major pieces of construction equipment that would be used, predictions of the noise levels at the closest noise-sensitive receptors (residences, hotels, schools, religious facilities, and similar facilities), and noise mitigation measures to be implemented to achieve compliance with the Federal Transit Administration 8-hour $L_{eq.equip}$ construction noise standards to the degree feasible. The Noise Control Plan must be approved by Metro prior to initiating noise-generating construction activities. The Project contractor shall conduct continuous noise monitoring to demonstrate compliance with the Federal Transit Administration 8-hour $L_{eq.equip}$ noise limits. If the Federal*

Transit Administration 8-hour $L_{eq.equip}$ criteria are exceeded, the Project contractor shall implement measures to reduce construction noise as much as feasible. The Project contractor shall establish a public information and complaint system. The Project contractor shall respond to and provide corrective action for complaints within 24-hours. In addition, the Project shall comply with local noise ordinances when applicable, including by obtaining a variance(s) from the applicable local jurisdiction when nighttime work is required. Noise reducing methods that may be implemented by the Project contractor include:

- *If nighttime construction is planned, a noise variance may be prepared by the Project contractor, if required by the jurisdiction, that demonstrates the implementation of control measures to maintain noise levels below the applicable Federal Transit Administration and local standards.*
- *Where nighttime construction would exceed the FTA nighttime criteria, avoid nighttime construction to the degree feasible.*
- *Utilize specialty equipment equipped with enclosed engines and/or high performance mufflers as feasible. The Project contractor shall locate equipment and staging areas as far from noise-sensitive receptors as possible.*
- *Limit unnecessary idling of equipment.*
- *Install temporary noise barriers as needed where feasible.*
- *Reroute construction related truck traffic away from residential streets to the extent permitted by the relevant municipality.*
- *Avoid impact pile driving where possible. Drilled piles or vibratory pile drivers would be required where feasible.*

- *Where Project construction cannot be performed in accordance with the requirements of the applicable noise limits, the Project contractor should be required to investigate alternative construction methods that would result in lower sound levels. Also, the Project contractor should be required to conduct noise monitoring to demonstrate compliance with noise limits outlined in the Noise Control Plan.*

MM VIB-6.1: ***Vibration Control Plan:***

- *Prior to construction, the Project contractor shall prepare a Vibration Control Plan demonstrating how the Federal Transit Administration building damage risk criteria and the Federal Transit Administration vibration annoyance criteria would be achieved. The Vibration Control Plan must be approved by Metro prior to initiating vibration-generating construction activities. The Vibration Control Plan would include a list of the major pieces of construction equipment that would be used, and the predictions of the vibration levels at the closest sensitive receivers. The Project contractor would conduct vibration monitoring to demonstrate compliance with the vibration limits during construction activity. Where the construction cannot be performed to meet the vibration criteria, the Project contractor shall implement alternative means and methods of* *construction measures to reduce vibration levels as much as feasible. Vibration reducing methods that may be implemented by the Project contractor include:*

  - *When feasible, use construction equipment or less vibration intensive techniques near vibration sensitive locations.*
  - *Use as small an impact device (i.e., hoe ram, pile driver) as possible to accomplish necessary tasks.*
  - *Avoid impact pile driving where possible. Drilled piles or vibratory pile drivers would be required where feasible.*
  - *When feasible, in construction areas close to sensitive buildings, select non-impact demolition and construction methods such as saw or torch cutting and removal for off-site demolition, and use chemical splitting, or hydraulic jack splitting, instead of high impact methods.*

- *The Project contractor shall monitor construction vibration levels at structures identified as a “historic” resource within the meaning of CEQA Guidelines Section 15064.5(a)to ensure the vibration damage threshold of 0.12 in/sec PPV shall not be exceeded. The vibration monitoring shall be conducted by a qualified professional for real-time vibration monitoring for construction work at the Project construction site requiring heavy equipment or ground compaction devices. A pre-construction and post-construction survey of these buildings shall be conducted by a qualified structural engineer. Any damage shall be noted. All vibration monitors used for these measurements shall be equipped with an “alarm” feature to provide advanced notification that vibration impact criteria have been approached. Documented damage in the post-construction survey shall be repaired as required by the Secretary of the Interior’s (SOI’s) Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. The following historic resources shall be included in the Vibration Control Plan.*
  - *Gayley Center located at 1101 Gayley Avenue, adjoining the proposed Wilshire Boulevard/Metro D Line Station*
  - *Linde Medical Building located at 10921 Wilshire Boulevard, adjacent to the proposed Wilshire Boulevard/Metro D Line Station*
  - *Tishman Building located at 10950 Wilshire Boulevard, adjacent to the proposed Wilshire Boulevard/Metro D Line Station*
  - *UCLA Ackerman Hall, 308 Westwood Plaza, Los Angeles*
  - *Historic buildings located at 5958 Van Nuys Boulevard, Sherman Oaks*

10.4.3 Impacts After Mitigation

10.4.3.1 Ancillary Facilities Noise

Without mitigation, TPSS units proposed to be located at sites 7 and 9 would generate noise levels at adjoining residential land uses that would exceed the moderate impact thresholds. Mitigated impacts are shown on Figure 10-10 and Figure 10-11. As shown in Table 10-9, implementation of MM NOI-6.1

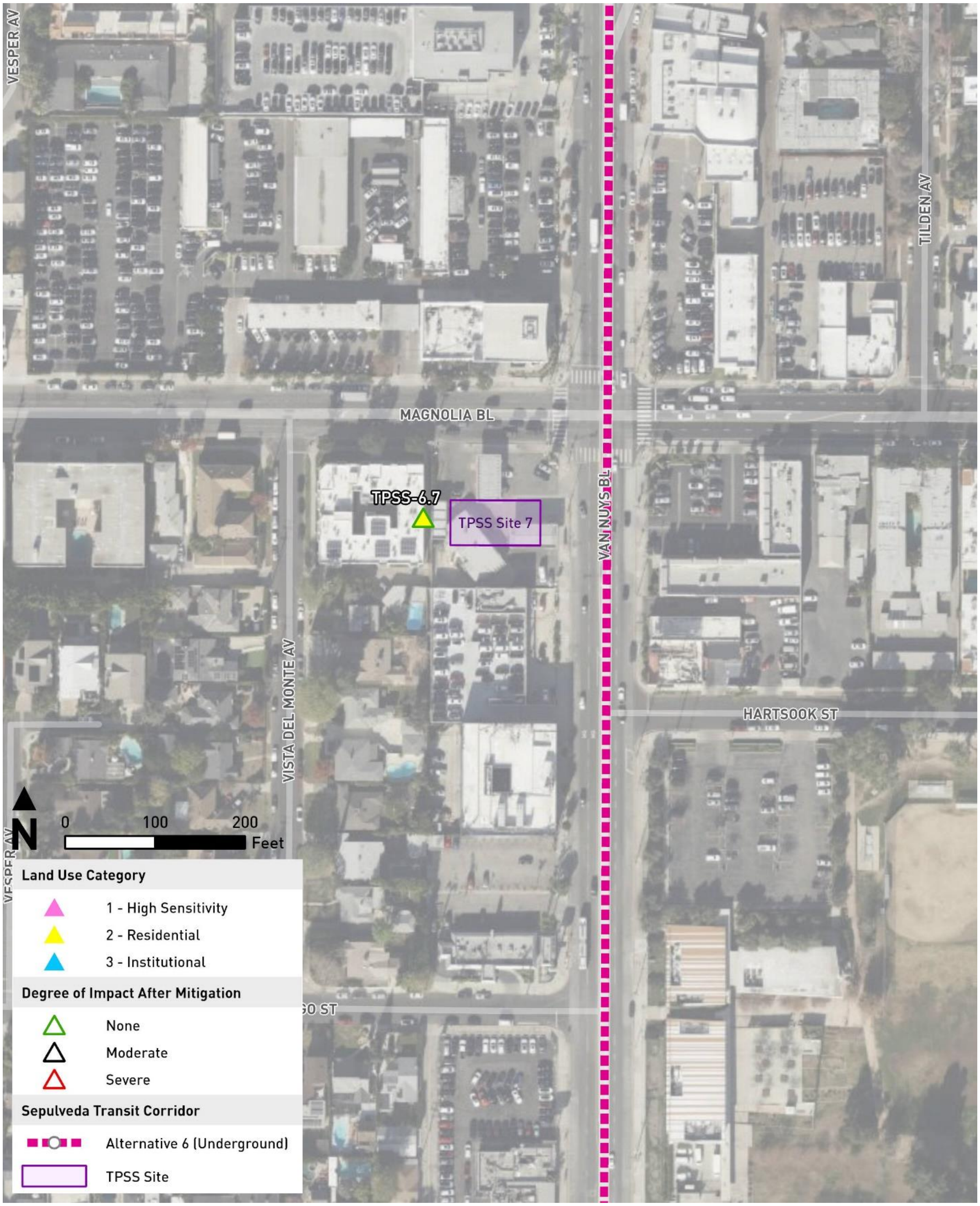
would result in TPSS noise levels below the moderate impact threshold at each site. Therefore, impacts would be less than significant with mitigation related to ancillary facilities noise.

Table 10-9. Alternative 6: Ancillary Facility Noise Impacts by Traction Power Substation Site After Mitigation

<table>
<tr><th rowspan="2">TPSS Site</th><th rowspan="2">Nearest Noise-Sensitive Land Use</th><th rowspan="2">Existing Sound Level (dBA, L_{dn})</th><th rowspan="2">TPSS Noise Level After Mitigation (dBA, L_{dn})</th><th colspan="2">Noise Impact Thresholds</th><th rowspan="2">Level of Impact</th></tr>
<tr><th>Moderate</th><th>Severe</th></tr>
<tr><td>7</td><td>TPSS 6.7: Magnolia Terrace Apartments 14520 Magnolia Boulevard, Sherman Oaks</td><td>63</td><td>56</td><td>60-65</td><td>>65</td><td>No Impact</td></tr>
<tr><td rowspan="2">9</td><td>TPSS 6.9a: HFL Vanowen Apartments 14419 Vanowen Street, Van Nuys</td><td rowspan="2">60</td><td rowspan="2">56</td><td rowspan="2">58-63</td><td rowspan="2">>63</td><td rowspan="2">No Impact</td></tr>
<tr><td>TPSS 6.9b: Multi-Family Residential 6822 Van Nuys Boulevard, Van Nuys</td></tr>
</table>

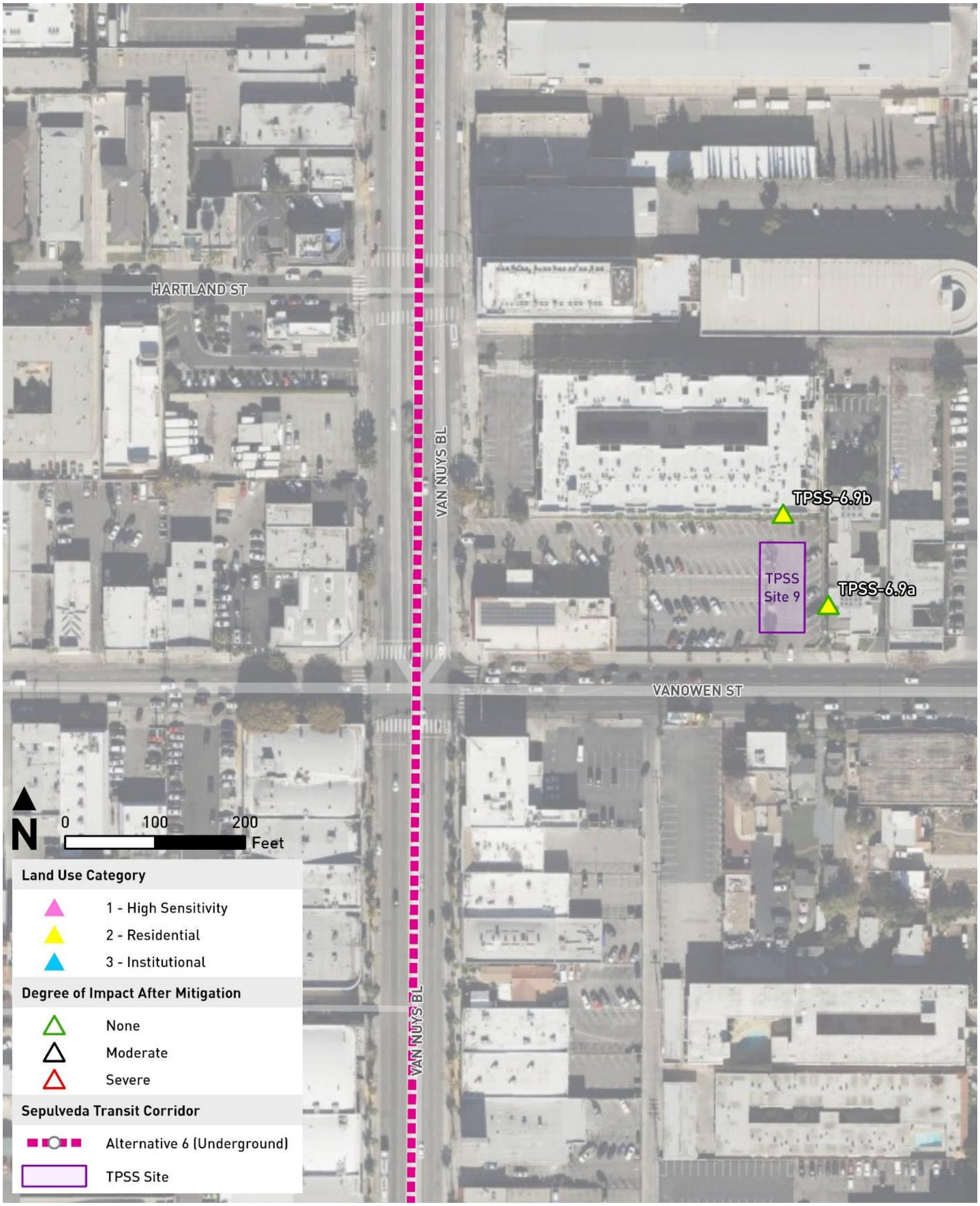
Source: HTA, 2024

Figure 10-10. Alternative 6: Mitigated Ancillary Facility Noise Impacts – Traction Power Substation Site 7



Source: HTA, 2024

Figure 10-11. Alternative 6: Mitigated Ancillary Facility Noise Impacts – Traction Power Substation Site 9



Source: HTA, 2024

10.4.3.2 Construction Noise

The proposed Alternative 6 alignment would result in temporary and periodic increases in ambient noise levels due to construction activity that would exceed FTA's criteria and, where applicable, the standards established by the local noise ordinances. While MM NOI-6.2 would be implemented, which would include noise-reducing measures, there may still be temporary or periodic increases in ambient noise levels that exceed FTA construction impact criteria. There are no feasible mitigation measures to completely eliminate all anticipated instances of construction noise levels above the FTA criteria. Therefore, impacts related to construction noise would be significant and unavoidable.

10.4.3.3 Construction Vibration

The proposed Alternative 6 alignment would result in temporary and periodic increases in ambient vibration levels due to construction activity that would exceed FTA's criteria. While MM VIB-6.1 would be implemented, which would include vibration-reducing measures, there may still be temporary or periodic increases in vibration levels that exceed FTA construction vibration impact criteria. Historic resources have been identified in MM VIB-6.1 that would require vibration monitoring and pre-construction and post-construction surveys. The mitigation would also require a pre-construction and post construction survey to be prepared, and any damage noted and restored per the requirements of SOI Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. Therefore, impacts related to construction vibration at historic resources would be less than significant with mitigation. Regarding construction vibration at non-historic structures, in some instances it may not be possible to reduce vibration by using less vibration intensive equipment due to geological conditions or physical constraints of the construction site. There are no feasible mitigation measures to completely eliminate all anticipated incidents of construction vibration levels exceeding the FTA criteria. Therefore, impacts related to construction vibration would be significant and unavoidable for both damage and annoyance.

11 PREPARERS OF THE TECHNICAL REPORT

Name	Title	Experience (Years)
Farshad Farhang	Principal	35

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Attachment 1. 24-Hour Noise Measurement Photographs and Summarized Results

Contents:

Attachment 1 contains the noise measurement data summaries pertaining to the 24-hour noise measurements conducted at representative Category 2 receptors in the Project Study Area. The attachment includes the measurement data for Table 5-1, Table 6-5, Table 7-5, Table 8-6, Table 9-6, and Table 10-3 of the Technical Report.

Attachment 2. Short-Term Noise Measurement Photographs and Summarized Results

Contents:

Attachment 2 contains the noise measurement data summaries pertaining to the short-term noise measurements conducted at representative Category 1 and 3 receptors in the Project Study Area. The attachment includes the measurement data for Table 5-2, Table 6-6, Table 7-6, Table 8-7, Table 9-7, and Table 10-4 of the Technical Report.

Attachment 3. Alternative 1: Airborne Noise Impact Assessment and Mitigation

Attachment 4. Alternative 1: Off-Road Construction Equipment Noise Levels

Attachment 5. Alternative 1: Groundborne Vibration and Noise Assessment

Attachment 6. Alternative 3: Airborne Noise Impact Assessment and Mitigation

Attachment 7. Alternative 3: Off-Road Construction Equipment Noise Levels

Attachment 8. Alternative 3: Groundborne Vibration and Noise Assessment

Attachment 9. Alternative 4: Airborne Noise Impact Assessment

Attachment 10. Alternative 4: Off-Road Construction Equipment Noise Levels

Attachment 11. Alternative 4: Groundborne Vibration and Noise Impact Assessment

Attachment 12. Alternative 5: Off-Road Construction Equipment Noise Levels

Attachment 13. Alternative 5: Groundborne Vibration and Noise Impact Locations and Mitigation

Attachment 14. Alternative 6: Off-Road Construction Equipment Noise Levels

Attachment 15. Alternative 6: Groundborne Vibration and Noise Assessment