



Section 4.9

Noise and Vibration

This section summarizes the methodology and assumptions used to analyze potential effects from noise and vibration generated during construction and operation of the Eastside Transit Corridor Phase 2 Project alternatives. Potential noise and vibration impacts of the proposed alternatives are also evaluated in this section. Information in this section is based on, and updated where appropriate from, the Noise and Vibration Technical Memorandum, incorporated into this Draft EIS/EIR as Appendix T.

4.9.1 Regulatory Framework/Methodology

4.9.1.1 Federal Transit Administration

4.9.1.1.1 Noise

The Federal Transit Administration's (FTA's) guidance manual *Transit Noise and Vibration Impact Assessment*, May 2006, presents the basic concepts, methods, and procedures for evaluating the extent and severity of noise impacts from transit projects. Transit noise impacts are assessed based on land use categories and sensitivity to noise from transit sources under FTA guidelines. As summarized in **Figure 4.9-1**, FTA noise impact criteria are defined by two curves that allow project noise levels to increase as existing noise increases up to a point, beyond which impact is determined based on project noise alone. FTA land use categories and required noise metrics are described in **Table 4.9-1**.

FTA noise criteria establish three categories of impact: no impact, moderate impact, and severe impact. Under the no impact category, no change in noise level would occur. The moderate impact threshold defines areas where the change in noise is noticeable, but may not be sufficient to cause a

strong, adverse community reaction. The severe impact threshold defines the noise limits above which a significant percentage of the population would be highly annoyed by new noise. The level of impact at any specific site can be established by comparing the predicted future project noise level at the site to the existing noise level. For example, for residences and other FTA Category 2 land uses with an existing noise level of 65 A-weighted decibels (dBA), a moderate impact would occur with a future project noise level in the range from 61 to 66 dBA, while a severe impact would occur with a future project noise level greater than 66 dBA.

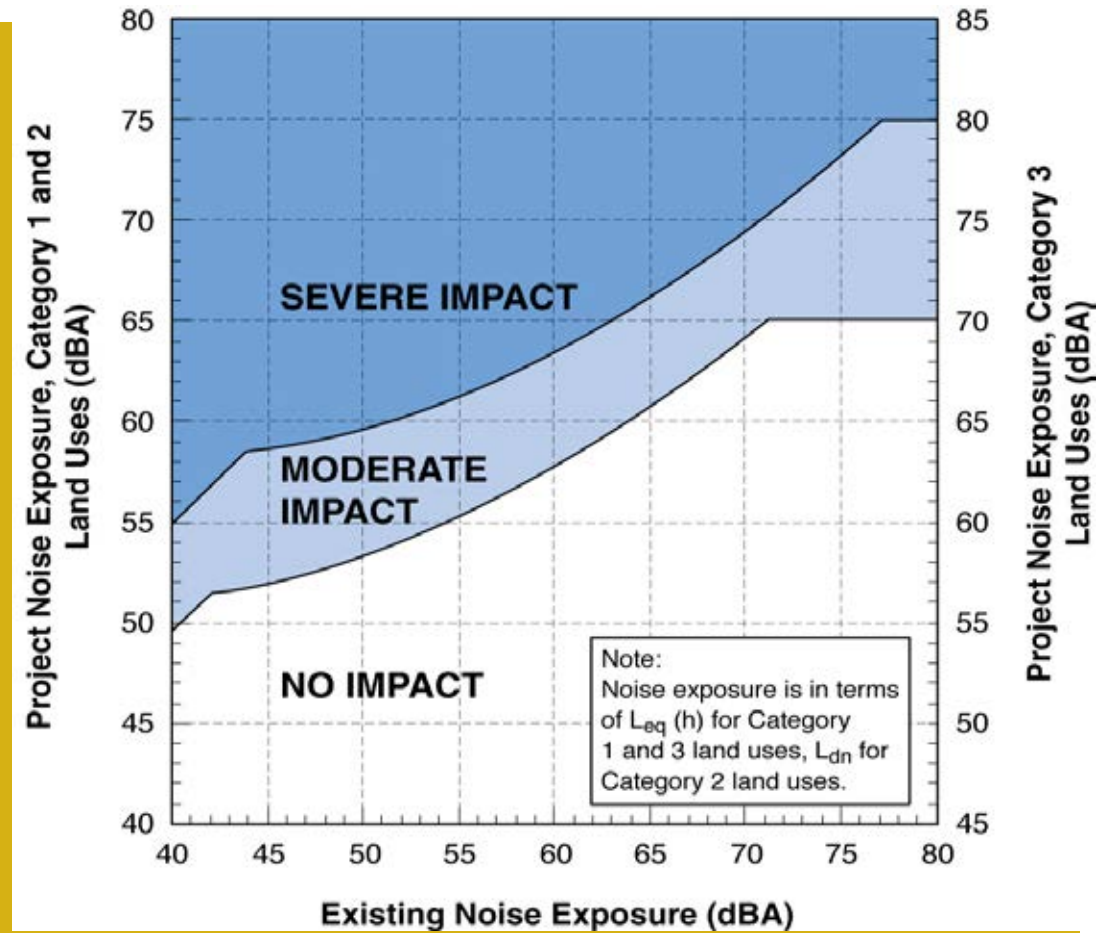
4.9.1.1.2 Vibration

FTA vibration criteria for evaluating ground-borne vibration (GBV) impacts from transit operations (such as train passbys) at nearby sensitive receptors are summarized in **Table 4.9-2**. These vibration criteria are related to root mean squared (RMS) GBV levels that are expected to result in human annoyance.

4.9.1.2 State

4.9.1.2.1 CEQA Guidelines

The California Environmental Quality Act (CEQA) does not provide quantitative thresholds for a substantial noise impact or a significant adverse vibration impact. Therefore, this analysis applied FTA criteria to determine the threshold for significance (FTA 2006). For example, a severe noise impact, as defined by FTA and summarized in **Figure 4.9-1**, was used to determine the CEQA significance of noise impact for the proposed project. The FTA vibration criteria for frequent events presented in **Table 4.9-2** were used as the CEQA significance impact criteria for GBV.



Source: "Transit Noise and Vibration Impact Assessment," Federal Transit Administration, Washington, DC, May 2006.

Figure 4.9-1. FTA Project Noise Impact Criteria

Table 4.9-1. FTA Land Use Categories and Noise Metrics

Land Use Category	Noise Metric	Description
1	Leq(h)	Tracts of land set aside for serenity and quiet, such as outdoor amphitheaters, concert pavilions, and historic landmarks.
2	Ldn	Buildings used for sleeping, such as residences, hospitals, hotels, and other areas where nighttime sensitivity to noise is of utmost importance.
3	Leq(h)	Institutional land uses with primarily daytime and evening uses, including schools, libraries, churches, museums, cemeteries, historic sites, parks, and certain recreational facilities used for study or meditation.

Source: "Transit Noise and Vibration Impact Assessment," Federal Transit Administration, Washington, DC, May 2006.

Table 4.9-2. Ground-Borne RMS Vibration Impact Criteria for Annoyance During Transit Operations and Construction (VdB)

Receptor Land Use		RMS Vibration Levels (VdB) ¹		
Category	Description	Frequent Events ²	Occasional Events ²	Infrequent Events ²
1	Buildings where low vibration is essential for interior operations	65	65	65
2	Residences and buildings where people normally sleep	72	75	80
3	Daytime institutional and office use	75	78	83
Specific Buildings	TV/Recording Studios/Concert Halls	65	65	65
	Auditoriums	72	80	80
	Theaters	72	80	80

Source: "Transit Noise and Vibration Impact Assessment," Federal Transit Administration, Washington, DC, May 2006.

Notes:

¹ GBV levels are referenced to 1x10⁻⁶ inches per second (VdB re 1 micro-inch/sec).

² The frequent event category is defined as more than 70 events per day, the occasional event category as 30 to 70 events per day, and the infrequent category as fewer than 30 events per day.

4.9.1.2.2 California Public Utilities Commission (CPUC)

The CPUC has jurisdiction over the operation of LRT 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 General Order 143-B states that a bell, siren, horn, whistle, or similar audible warning device should be sounded at any public crossing. Based on the levels used for other Metro transit lines, the default FTA reference levels were used, including 72 dBA for grade crossing bells and 76 dBA for train horns at 50 feet. These default FTA noise levels are below the maximum federal limit specified in the Federal Railroad Administration (FRA) Use of Locomotive Horns at Highway-Rail Grade Crossings; Final Rule (49 CFR Parts 222 and 229, August 17, 2006).

4.9.1.3 Local

Local ordinances are not applicable to the assessment of impacts from operation of federal transit projects. Local ordinances regarding noise and vibration are typically qualitative, however, in that they refer to noise "annoyance" from public disturbances.

4.9.2 Affected Environment/Existing Conditions

A screening assessment was conducted to identify the location and land use category of noise- and vibration-sensitive receptors along the Eastside Transit Corridor Phase 2 alignments. These include residential areas and buildings such as hospitals, schools, churches, parks, and noise-sensitive historic resources.

To determine the existing background noise levels at sensitive receptors in the vicinity of the proposed

LRT alignments, a noise monitoring program was conducted at 17 representative locations selected based on FTA guidelines. Hourly equivalent A-weighted noise levels [or Leq(h) in dBA] were measured during the peak hour at non-residential FTA Category 3 land uses (such as schools and parks) and continuously over a 24-hour period at FTA Category 2 land uses (residential land uses) to determine the average ambient conditions during a typical weekday. The representative noise monitoring locations are shown in **Figure 4.9-2**. The noise measurements document existing noise sources along the project alignments, such as existing aircraft traffic overhead and background traffic along I-605, SR 60, Garfield Avenue, Washington Boulevard, and other major cross streets. The reference noise levels for each of the proposed noise sources (including train passbys and wheel squeal) and other operating characteristics (such as average dwell times and source heights) are summarized in **Table 4.9-3**. Ambient noise levels measured at the representative locations are summarized in **Table 4.9-4**. Along the alignments, 24-hour noise levels range from 66 dBA to 77 dBA and peak-hour noise levels range from 71 dBA to 73 dBA.

Noise monitoring was not intended to document the background noise level at every receptor. Instead, sites were strategically selected to document existing noise exposure at different residential clusters along the proposed alignments. The noise levels from these existing sources were adjusted to reflect distance propagation to other nearby clusters of residences and other noise-sensitive uses where appropriate. For example, the baseline levels measured at the 17 representative monitoring sites were used to estimate background levels at almost 900 receptors along the SR 60 LRT Alternative alignment and over 2,100 receptors along the Washington Boulevard LRT Alternative alignment. The measured noise levels were applied to these other noise-sensitive receptor sites based on their similarities to the monitoring sites regarding nearby roadways and intersections, land

use densities, and geographical distance from the monitoring sites.

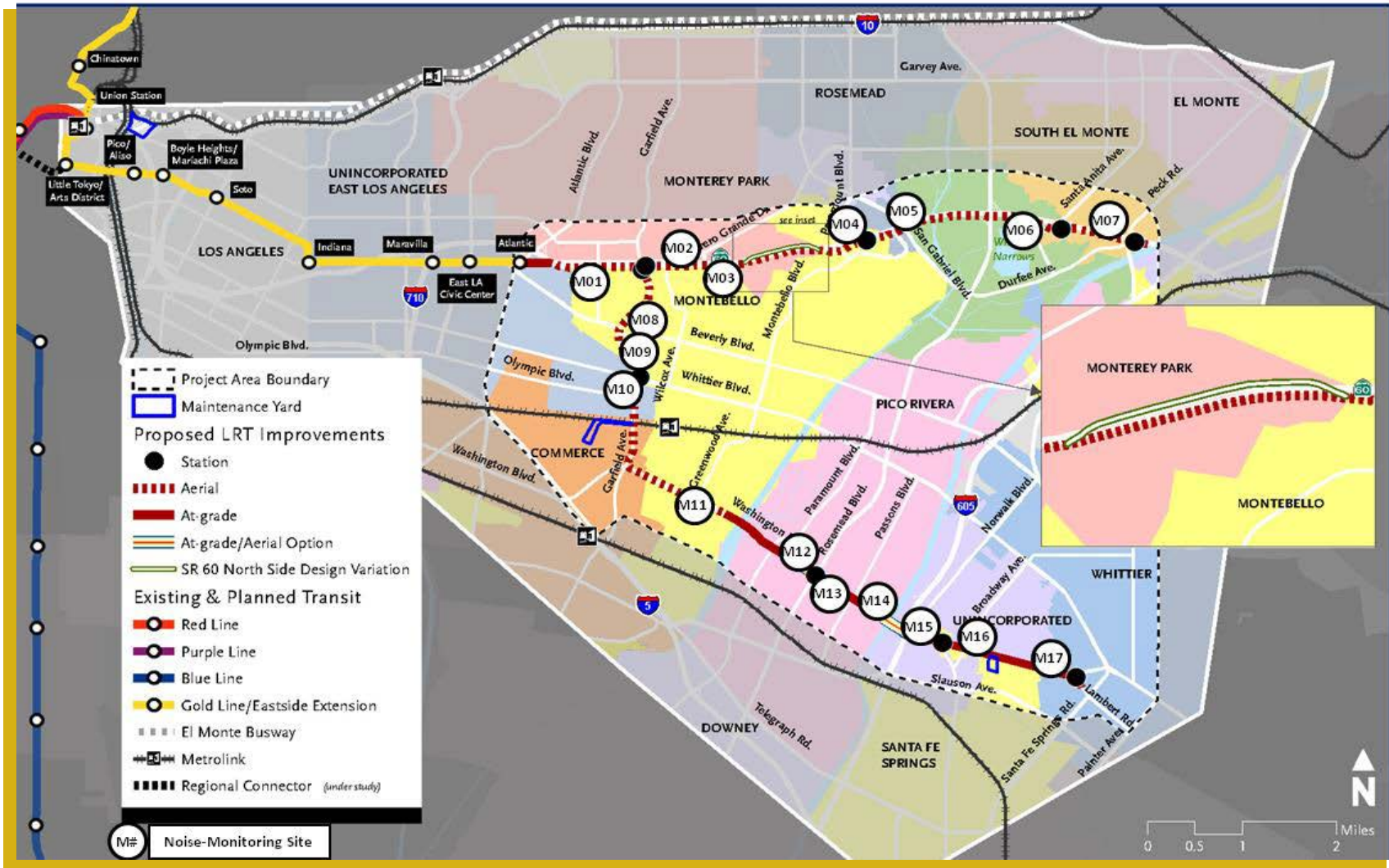
4.9.3 Environmental Impacts/Environmental Consequences

The following sections summarize the evaluation of potential noise and vibration impacts for each alternative as discussed in detail in Appendix T, Noise and Vibration Technical Memorandum, of this Draft EIS/EIR. The thresholds for determining the significance of operational impacts for this analysis were based on FTA *Transit Noise and Vibration Impact Assessment* guidelines (FTA 2006). Per FTA guidelines, the proposed project, or alternatives under consideration, would result in a noise impact if the future project noise is predicted to exceed the FTA moderate or severe thresholds. However, an adverse effect under the National Environmental Policy Act (NEPA) would only occur if the FTA severe impact criteria are exceeded. Similarly, the proposed project would result in a vibration impact if maximum levels from an LRT train passby are predicted to exceed the FTA frequent criteria selected for each land use type.

As indicated above, CEQA does not provide quantitative thresholds for a substantial operational noise impact or a significant adverse vibration impact. Therefore, this analysis applied FTA criteria to determine the thresholds for significance.

The following FTA screening distances were used to develop the population of receptors included in the noise and vibration modeling analyses:

- 350 feet – unobstructed noise screening distance
- 150 feet – unobstructed vibration screening distance



Source: AECOM November 2010.

Figure 4.9-2. Noise Monitoring Locations

Table 4.9-3. Summary of Noise Source Reference Data

Noise Source			Duration(sec)	Height(ft)	Noise Level (dBA) ¹	
Category	Name	Description			Lmax	SEL
LRT	Passbys	Passby operations	-- ²	2	78 ³	80
	Warning device	Onboard bell	5	10	76 ³	79 ³
	Switches/crossovers	Special track work	--	0	86 ³	88
	Wheel squeal	Curves <65 feet	4	0	100	136
	Auxiliary equipment	Stations only	30 ⁴	10	70	106
Crossing Bell	Grade crossing bell	Grade crossing	15 ³	10	72 ⁵	108
Parking	Park and ride	Parking garage	--	10	56	92
Yard	Maintenance yard	Yard	--	2	82	118

Source: AECOM November 2010.

Notes:

¹ All noise levels are reported in dBA at a reference distance of 50 feet and a reference speed of 50 miles per hour for passbys only. Lmax represents the maximum noise level during an event and SEL is the sound exposure level that converts the cumulative noise energy of an event to one second. Default FTA reference levels are reported except where noted.

² "--" means not applicable. Duration time is not used to compute passby and facility noise levels.

³ Noise levels and duration times are based on the Metro Gold Line Phase II – Pasadena to Montclair Draft EIS/EIR (April 2004).

⁴ The default dwell time is 30 seconds at all proposed stations.

⁵ The Lmax level for the crossing bell reflects a 5-dBA penalty to account for the intrusive character of the noise source.

Table 4.9-4. Baseline Noise Levels Measured along the Project Alignments (in dBA)

Receptor		Alignment	Land Use		24-Hr Ldn	Pk-Hr Leq
ID ¹	Description		Type ²	FTA		
M01	3509 Via Campo at Keenan Street	SR 60, Washington Blvd.	SFR	2	69	66
M02	385 Pomona Blvd. at Fulton Avenue	SR 60	SFR	2	73	70
M03	1640 Via Palermo at Messina Way	SR 60	SFR	2	77	72
M04	306 Ellingbrook Drive at N. Jerseydale Avenue	SR 60	SFR	2	66	60
M05	8753 Landis View Lane at Muscatel Avenue	SR 60	SFR	2	73	69
M06	Whittier Narrows Recreation Area	SR 60	Park	3	--3	71
M07	11203 E. Maplefield Street at Allgeyer Avenue	SR 60	SFR	2	67	64
M08	608 N. Garfield Avenue at Via San Delarrio Street	Washington Blvd.	SFR	2	68	65
M09	444 and 452 Garfield Avenue at N. Hay Street	Washington Blvd.	SFR	2	67	66
M10	1001 Garfield Avenue at Northside Drive	Washington Blvd.	SFR	2	72	69
M11	860 Washington Blvd. at S. Greenwood Avenue	Washington Blvd.	SFR	2	71	68
M12	6735 Keltonview Drive at Washington Blvd.	Washington Blvd.	SFR	2	67	64
M13	Former AT&SF Depot, 9122 Washington Blvd. at Loch Alene Avenue	Washington Blvd.	Museum	3	--	73
M14	6768 Washington Blvd. at Cord Avenue	Washington Blvd.	SFR	2	70	67
M15	7857 Milna Avenue at Washington Blvd.	Washington Blvd.	SFR	2	71	67
M16	7904 Broadway Avenue at Washington Blvd.	Washington Blvd.	SFR	2	66	63
M17	7972 Calobar Avenue at Washington Blvd.	Washington Blvd.	SFR	2	69	67

Source: AECOM November 2010.

Notes:

¹ ID corresponds to general location as shown in Figure 4.9-2.

² "SFR" = Single-Family Residence.

The day-night noise level is not applicable to institutional land uses.

The screening distances were applied from the centerline of the proposed transit corridors to determine the area of potential impact.

The following section summarizes the analysis and conclusions for each project alternative, as

discussed in detail in Appendix T, Noise and Vibration Technical Memorandum, of this Draft EIS/EIR. **Table 4.9-5** summarizes the results of the noise and vibration analysis.

Table 4.9-5. Summary of Potential Noise and Vibration Impacts

Alternative	Noise Impacts (NEPA/CEQA)	Vibration Impacts (NEPA/CEQA)	Adverse Noise Effects/Impacts After Mitigation (NEPA/CEQA)	Adverse Vibration Effects/ Impacts After Mitigation (NEPA/CEQA)
No Build (Construction and Operational Impacts)	None	None	None	None
TSM (Construction and Operational Impacts)	None	None	None	None
SR 60 LRT Alternative	<p>Construction: Adverse Effect/Significant Impact</p> <p>Operational: Adverse Effect/Significant Impact</p>	<p>Construction: Adverse Effect/Significant Impact</p> <p>Operational: Adverse Effect/Significant Impact</p>	<p>Construction: Not adverse after mitigation/Less than significant after mitigation</p> <p>Operational: Not adverse after mitigation/Less than significant after mitigation</p>	<p>Construction: Not adverse after mitigation/Less than significant after mitigation</p> <p>Operational: Not adverse after mitigation/Less than significant after mitigation</p>
Washington Boulevard LRT Alternative	<p>Construction: Adverse Effect/Significant Impact</p> <p>Operational: Adverse Effect/Significant Impact</p>	<p>Construction: Adverse Effect/Significant Impact</p> <p>Operational: Adverse Effect/Significant Impact</p>	<p>Construction: Not adverse after mitigation/Less than significant after mitigation</p> <p>Operational: Not adverse after mitigation/Less than significant after mitigation</p>	<p>Construction: Not adverse after mitigation/Less than significant after mitigation</p> <p>Operational: Not adverse after mitigation/Less than significant after mitigation</p>

Note: CEQA does not provide quantitative thresholds for a substantial noise impact or a significant adverse vibration impact. Therefore, this analysis applied FTA criteria to determine the threshold for significance (FTA 2006). An adverse effect under NEPA would only occur if the FTA severe impact criteria are exceeded. Potential adverse impacts are analyzed and disclosed in a manner consistent with NEPA and CEQA requirements.

4.9.3.1 No Build Alternative

4.9.3.1.1 Impact Analysis

Construction Impacts

No major construction activities are proposed under the No Build Alternative. Therefore, no construction noise and vibration impacts are expected under the No Build Alternative.

Operational Impacts

Future noise levels under the No Build Alternative are anticipated to be similar to those under existing conditions. For example, it takes a doubling of the traffic volumes for the noise levels to increase by 3 dBA, the threshold where most listeners detect the change.

Projected increases in traffic levels of less than 40 percent in the project area between now and 2035 would result in higher congestion and lower average travel speeds and, therefore, lower roadway noise levels. Therefore, no significant noise impacts would occur under the No Build Alternative. Since no project elements are proposed under the No Build Alternative, the alternative would not cause any vibration impacts.

4.9.3.1.2 Mitigation Measures

Since the No Build Alternative would have no noise or vibration impacts, no mitigation measures are required.

4.9.3.1.3 Impacts Remaining After Mitigation

NEPA Finding

The No Build Alternative would not result in any adverse noise or vibration effects.

CEQA Determination

The No Build Alternative would not result in any noise or vibration impacts.

4.9.3.2 TSM Alternative

4.9.3.2.1 Impact Analysis

Construction Impacts

No major construction activities are proposed under the TSM Alternative. Therefore, no

construction noise and vibration impacts are expected under the TSM Alternative.

Operational Impacts

The TSM Alternative primarily involves improvements to bus service to reduce traffic congestion. The number of buses that would be added under the TSM Alternative would not result in a doubling of traffic along the roadways in the project area and, therefore, would not result in a noticeable increase in roadway noise.

As a result, the TSM Alternative would not result in noise impacts. Future vibration levels under the TSM Alternative are expected to be similar to those currently experienced under existing conditions. The pneumatic tires and suspension systems of the buses associated with the TSM Alternative would eliminate most GBV and rarely cause vibration annoyance, except at receptors close to potholes or bridge expansion joints. Therefore, the TSM Alternative would not result in any adverse effects to vibration under NEPA or significant impacts under CEQA.

4.9.3.2.2 Mitigation Measures

Since the TSM Alternative would have no noise or vibration effects or impacts, no mitigation measures are required.

4.9.3.2.3 Impacts Remaining After Mitigation

NEPA Finding

The TSM Alternative would not result in any adverse construction or operational noise or vibration effects.

CEQA Determination

The TSM Alternative would have no construction or operational noise or vibration impacts.

4.9.3.3 SR 60 LRT Alternative

4.9.3.3.1 Impact Analysis

Construction Impacts

Several construction activities may be required as part of the SR 60 LRT Alternative including:

- Guideway or track laying (at-grade and aerial)
- Station construction
- Parking garage (site demolition and facility construction)
- Maintenance yard (site demolition and facility construction)

According to the project's Construction Methods Technical Memorandum, included as Appendix L in this Draft EIS/EIR, at-grade track laying or guideway construction equipment would generally consist of rubber-tired excavators, loaders, rubber-tired compactors, graders and small bulldozers, and water trucks for dust control. For aerial guideway construction, activities would include the placement of piles or support columns and girders to create a span between the bents. Equipment required for aerial guideway construction would include pile drivers (vibratory or impact), drilling rigs, possibly specialized water jet excavators, trucks to remove excavated soil, transit mix concrete trucks and concrete pumps, specialized truck trailers to deliver pre-cast concrete beams, cranes, trucks to deliver forms, reinforcing steel, pavement saws, pre-cast concrete post tensioning jacks and related equipment, and water trucks for dust control.

To minimize noise and vibration impacts during construction, the contractor may utilize cast-in-drilled-hole (CIDH) piles in the vicinity of noise sensitive receptors. Piles are support columns that may be driven or hammered into the ground. To accomplish this, contractors typically use equipment called pile drivers for speed and efficiency. CIDH piles eliminate hammering by using large augers to drill a hole into which a steel frame is placed. The drilled hole and steel frame insert are then filled with concrete to create cast-in-drilled-hole columns or piles. Noise and vibration impacts could also be reduced if steel torque-down piles are used instead of driven piles.

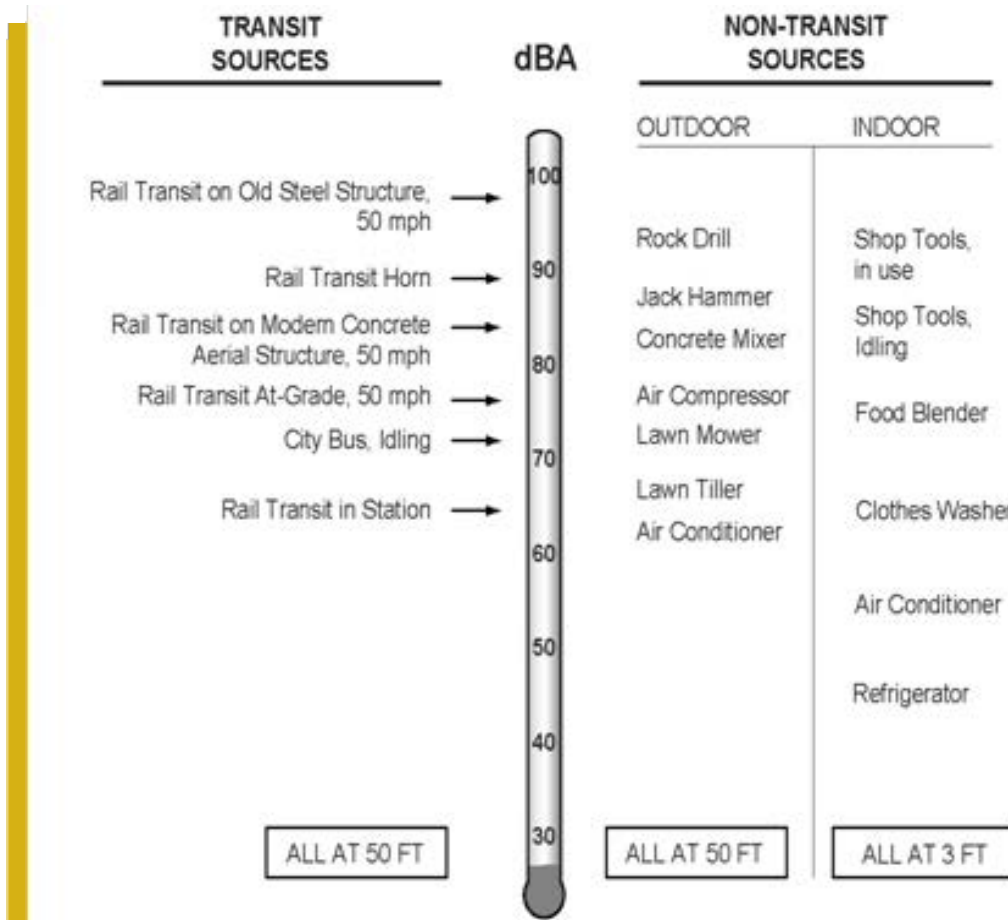
The use of CIDH piles that utilize the pre-augering method or steel torque-down piles would not be

expected to result in any adverse construction noise or vibration impacts as no pounding effects would occur. Other activities that would utilize piles include station and parking garage construction, which require piles to support the weight of the massive structures. These activities would also be eligible to utilize CIDH piles or steel torque-down piles to eliminate the potential of adverse noise and vibration impacts in the community.

Construction Noise

Typical A-weighted noise levels from construction equipment, transit, and other common sources are summarized in **Figure 4.9-3**. The A-weighting scale is used to best describe the response of human hearing to transit and other environmental noise. Based on laboratory and field testing, acoustical scientists determined that the sensitivity of human hearing generally falls between 250 and 10,000 Hz. Therefore, the A-weighting scale was developed to replicate the sensitivities of human hearing by filtering out low and very high frequencies. The A-weighting scale is utilized by all federal agencies for evaluating impacts in the community. The noise thermometer is intended to show the different levels as measured from a reference distance of 50 feet from the source.

Noise levels from construction activities along the SR 60 LRT Alternative alignment, although temporary, could be a nuisance at nearby sensitive receptors such as residences and schools. Noise levels during construction are difficult to predict and vary depending on the types of construction activity and the types of equipment used for each stage of work. Heavy machinery, the major source of noise in construction, is constantly moving in unpredictable patterns and is not usually at one location very long. Project construction activities include, for example, constructing track bed, installing bents for the aerial structures, relocating utilities, renovating grade crossings, and constructing stations.



Source: "Transit Noise and Vibration Impact Assessment," Federal Transit Administration, Washington, DC, May 2006

Figure 4.9-3. Typical A-weighted Noise Levels

No specific information is available during the environmental analysis phase of the project on the selection of equipment for each construction activity. Details on the actual equipment types and the duration of their use would not be determined until a contractor is selected for the work. However, it is recognized that there would be adverse impacts during construction in some locations.

Since the proposed construction is expected to last about 12 to 18 months at any one location, depending on the type of activity, significant noise impacts are expected, particularly on those receptors adjacent to the SR 60 LRT Alternative alignment. Noise control measures are expected to eliminate impacts and minimize extended disruption of normal activities. Along the SR 60 LRT Alternative, construction activities would

include laying track for both aerial and at-grade sections, and construction of Metro stations, bridges, park and ride garages, and a maintenance yard. Daytime noise is predicted to exceed the FTA limit of 90 dBA at residential receptors at distances ranging from 32 feet during station construction to 40 feet during the laying of at-grade track. Daytime noise is predicted to exceed the FTA limit of 100 dBA at commercial receptors at distances that range from 10 feet during station construction to 13 feet during the laying of at-grade track. Based on these preliminary construction noise estimates, construction activities are predicted to exceed the FTA daytime noise limits only at the residences and commercial properties closest to station and guideway construction. As such, construction of the SR 60 LRT Alternative would result in a

temporary adverse effect under NEPA and a significant impact under CEQA if not mitigated.

To ensure that noise impacts are minimized during construction, all construction activities are intended to comply with Metro's baseline specifications (Section 01565, Construction Noise and Vibration Control). Although Metro, as a state-chartered agency, is exempt from local noise ordinances, Metro is committed to consistency with local construction noise limits whenever feasible and reasonable, in accordance with its own construction specifications. For example, Metro's contractor would utilize control measures from its own specifications that effectively minimize noise and vibration impacts in the community, such as:

- Conducting construction activities during the daytime whenever possible;
- Requiring special permits for construction within a specified distance and a specified time period for residential zones during nights and weekends;
- Using construction equipment with effective noise-suppression devices;
- Using noise control measures, such as enclosures and noise barriers, as necessary to protect the public and achieve compliance with Metro's noise limits; and
- Conducting all operations in a manner that will minimize, to the greatest extent feasible, disturbance to the public in areas adjacent to the construction activities and to occupants of nearby buildings. This includes methods that result in shortening the construction period wherever possible.

Construction Vibration

Unlike noise, vibration levels from construction activities are not cumulative, but are instead dependent on the type of activity and equipment used. Vibration is also dependent on the ground and terrain conditions, the presence of underground utilities, and the type and condition of the building at the receptor. As a result, except for

digging and pounding activities in hard soils, most construction activities do not contribute to vibration impacts due to the typically long distance between the activity and the sensitive receptor.

Along the SR 60 LRT Alternative, construction activities would include the use of bulldozers, dump trucks, and vibratory rollers. The use of impact pile drivers would be avoided whenever possible to eliminate the potential for vibration impacts (such as minor cosmetic structural damage) at nearby sensitive receptors. The FTA vibration damage criterion of 0.2 inches per second (ips) would be exceeded (for typical timber and masonry residences) at distances ranging from 15 feet for trucks to 20 feet for bulldozers to 35 feet for vibratory rollers. In accordance with the FTA guidelines, the vibration limit is used during the environmental impact assessment phase to identify potential problem locations that should be addressed in more detail during final design. The FTA criterion is intended to be used more as an indicator of potential damage rather than as a definitive evaluation of impact. During final design, when details of the actual construction equipment to be used would be determined, a more definitive evaluation of potential impact and damage is recommended to address these potential concerns.

Similarly, the FTA vibration infrequent annoyance criterion of 80 VdB for residences and other FTA Category 2 land uses would be exceeded at distances ranging from 40 feet for trucks to 50 feet for bulldozers to 70 feet for vibratory rollers. As a result of these preliminary construction vibration estimates, construction activities are predicted to exceed the FTA impact criteria only at the residences and commercial properties closest to construction. The FTA infrequent event category was used to assess impact from perceptible vibration events, since not all construction activity would be perceptible. If not mitigated, construction of the SR 60 LRT Alternative would result in a temporary adverse effect under NEPA and a significant impact under CEQA based on the magnitude and duration of construction.

(See Chapter 2, Table 2-5 Summary of Construction Activities for Both LRT Build Alternatives.)

Operational Impacts

The SR 60 LRT Alternative would have four potential sources of noise and vibration during

operations: LRV passbys, special track work, traction power substation (TPSS) facilities, and maintenance yard activities. Noise impacts are summarized in **Table 4.9-6** for representative locations and in **Table 4.9-7** for the entire SR 60 LRT Alternative alignment.

Table 4.9-6. SR 60 LRT Alternative Noise Levels at Representative Receptors (in dBA)

Receptor		Land Use		Existing Noise	Project Noise ^{4,5}	FTA Criteria	
ID ¹	Description	Type ²	FTA ³			"Moderate"	"Severe"
M01	3509 Via Campo	SFR	2	69	<u>65</u>	64	69
M02	385 Pomona Blvd.	SFR	2	73	57	65	72
M03	1640 Via Palermo	SFR	2	77	59	65	75
M04	306 Ellingbrook Drive	SFR	2	66	54	62	67
M05	8753 Landis View Lane	SFR	2	73	60	65	72
M06	Whittier Narrows Recreation Area	Park	3	71	58	70	75
M07	11203 E. Maplefield Street	SFR	2	67	52	62	68

Source: AECOM February 2011.

Notes:

¹ ID corresponds to general location as shown in Figure 4.9-2.

² SFR = Single-Family Residence

³ This column refers to the land use categories previously described in Table 4.9-1, FTA Land Use Categories and Noise Metrics.

⁴ FTA moderate impacts are **bold** and underlined.

⁵ The "Project Noise" levels represent the future project noise only. The cumulative future ambient noise with the project would be equal to the "Existing Noise" logarithmically added to the "Project Noise."

LRV Passby: Except for receptors in the immediate vicinity of stationary noise sources (such as stations and park and ride facilities or special track work such as switches), receptor noise along the SR 60 LRT Alternative would be primarily due to passbys from LRVs. Maximum passby noise levels from LRVs (shown in Table 4.9-3) were used to develop cumulative day-night noise levels over a 24-hour period using typical weekday operating conditions. Impacts associated with LRV passby are summarized in Table 4.9-7.

Special Track Work: Special track work (such as turnouts and crossovers) is proposed at several locations along the SR 60 LRT Alternative alignment to minimize the number of potential impacts while providing operational flexibility. Special track work has been designed in accordance with Metro’s design criteria. Turnouts or switches allow trains to move from one track to another, while crossovers allow trains to move between parallel tracks.

Table 4.9-7. Summary of SR 60 LRT Alternative Noise Impacts

ID ¹	Location	Type of Use ²	Impact (Moderate or Severe) ³	No. Residences Affected ⁴		Major Source(s) Contributing to Impact ⁵
				SR 60	SR 60 Design Variation	
	FTA Category 2					
M01	Via Campo	SFR MFR	Moderate Moderate	13 4	13 4	LRV passbys
M03	Via Palermo	SFR	Moderate	9	0	LRV passbys
M05	Muscatel Avenue	SFR	Moderate	1	1	LRV passbys
M07	Lexington Gallatin Road	SFR	Moderate	3	3	Switches and LRV passbys
	Lexham Avenue	SFR	Moderate Severe	3 1	3 1	
	Fawcett Avenue	SFR	Moderate	3	3	
	Total FTA Category 2		Severe Moderate Total	[1] <u>36</u> 37	[1] <u>27</u> 28	
	FTA Category 3					
	Total FTA Category 3		Severe Moderate Total	0 <u>0</u> 0	0 <u>0</u> 0	
	Total – All Uses		Severe Moderate Total	[1] <u>36</u> 37	[1] <u>27</u> 28	

Source: AECOM October 2011.

Notes:

¹ ID corresponds to general location as shown in Figure 4.9-2.

² SFR = Single-Family Residence; MFR = Multi-Family Residence.

³ FTA moderate and severe impacts are **bold** and underlined and severe impacts are **bold** and shown in brackets ([]).

⁴ The number of affected residences is shown for both the SR 60 LRT Alternative and the SR 60 Design Variation.

⁵ Major sources include LRV passbys, LRT warning bells, and switches or special track work. The maintenance yard and TPSS are not expected to be primary sources of impacts in any noise-sensitive locations.

Noise from switches or crossovers comes from a small gap in the central part of the switch known as a frog. Noise levels would increase up to 8 dBA in the vicinity of the switch. Maximum noise levels from special track work (summarized in Table 4.9-3) were used to develop cumulative day-night noise levels over a 24-hour period and Leq noise levels using typical weekday operating conditions. Impacts associated with special track work are summarized in Table 4.9-7.

At FTA Category 2 land uses such as residences, motels, and hospitals, the Ldn descriptor was used to reflect their particularly heightened sensitivity to nighttime noise. At FTA Category 3 land uses such as institutional uses, the peak-hour Leq descriptor was used to reflect their sensitivity to daytime noise.

The noise levels from the existing condition and the predicted future noise levels from operation of the SR 60 LRT Alternative LRVs are summarized in Table 4.9-6 for the same receptor locations used to monitor existing noise levels (see Figure 4.9-2).

For comparison with the FTA criteria, the “Project Noise” levels in Table 4.9-6 represent the future project noise only, without the existing noise. The cumulative future ambient noise with the project would be equal to the “Existing Noise” logarithmically added to the “Project Noise.”

As summarized in Table 4.9-6, the Ldn day-night noise levels at residences along the proposed SR 60 LRT Alternative alignment are predicted to range from 52 dBA to 65 dBA and the peak-hour Leq at the Whittier Narrows Recreation Area is predicted to be 58 dBA. At the selected representative receptors, only the noise level at Site M01 is predicted to exceed the FTA moderate impact criteria.

Noise impacts at the selected noise monitoring locations described above were used to determine noise impacts generated by the SR 60 LRT Alternative at approximately 900 sensitive land use receptors along the proposed alignment. The

predicted noise impacts associated with operation of the SR 60 LRT Alternative are summarized in Table 4.9-7. As shown in Table 4.9-7, corridor-wide project noise levels associated with LRV passby and special track work are predicted to exceed the FTA moderate impact criteria at 36 residences, and to exceed the FTA severe impact criteria at one additional residence (a single-family residence along Lexham Avenue). The two historical resources identified along the SR 60 LRT Alternative alignment (Helms Bakery and Chinese Garden Restaurant) are not considered sensitive land use receptors; one is now an industrial use and the other is a commercial restaurant. Therefore, significant noise impacts would not occur at these two properties.

In summary, one significant impact would occur at the residence where noise levels would exceed the FTA severe impact criteria. Project noise levels along the SR 60 LRT Alternative would not exceed the FTA impact criteria at any FTA Category 3 land use receptors. The SR 60 LRT Alternative would result in an adverse effect under NEPA and a significant impact under CEQA if not mitigated.

Maximum noise levels from switches located east of the Santa Anita Avenue station are predicted to range from 73 to 83 dBA at residences along Lexham and Fawcett Avenues just west of South El Monte High School. As shown in Table 4.9-7, these switches are predicted to contribute to noise levels that exceed the FTA moderate impact criteria at these residences.

For the SR 60 North Side Design Variation, the impacts are predicted to be exactly the same except in the vicinity of Via Palermo. At Via Palermo, reduced LRT speeds west of the design variation are predicted to result in nine fewer moderate noise impacts at residences, for a total of 27 impacts.

Reduced travel speeds approaching the design variation segment (from 55 mph to 45 mph) are predicted to result in slightly lower operational noise levels at residences along Via Palermo. The one FTA severe impact is predicted at the same

single-family residence along Lexham Avenue. None of the noise levels generated by the SR 60 LRT Alternative with the North Side Design Variation are predicted to exceed the FTA impact criteria at any FTA Category 3 receptors. The noise impacts associated with the SR 60 LRT Alternative are summarized graphically in Appendix T, Noise and Vibration Technical Memorandum, of this Draft EIS/EIR.

Traction Power Substations: As part of the SR 60 LRT Alternative, TPSS facilities would be installed at several locations along the proposed rail corridor to provide adequate electrical power for LRT service. Each TPSS would be designed in accordance with the Metro system-wide design criteria noise guideline of 50 dBA at 50 feet or the nearest residential building, whichever is closer. This operating noise level for the TPSS would be significantly lower than existing ambient noise levels (which range from 66 to 77 dBA) and LRV passby noise levels of 78 dBA at 50 feet. Therefore, noise generated by the TPSS would not exceed the FTA noise impact criteria at any land use receptors along the SR 60 LRT Alternative alignment, and no significant noise impact would occur. The SR 60 LRT Alternative would not result in an adverse effect under NEPA and would have a less than significant impact under CEQA.

Maintenance Yard: One 11-acre site has been identified as a maintenance yard option for the SR 60 LRT Alternative, referred to as the Mission Junction Maintenance Yard Option. The site is located in an industrial area and is adjacent to the existing Mission Junction rail facility, which is directly north of the intersection of Cesar Chavez Avenue and Mission Road. The proposed maintenance yard would accommodate daily maintenance, inspection and repairs, and storage of LRVs.

The closest noise-sensitive receptors are residences located north of Alhambra Avenue over 2,000 feet from the proposed Mission Junction Maintenance Yard Option, which is well outside the FTA screening distance of 1,000 feet. Therefore, noise

generated by maintenance yard activity would not exceed the FTA noise impact criteria at the closest sensitive land use receptors and no significant noise impact would occur. The SR 60 LRT Alternative would not result in an adverse effect under NEPA and would have a less than significant impact under CEQA.

Vibration Impacts

Transit vibration impacts are assessed based on individual events, such as when a train passes by. To reduce transit vibration impacts at residences and other sensitive receptors along the build alternative alignments, the entire rail corridor would be constructed with ballast and continuously-welded rail (CWR) track. These measures are expected to reduce vibration levels that are caused by steel wheels rolling over steel rails at rail joints. Along aerial sections, elevated structures create additional separation between the train source and the ground-level receptors, resulting in greater attenuation.

At at-grade crossings, embedded track at cross streets is not expected to result in any vibration impacts due to the short section, which is limited to the width of the cross street. All predicted vibration levels were compared with the FTA frequent impact criteria to assess the severity of impact.

The SR 60 LRT Alternative would have three potential sources of vibration during operations: LRV passbys along tangent or CWR track, LRV passbys through special track work such as switches along the corridor, and switches at the maintenance yard.

Transit vibration levels were predicted at the same receptor locations used for the noise analysis. As summarized in **Table 4.9-8**, the maximum vibration levels from LRVs are predicted to range from 32 VdB to 63 VdB. As summarized in Table 4.9-8, all of the vibration levels at the representative receptor sites are predicted to be below the FTA frequent impact criteria.

Table 4.9-8. SR 60 LRT Alternative Vibration Levels at Representative Receptors (in VdB)

Receptor		Land Use		Vibration	FTA Criteria	
ID ¹	Description	Type ²	FTA ³		"frequent"	Impact
M01	3509 Via Campo	SFR	2	63	72	No
M02	385 Pomona Blvd.	SFR	2	50	72	No
M03	1640 Via Palermo	SFR	2	58	72	No
M04	306 Ellingbrook Drive	SFR	2	35	72	No
M05	8753 Landis View Lane	SFR	2	51	72	No
M06	Whittier Narrows Recreation Area	Park	3	60	75	No
M07	11203 E. Maplefield Street	SFR	2	32	72	No

Source: AECOM November 2010.

Notes:

¹ ID corresponds to general location as shown in Figure 4.9-2.

² SFR = Single-Family Residence

³ This column refers to the land use categories previously described in Table 4.9-1, FTA Land Use Categories and Noise Metrics.

Table 4.9-9 summarizes corridor-wide vibration levels associated with LRV passby and special track work. As shown in Table 4.9-9, vibration levels are predicted to exceed the FTA frequent criterion of 72 VdB at three residences (FTA Category 2 land uses). All of these impacts are due to the proximity of residences along Lexham Avenue to the proposed switches east of the Santa Anita Avenue station. Maximum vibration levels at FTA Category 3 land uses are predicted to range from 41 VdB to 62 VdB. No other vibration impacts are predicted at FTA Category 3 land use receptors along the SR 60 LRT Alternative alignment. If not mitigated, the SR 60 LRT Alternative would result in an adverse effect under NEPA and a significant impact under CEQA to these sensitive receptors.

As indicated above, the two historical resources identified along the SR 60 LRT Alternative alignment are not considered sensitive land use receptors and no significant vibration impact would occur at these two properties. The vibration impacts associated with the SR 60 LRT Alternative

are summarized graphically in Appendix T, Noise and Vibration Technical Memorandum, of this Draft EIS/EIR. None of the vibration impacts are due to LRV passbys along CWR track. The SR 60 LRT Alternative would not result in an adverse effect under NEPA and would have a less than significant impact under CEQA to historic resources.

Vibration impacts would be the same for the SR 60 LRT Alternative with or without the North Side Design Variation.

A vibration analysis was also prepared on LRV passby affects to slope stability at the OII Landfill site. Based on applied methodologies from FTA's *Transit Noise and Vibration Impact Assessment* guidelines, the maximum potential vibration level from a LRV passby (estimated at the base of the track structure support piling or column) is one or two orders of magnitude less than typical construction activities. Given the above, no vibration levels exceeding the FTA damage criteria

are predicted and therefore no significant vibration effects would occur. Detailed vibration analysis on the OII Landfill site is provided in Appendix T, Noise and Vibration Technical Memorandum, of this Draft EIS/EIR.

The closest vibration-sensitive receptors in the vicinity of the proposed Mission Junction Maintenance Yard Option site are residences north

of Alhambra Avenue over 2,000 feet away. Therefore, vibration generated from slow-moving LRVs over switches and other activities at the maintenance yard would not exceed the FTA vibration impact criterion at any of the closest vibration-sensitive receptors and no significant vibration impact would occur.

Table 4.9-9. Summary of SR 60 LRT Alternative Vibration Impacts

ID ¹	Location	Type of Use ²	Impact (Frequent)	No. Residences Affected ³		Major Source(s) Contributing to Impact ⁴
				Base	North	
	FTA Category 2					
M07	Lexham Avenue	SFR	Frequent	3	3	Switches
	Total FTA Category 2		Frequent	3	3	
	FTA Category 3			0	0	--
	Total – All Uses		Total	3	3	

Source: AECOM February 2011.

Notes:

¹ ID corresponds to general location as shown in Figure 4.9-2.

² SFR = Single-Family Residence.

³ The number of affected residences is shown for both the SR 60 LRT Alternative and the SR 60 North Side Design Variation.

⁴ Major sources include LRV passbys, LRT warning bells, and switches or special track work. The maintenance yard and TPSS are not expected to be primary sources of impacts in any noise-sensitive locations.

4.9.3.3.2 Mitigation Measures

Construction Mitigation Measures

The SR 60 LRT Alternative would have temporary adverse effects (limited to the duration of construction) under NEPA and a significant impact under CEQA during construction with regard to noise and vibration; however these effects/impacts would be mitigated through the following measures:

- 4.9-i Use construction methods that avoid pile-driving at locations with noise- and vibration-sensitive receptors, such as residences, schools, and hospitals. Metro’s

contractor would consider using cast-in-drilled-hole (CIDH) or other suitable piling methods (such as steel torque-down piles) rather than impact pile drivers to reduce excessive noise and vibration. This should be considered near sensitive receptors.

- 4.9-ii In areas where vibration-producing equipment would be used, Metro’s contractor would conduct a survey of the closest receptors (particularly fragile historic properties) to determine the baseline structural integrity and condition of walls and joints. These surveys would include the installation of strain gauges or

photographic documentation of the interior walls and exterior façade to provide a basis for comparison after construction is completed. Depending on the baseline conditions of the nearby buildings, an appropriate construction and monitoring plan would be developed to minimize potential damage to susceptible structures. Where possible, temporary noise barriers would be erected between noisy activities and noise-sensitive receptors. If driven piles are required for deep foundation support or in areas within the monocoil (to contain contaminated materials), steel torque-down piles can also be used to mitigate noise and vibration impacts.

- 4.9-iii Construction equipment and material staging areas would be located away from sensitive receptors.
- 4.9-iv Construction traffic and haul routes would be routed along roads in non-noise-sensitive areas where possible.
- 4.9-v Contractors would be required to use best available control technologies, whenever possible, to limit excessive noise and vibration when working near residences.
- 4.9-vi Metro will minimize the construction duration using construction methods that would shorten the construction schedule.
- 4.9-vii Whenever possible, construction activities would be conducted during the daytime and during weekdays in accordance with most local noise-control ordinances.
- 4.9-viii The public would be adequately notified of construction operations and schedules. Methods such as construction-alert publications or a Project Hotline would be used to handle complaints quickly.

In addition, per Mitigation Measures 3.0-ii through 3.0-viii in Chapter 3, a Traffic Management Plan would also reduce noise and vibration effects/impacts from traffic and freeway operations during construction of the SR 60 LRT Alternative to

not adverse under NEPA and less than significant under CEQA. (Refer to the specific section for the detailed mitigation measure.)

Operational Mitigation Measures

Noise

The SR 60 LRT Alternative would have adverse effects under NEPA and a significant impact under CEQA from noise effects/impacts due to gaps at switches. These effects/impacts may be eliminated in a number of ways, such as relocating the switches (which are a crossover component), installing ballast mats under conventional switches to “decouple” the train vibration from the track supporting structure, or using a “gapless” spring frog.

- 4.9-ix Relocating switches away from noise-sensitive receptors is one cost-effective measure for mitigating this impact. However, if operational concerns interfere with the relocation of switches, then several other viable mitigation options are available such as point-less switches (“gapless spring frogs” that eliminate the gap in the rail) or low-vibration isolators (ballast mats or tie pads) such as have been used on the San Diego Trolley system. The proposed crossover east of the Santa Anita Avenue station would be relocated away from sensitive land use receptors to eliminate noise impacts due to switches per FTA noise criteria.
- 4.9-x For noise impacts due to LRV passbys along tangent aerial track sections, parapets are recommended in lieu of safety railings as part of the SR 60 LRT Alternative alignment to provide additional shielding for nearby residences. Parapets would be used at the following locations to eliminate noise impacts from LRV passbys:
 - Eastbound track side starting just west of Gerhart Avenue to just east of Findlay Avenue – three-foot by 2,500-foot barrier

- Eastbound track side starting just east of Vail Avenue to the Montebello/Monterey Park city boundary – three-foot by 800-foot barrier (not applicable for the SR 60 North Side Design Variation)
- Eastbound track side starting just east of San Gabriel Boulevard to Muscatel Avenue – three-foot by 800-foot barrier

Except for the noise barrier starting just east of Vail Avenue, the proposed mitigation for the SR 60 North Side Design Variation would be the same as for the SR 60 LRT Alternative. No noise impacts are predicted under the SR 60 North Side Design Variation between Vail Avenue and the Montebello/Monterey Park city boundary.

In combination, these measures would address the adverse noise effects under NEPA and significant noise impacts under CEQA.

Vibration

As with the mitigation proposed for noise, vibration impacts due to gaps at switches may be eliminated by available options such as relocating the switches, installing ballast mats under conventional switches to “decouple” the train vibration from the track supporting structure, or using a “gapless” spring frog (see Mitigation Measure 4.9-ix above). The proposed crossover east of the Santa Anita Avenue station would be relocated away from sensitive land use receptors to eliminate predicted vibration impacts due to switches at the three residences along the SR 60 LRT Alternative.

No other vibration impacts are predicted along the SR 60 LRT Alternative alignment due to track switches because the switches would be strategically located as part of the advanced conceptual design to avoid impacts from rail discontinuities.

Mitigation measure 4.9-ix, identified above, would address the adverse vibration effects under NEPA and significant vibration impacts under CEQA. (Refer to Appendix HH, Conceptual Engineering Drawings, for specific crossover locations and Appendix T, Noise and Vibration Technical

Memorandum, of this Draft EIS/EIR for specific mile marker locations of noise barriers.)

4.9.3.3 Impacts Remaining After Mitigation

NEPA Finding

With the implementation of mitigation measures, no adverse construction noise or vibration effects would occur during construction of the SR 60 LRT Alternative.

With the implementation of mitigation measures, operational noise and vibration levels at all impacted sites along the SR 60 LRT Alternative alignment would be reduced below the FTA severe impact threshold. Therefore, no adverse effects would occur as a result of transit operations.

CEQA Determination

With the implementation of mitigation measures, no significant construction noise and vibration impacts would occur during construction of the SR 60 LRT Alternative.

Along the SR 60 LRT Alternative alignment, with or without the North Side Design Variation, implementation of mitigation measures would reduce the noise impact to less than significant.

4.9.3.4 Washington Boulevard LRT Alternative

4.9.3.4.1 Impact Analysis

Construction Impacts

Several construction activities may be required as part of the Washington Boulevard LRT Alternative, including:

- Guideway or track laying (at-grade and aerial)
- Station construction
- Bridge construction
- Parking garage (site demolition and facility construction)
- Maintenance yard (site demolition and facility construction)

According to the project's Construction Methods Technical Memorandum, included as Appendix L in this Draft EIS/EIR, at-grade track laying or guideway construction equipment would generally consist of rubber-tired excavators, loaders, rubber-tired compactors, graders and small bulldozers, and water trucks for dust control. For aerial guideway construction, activities would include the placement of piles or support columns and girders to create a span between the bents. Equipment required for aerial guideway construction would include pile drivers (vibratory or impact), drilling rigs, possibly specialized water jet excavators, trucks to remove excavated soil, transit mix concrete trucks and concrete pumps, specialized truck trailers to deliver pre-cast concrete beams, cranes, trucks to deliver forms, reinforcing steel, pavement saws, pre-cast concrete post tensioning jacks and related equipment, and water trucks for dust control.

To minimize noise and vibration impacts during construction, the contractor may utilize CIDH piles or steel torque-down piles in the vicinity of sensitive receptors. Piles are support columns that may be driven or hammered into the ground. To accomplish this, contractors typically use equipment called pile drivers for speed and efficiency. CIDH piles eliminate hammering by using large augers to drill a hole in which a steel frame is placed. The drilled hole and steel frame insert are then filled with concrete to create CIDH columns or piles. The use of CIDH piles that utilize the pre-augering method would not be expected to result in any adverse construction noise or vibration impacts. Noise and vibration impacts could also be reduced if steel torque-down piles are used instead of driven piles. Other activities that would also utilize piles including station and parking garage construction in order to support the weight of the massive structures. These activities could also use CIDH piles or steel torque-down piles to eliminate the potential for adverse noise and vibration impacts in the community.

Construction Noise

Typical A-weighted noise levels from construction equipment, transit, and other common sources are summarized above in Figure 4.9-3. The noise thermometer is intended to show the different levels as measured from a reference distance of 50 feet from the source.

Noise levels from construction activities along the Washington Boulevard LRT Alternative alignment, although temporary, could be a nuisance at nearby sensitive receptors such as residences and schools. Noise levels during construction are difficult to predict and vary depending on the types of construction activity and the types of equipment used for each stage of work. Heavy machinery, the major source of noise in construction, is constantly moving in unpredictable patterns and is not usually at one location very long. Project construction activities include, for example, constructing track bed, installing bents for the aerial structures, relocating utilities, renovating grade crossings, and constructing stations. No specific information on the selection of equipment for each construction activity is available during the environmental analysis phase of the project. Details on the actual equipment types and duration of usage would not be determined until a contractor is selected for the work. However, it is recognized that adverse impacts would occur during construction in some locations. In addition, activities associated with construction staging and/or material laydown areas can result in adverse noise impacts if they take place in noise-sensitive areas. Locations for construction staging are identified in the separate Real Estate Acquisition–Displacement and Relocation Technical Memorandum, included as Appendix O in this Draft EIS/EIR.

Since the proposed construction is expected to last about 12 to 18 months at any one location depending on the type of activity, significant noise impacts are expected, particularly for those receptors adjacent to the Washington Boulevard LRT Alternative alignment. Therefore, noise control measures are anticipated to eliminate impacts and minimize the extended disruption of normal

activities. Along the Washington Boulevard LRT Alternative, construction activities would include laying track for aerial and at-grade sections and constructing stations, bridges, park and ride garages, and a maintenance yard. The distances at which daytime noise is predicted to exceed the FTA daytime noise limits of 90 dBA at residential receptors ranges from 32 feet during station construction to 40 feet during at-grade track laying. The distances at which daytime noise is predicted to exceed the FTA limits of 100 dBA at commercial receptors range from 10 feet during station construction to 13 feet during laying of at-grade track. Based on these preliminary construction noise estimates, construction activities are predicted to exceed the FTA daytime noise limits only at the residences and commercial properties closest to station and guideway construction. Construction of the Washington Boulevard LRT Alternative would result in a temporary adverse effect under NEPA and a significant impact under CEQA if not mitigated.

To ensure that noise impacts are minimized during construction, all construction activities would comply with Metro’s baseline specifications *Section 01565, Construction Noise and Vibration Control*. Although Metro, as a state-chartered agency, is exempt from local noise ordinances, it is still committed to consistency with local construction noise limits, whenever feasible and reasonable, in accordance with its own construction specifications. For example, Metro’s contractor would utilize control measures from its own specifications that effectively minimize noise and vibration impacts in the community, such as:

- Conducting construction activities during the daytime whenever possible;
- Requiring special permits for all construction within a specified distance and a specified time period for residential zones during nights and weekends;
- Using construction equipment with effective noise-suppression devices;
- Using noise control measures, such as enclosures and noise barriers, as necessary to protect the public and achieve compliance with Metro's noise limits; and
- Conducting all operations in a manner that will minimize, to the greatest extent feasible, disturbance to the public in areas adjacent to construction activities and to occupants of nearby buildings. This includes using methods that shorten the duration of construction activities as a whole or in any one particular area.

Construction Vibration

Unlike noise, vibration levels from construction activities are not cumulative; rather, they depend on the type of activity and equipment used.

Vibration is also dependent on the ground and terrain conditions, the presence of underground utilities, and the type and condition of the building at the receptor.

As a result, except for digging and pounding activities in hard soils, most construction activities do not contribute to vibration impacts due to the typically long distance between the activity and the sensitive receptor.

Along the Washington Boulevard LRT Alternative, construction activities would include the use of bulldozers, dump trucks, and vibratory rollers. The use of impact pile drivers would be avoided whenever possible to eliminate the potential of vibration impacts (such as minor cosmetic structural damage) at nearby sensitive receptors. The distances at which vibrations would exceed the FTA vibration damage criterion of 0.2 ips (for typical timber and masonry residences) range from 15 feet for trucks to 20 feet for bulldozers to 35 feet for vibratory rollers. In accordance with the FTA guidelines, the vibration limit is used during the environmental impact assessment phase to identify potential problem locations that should be addressed in more detail during final design. The FTA criterion is intended to be used more as an indicator of potential damage rather than a

definitive evaluation of impact. During final design, when details of the actual construction equipment to be used would be determined, a more definitive evaluation of potential impact and damage is recommended to address these potential concerns.

Similarly, the distances at which vibration levels would exceed the FTA vibration infrequent annoyance criterion of 80 VdB for residences and other FTA Category 2 land uses range from 40 feet for trucks to 50 feet for bulldozers to 70 feet for vibratory rollers. As a result of these preliminary construction vibration estimates, construction activities are predicted to exceed the FTA impact criteria only at the residences and commercial properties closest to construction. The FTA infrequent event category was used to assess impact from perceptible vibration events, since not all construction activity would be perceptible. If not mitigated, construction of the Washington Boulevard LRT Alternative would result in a temporary adverse effect under NEPA and a significant impact under CEQA based on the magnitude and duration of construction. (See Chapter 2, Table 2-5 Summary of Construction Activities for Both LRT Build Alternatives.)

Operational Impacts

The Washington Boulevard LRT Alternative would have five potential sources of noise and vibration during operations: LRV passbys, warning bells associated with at-grade crossings, special track work, TPSS facilities, and maintenance yard activities. Noise impacts are summarized in **Table 4.9-10** for representative locations and in **Table 4.9-11** for the entire Washington Boulevard LRT Alternative alignment.

LRV Passby: Except for receptors in the immediate vicinity of stationary noise sources (such as stations and park and ride facilities or special track work such as switches), receptor noise along the Washington Boulevard LRT Alternative would be primarily due to passbys from LRVs. Maximum passby noise levels from LRVs (summarized in Table 4.9-3) were used to develop cumulative day-night noise levels over a 24-hour

period and Leq noise levels using typical weekday operating conditions. Impacts associated with LRV passbys are summarized in Table 4.9-11.

Special Track Work: Special track work (such as turnouts and crossovers) is proposed at several locations along the Washington Boulevard LRT Alternative alignment to minimize the number of potential impacts while providing operational flexibility. Special track work has been designed in accordance with Metro's design criteria. As indicated above, noise levels would increase up to 8 dBA in the vicinity of the switch. Maximum noise levels from special track work (summarized in Table 4.9-3) were used to develop cumulative day-night noise levels over a 24-hour period and Leq noise levels using typical weekday operating conditions. Impacts associated with special track work are summarized in Table 4.9-11.

At-Grade Crossings: There are 12 at-grade crossings along the Washington Boulevard LRT Alternative. However, the closest noise-sensitive receptors at most grade crossings are shielded by commercial buildings (i.e., commercial buildings fill the four quadrants surrounding the grade crossings, thereby blocking the line-of-sight of the crossing signals). At Pioneer Boulevard, for example, Lmax noise levels from grade crossings at the closest residence where impacts are predicted are 76 dBA for LRV warning bells or horns.

Maximum noise levels from warning bells (summarized in Table 4.9-3) were used to develop cumulative day-night noise levels over a 24-hour period and Leq noise levels using typical weekday operating conditions. Impacts associated with LRV warning bells are summarized in Table 4.9-11.

For FTA Category 2 land uses such as residences, motels, and hospitals, the Ldn descriptor was used to reflect their particularly heightened sensitivity to nighttime noise. At FTA Category 3 land uses such as institutional uses, the peak-hour Leq descriptor was used to reflect their sensitivity to daytime noise.

Table 4.9-10. Washington Boulevard LRT Alternative Noise Levels at Representative Receptors (in dBA)

Receptor		Land Use		Existing Noise	Project Noise ^{3,4}	FTA Criteria	
ID ¹	Description	Type ²	FTA			"Moderate"	"Severe"
M01	3509 Via Campo	SFR	2	69	65	64	69
M08	608 N. Garfield Avenue	MFR	2	68	62	63	68
M09	444 and 452 Garfield Avenue	MFR	2	67	62	62	68
M10	1001 Garfield Avenue	SFR	2	72	65	65	71
M11	860 Washington Blvd.	SFR	2	71	66	65	70
M12	6735 Keltonview Drive	SFR	2	67	64	62	68
M13	9122 Washington Blvd.	Museum	3	73	61	70	77
M14	6768 Washington Blvd.	SFR	2	70	61	64	70
M15	7857 Milna Avenue	SFR	2	71	63	65	70
M10	1001 Garfield Avenue	SFR	2	72	65	65	71
M11	860 Washington Blvd.	SFR	2	71	66	65	70
M12	6735 Keltonview Drive	SFR	2	67	64	62	68
M13	9122 Washington Blvd.	Museum	3	73	61	70	77
M16	7904 Broadway Avenue	SFR	2	66	55	62	67
M17	7972 Calobar Avenue	SFR	2	69	61	64	69

Source: AECOM February 2011.

Notes:

¹ ID corresponds to general location as shown in Figure 4.9-2.

² SFR = Single Family Residence; MFR = Multi-Family Residence.

³ FTA moderate impacts are **bold** and underlined.

Table 4.9-11. Summary of Washington Boulevard LRT Alternative Noise Impacts

ID ¹	Location	Land Use Type ²	Impact (Moderate or Severe)	No. Residences Affected ³	Major Source(s) Contributing to Impact ⁴
	FTA Category 2				
M01	Via Campo	SFR SFR MFR	Moderate Severe Moderate	<u>15</u> [1] 4	LRV passbys
M08	North Garfield Avenue	SFR MFR	Moderate Moderate	<u>3</u> 30	Switches and LRV passbys
M09	North Garfield Avenue	MFR	Moderate	<u>9</u>	LRV passbys
M10	Montebello Historic District, North Garfield Avenue	SFR MFR	Moderate Moderate	<u>19</u> 27	LRV passbys
M11	Kelly House, Washington Blvd.	SFR	Moderate	<u>1</u>	LRV passbys
M12 ⁵	Washington Blvd. at Paramount Blvd.	MFR	Moderate	<u>10</u>	LRV Bells and LRV passbys
M14 ⁶	Washington Blvd. at Bonnie Vale Place Washington Blvd. at Lemoran Avenue	SFR SFR	Moderate Moderate	<u>2</u> 1	Switches and LRV passbys
M15 ⁶	Washington Blvd. at Pioneer Blvd.	SFR	Moderate	<u>3</u>	LRV Bells and LRV passbys
M16	Washington Blvd. at Ridgeview Lane	SFR	Moderate	<u>1</u>	LRV passbys
M17	Sorensen Avenue	SFR	Moderate	<u>8</u>	LRV Bells and LRV passbys
	Crowndale Avenue	SFR MFR	Moderate Moderate	<u>1</u> 1	Switches and LRV passbys
	Total FTA Category 2		Severe Moderate Total	[1] <u>135</u> 136	
	FTA Category 3				
M12	Washington Blvd. at Crossway Drive	School	Moderate	<u>1</u>	Switches and LRV passbys

Table 4.9-11. Summary of Washington Boulevard LRT Alternative Noise Impacts (continued)

ID ¹	Location	Land Use Type ²	Impact (Moderate or Severe)	No. Residences Affected ³	Major Source(s) Contributing to Impact ⁴
	Total FTA Category 3		Severe Moderate Total	[0] <u>1</u> 1	
	Total – All Uses		Severe Moderate Total	[1] <u>136</u> 137	

Source: AECOM February 2011.

Notes:

¹ ID corresponds to general location as shown in Figure 4.9-2.

² SFR = Single-Family Residence; MFR = Multi-Family Residence.

³ FTA moderate impacts are **bold** and underlined and severe impacts are **bold** and shown in brackets ([]).

⁴ Major sources include LRV passbys, LRT warning bells, and switches. The maintenance yard and TPSS are not expected to be major sources of impacts in any noise-sensitive locations.

⁵ Receptors along the Rosemead Boulevard aerial option are represented by Site M12. There is no change in the number of predicted noise impacts between the at-grade and the aerial crossings in this area.

⁶ Receptors along the San Gabriel River/I-605 aerial crossing option are represented by Sites M14 and M15. There is no change in the number of predicted noise impacts between the at-grade and the aerial options along this section of the proposed alignment.

The noise levels from the existing condition and the predicted future noise levels from operation of the Washington Boulevard LRT Alternative LRVs are summarized in Table 4.9-10 for the same receptor locations used to monitor existing noise levels (see Figure 4.9-2). For comparison with the FTA criteria, the “Project Noise” levels in Table 4.9-10 represent the future project noise only, without the existing noise.

The cumulative future ambient noise with the project would be equal to the “Existing Noise” logarithmically added to the “Project Noise.” As summarized in Table 4.9-10, the Ldn day-night noise levels at residences along the Washington Boulevard LRT Alternative alignment are predicted to range from 55 dBA to 66 dBA. At the selected representative receptors, only the noise levels at Sites M01, M09, M10, M11, and M12 are predicted to meet or just exceed the FTA moderate noise impact criteria as listed in Table 4.9-10.

Noise impacts at the selected noise monitoring locations described above were used to determine noise impacts generated by the Washington Boulevard LRT Alternative at over 2,100 receptors throughout the project area, which includes historical resources that are also sensitive land use receptors. The predicted noise impacts associated with operation of the Washington Boulevard LRT Alternative are summarized in Table 4.9-11. As shown in Table 4.9-11, corridor-wide project noise levels associated with LRV passby, warning bells, and special track work (assuming at-grade crossing options at Rosemead Boulevard and San Gabriel River/I-605) are predicted to exceed the FTA moderate impact criteria at 135 residences and to exceed the FTA severe impact criteria at one residence (located just north of the Montebello Golf Course and Country Club).

In addition, project noise levels along the Washington Boulevard LRT Alternative are predicted to exceed the FTA moderate impact

criteria at one FTA Category 3 land use receptor (a school along Washington Boulevard opposite Crossway Drive).

In summary, one significant impact would occur at the residence where noise levels would exceed the FTA severe impact criteria. The same number of noise impacts predicted for the at-grade option is also predicted for the Rosemead Boulevard and San Gabriel River/I-605 aerial crossings. As such, the Washington Boulevard LRT Alternative would result in an adverse effect under NEPA and a significant impact under CEQA if not mitigated.

The noise impacts associated with the Washington Boulevard LRT Alternative are summarized graphically in Appendix T, Noise and Vibration Technical Memorandum, of this Draft EIS/EIR.

Traction Power Substations: As part of the Washington Boulevard LRT Alternative, TPSS facilities would be installed at several locations along the proposed rail corridor to provide adequate electrical power for LRT service. Each TPSS would be designed in accordance with the Metro system-wide design criteria noise guideline of 50 dBA at 50 feet or the nearest residential building, whichever is closer. This operating noise level for the TPSS would be significantly lower than existing ambient noise levels (which range from 66 dBA Ldn to 73 dBA Leq) and LRV passby noise levels of 78 dBA at 50 feet. Therefore, noise generated by the TPSS would not exceed the FTA noise impact criteria at any land use receptors along the Washington Boulevard LRT Alternative alignment, and no significant noise impact would occur. As such, the Washington Boulevard LRT Alternative would not result in an adverse effect under NEPA and would have a less than significant impact under CEQA.

The findings are the same regardless of whether the at-grade or aerial crossing options proposed at Rosemead Boulevard and San Gabriel River/I-605 are selected for implementation.

Maintenance Yard: Along the Washington Boulevard LRT Alternative, three potential options

have been preliminarily identified for the location of a new maintenance yard. These potential options include the following locations:

- Mission Junction Maintenance Yard Option - an 11-acre site adjacent to an industrial area generally bounded by I-5 to the east, I-10 to the south, the Los Angeles River to the west, and the Union Pacific rail line to the north
- Commerce Maintenance Yard Option – a 12-acre site located west of Garfield Avenue on Southern California Edison’s transmission line right-of-way (ROW) in an industrial area, approximately 1,600 feet away from the mainline in the city of Commerce
- Santa Fe Springs Maintenance Yard Option – a nine-acre site located in a commercial/ industrial area immediately south of Washington Boulevard and east of Allport Avenue in the city of Santa Fe Springs

Activities that would occur at the proposed maintenance yard include daily maintenance, inspection and repairs, and storage of LRVs. The Santa Fe Springs Maintenance Yard Option would require an at-grade crossing at which crossing gates and bells would be activated when the LRT accesses the facility.

Each maintenance yard option is located in a predominantly industrial area and there are no noise-sensitive receptors (such as residences, schools, churches, or parks) located within the 1,000-foot FTA screening distance of each potential site. Therefore noise generated by maintenance yard activity would not exceed the FTA noise impact criteria at the closest sensitive land use receptors, and no significant noise impact would occur. The Washington Boulevard LRT Alternative would not result in an adverse effect under NEPA and would have a less than significant impact under CEQA.

Vibration Impacts

Transit vibration impacts are assessed based on individual events, such as when a train passes by.

To reduce transit vibration impacts at residences and other sensitive receptors along the build alternatives, the entire rail corridor would be constructed with ballast and CWR track. These measures are expected to reduce vibration levels caused by steel wheels rolling over steel rails at rail joints. Along aerial sections, elevated structures create additional separation between the train source and the ground-level receptors, resulting in greater attenuation. At at-grade crossings, embedded track at cross streets is not expected to result in any vibration impacts due to the short section, which is limited to the width of the cross street. All predicted vibration levels were compared with the FTA frequent impact criteria to assess the severity of the impact.

The Washington Boulevard LRT Alternative would have three potential sources of vibration during operations: LRV passbys along tangent or CWR

track, LRV passbys through special track work such as switches along the corridor, and switches at the maintenance yard.

Transit vibration levels were predicted at the same receptor locations used for the noise analysis. As summarized in **Table 4.9-12**, the maximum vibration levels from LRVs are predicted to range from 48 VdB to 76 VdB. As summarized in Table 4.9-12, the maximum vibration level in the vicinity of Receptors M12 and M15 would exceed the FTA frequent criterion of 72 VdB for residential land uses. Vibration levels at all other representative receptor sites are predicted to be below the FTA frequent impact criteria.

Table 4.9-12. Washington Boulevard LRT Alternative Vibration Levels at Representative Receptors (in VdB)

Receptor		Land Use		Build Vibration ³	FTA Criteria	
ID ¹	Description	Type ²	FTA		"frequent"	Impact
M01	3509 Via Campo	SFR	2	63	72	No
M08	608 N. Garfield Avenue	SFR	2	62	72	No
M09	444 and 452 Garfield Avenue	SFR	2	65	72	No
M10	1001 Garfield Avenue	SFR	2	64	72	No
M11	860 Washington Blvd.	SFR	2	70	72	No
M12	6735 Keltonview Drive	SFR	2	<u>73</u>	72	Yes
M13	9122 Washington Blvd.	Museum	3	69	75	No
M14	6768 Washington Blvd.	SFR	2	64	72	No
M15	7857 Milna Avenue	SFR	2	<u>76</u>	72	Yes
M16	7904 Broadway Avenue	SFR	2	48	72	No
M17	7972 Calobar Avenue	SFR	2	62	72	No

Source: AECOM November 2010.

Notes:

¹ ID corresponds to general location as shown in Figure 4.9-2.

² SFR = Single-Family Residence.

³ Instances exceeding the FTA frequent criteria are **bold and underlined**.

Table 4.9-13 summarizes corridor-wide vibration levels associated with LRV passby and special track work. As shown in Table 4.9-13, vibration levels are predicted to exceed the FTA frequent criterion of 72 VdB at 31 residences (FTA Category 2 land uses). All of these impacts are due to the proximity of residences to proposed switches. In addition, vibration levels are predicted to exceed the FTA frequent criterion of 75 VdB at one FTA Category 3 land use (an educational facility along Washington Boulevard at Keltonview Drive). Therefore, the Washington Boulevard LRT Alternative would result in an adverse effect under NEPA and a significant impact under CEQA if not mitigated.

No other vibration impacts are predicted at FTA Category 3 land use receptors along the Washington Boulevard LRT Alternative alignment. The vibration impacts associated with the Washington Boulevard LRT Alternative are summarized graphically in Appendix T, Noise and Vibration Technical Memorandum, of this Draft EIS/EIR. None of the vibration impacts are due to LRV passbys along CWR track.

Vibration impacts would be the same if the Rosemead Boulevard and the San Gabriel River/I-605 crossing were aerial or at-grade except near Site M15 at Milna Avenue. The aerial alignment of the Washington Boulevard LRT Alternative is predicted to result in two fewer vibration impacts compared to the at-grade alignment.

The three potential maintenance yard options were selected because of their location in a predominantly industrial area. There are no vibration-sensitive land use receptors (such as residences, schools, churches or parks) located within the 1,000-foot FTA screening distance of any of the proposed maintenance yard options.

Therefore, vibration generated from slow-moving LRVs over switches and other activities at the maintenance yard would not exceed the FTA vibration impact criterion at any of the closest

vibration-sensitive receptors and no significant vibration impact would occur.

4.9.3.4.2 Mitigation Measures

Construction Mitigation Measures

The Washington Boulevard LRT Alternative would have temporary adverse effects (limited to the duration of construction) under NEPA and a significant impact under CEQA during construction due to noise and vibration. However, the same mitigation measures (mitigation measures 4.9-i through 4.9-viii) identified above in Section 4.9.3.3.2 for the SR 60 LRT Alternative and summarized in Table ES-2 would apply to the Washington Boulevard LRT Alternative and would mitigate these effects/impacts. In addition, per Mitigation Measures 3.0-ii through 3.0-viii and 3.0-xvii in Chapter 3, a Traffic Management Plan would also address noise and vibration effects/impacts from traffic and freeway operations during construction of the Washington Boulevard LRT Alternative, resulting in effects/impacts that are not adverse under NEPA and less than significant under CEQA. (Refer to the specific section for the detailed mitigation measure.)

Operational Mitigation Measures

Noise

The Washington Boulevard LRT Alternative would have adverse effects under NEPA and a significant impact under CEQA from noise effects/impacts due to gaps at switches. These effects/impacts may be eliminated in any number of ways such as relocating the switches (which are a crossover component), installing ballast mats under conventional switches to “decouple” the train vibration from the track supporting structure, or using a “gapless” spring frog.

Table 4.9-13. Summary of Washington Boulevard LRT Alternative Vibration Impacts

ID ¹	Location	Type of Use ²	Impact (Frequent)	No. Residences Affected	Major Source(s) Contributing to Impact ³
FTA Category 2					
M01	Via Campo	SFR	Frequent	3	Switches
M08	Garfield Avenue at Via San Delarro	SFR MFR	Frequent	1 5	Switches
M12	Washington Blvd. at Keltonview Drive	SFR	Frequent	5	Switches
M15	Washington Blvd. at Milna Avenue	SFR	Frequent	15	Switches
M17	Calobar Avenue	SFR MFR	Frequent	1 1	Switches
Total FTA Category 2			Frequent	31	
FTA Category 3					
M13	Washington Blvd. at Keltonview Drive	Educational Facility	Frequent	1	Switches
Total FTA Category 3			Frequent	1	
Total – All Uses			Total	32	

Source: AECOM February 2011.

Notes:

¹ ID corresponds to general location as shown in Figure 4.9-2.

² SFR = Single-Family Residence; MFR = Multi-Family Residence.

³ Major sources include LRV passbys, LRT warning bells, and switches or special track work. The maintenance yard and TPSS are not expected to be major sources of impacts in any noise-sensitive locations.

4.9-xi Relocating switches away from noise-sensitive receptors is one cost-effective measure for mitigating this impact. However, if operational concerns interfere with the relocation of switches, then several other viable mitigation options are available such as point-less switches (“gapless spring frogs” that eliminate the gap in the rail) or low-vibration isolators (ballast mats or tie pads) such as those that have been used on the San Diego Trolley system. The following crossovers would be relocated away from sensitive land use receptors to eliminate noise impacts due to switches:

- Relocate crossover proposed along Garfield Avenue south of Via San Del Aro.
- Relocate crossover proposed along Garfield Avenue north of Madison Avenue.
- Relocate crossover proposed along Washington Boulevard west of Crossway Drive.
- Relocate crossover proposed along Washington Boulevard east of Pioneer Boulevard.
- Relocate crossover proposed along Washington Boulevard west of Lambert Road.

- 4.9-xii For noise impacts due to LRV passbys along tangent aerial track sections, parapets are recommended in lieu of safety railings as part of the Washington Boulevard LRT Alternative alignment to provide additional shielding for nearby residences. Parapets would be used at the following locations to eliminate noise impacts from LRV passbys:
- Eastbound track side starting east of Sadler Avenue to just east of Findlay Avenue – three-foot by 2,500-foot barrier
 - Westbound track side starting at Via Alta Mira to just west of Via Acosta - three-foot by 1,500-foot barrier
 - Eastbound track side starting just west of Via San Del Aro to Via Acosta – three-foot by 1,300-foot barrier
 - Westbound track side starting at Hay Street to Madison Avenue – three-foot by 900-foot barrier
 - Eastbound and westbound track side starting west of Alston Street to the Union Pacific Railroad – three-foot by 2,500-foot barrier
 - Westbound track side adjacent to the Greenwood Avenue station – three-foot by 200-foot barrier
 - Moderate noise impacts predicted along at-grade sections of the Washington Boulevard LRT Alternative would require consideration and adoption of mitigation measures when it is considered reasonable according to FTA guidelines. The use of noise barriers would not be as effective along the aerial sections due to the required openings at street crossings. Other mitigation measures (such as residential sound insulation) may not be cost-effective since many of the impacts are predicted to equal or only slightly exceed the moderate thresholds. Furthermore, all of the predicted noise levels along the Washington Boulevard LRT Alternative alignment are well below the measured existing ambient noise levels.
- 4.9-xiii For impacts due to at-grade crossings, specifically LRT warning bells, stationary control measures are proposed to eliminate the required sounding of the LRT warning bells. Based on the current operating procedures along the Gold Line, in-street running transit service includes synchronized traffic lights.
- As a result, regular use of warning bells (both stationary and on board trains) is not required. Therefore, the current operating procedures would eliminate the need to sound warning horns. These control measures are an effective tool for mitigating noise impacts from LRT warning bells, particularly during the nighttime when residents are most sensitive to noise intrusion.
 - Combined, these measures would address the adverse noise effects under NEPA and significant noise impacts under CEQA.

Vibration

As with the mitigation proposed for noise, vibration impacts due to gaps at switches may be eliminated by available options such as relocating the switches, installing ballast mats under conventional switches to “decouple” the train vibration from the track supporting structure, or using a “gapless” spring frog. The crossovers described in Mitigation Measure 4.9-xi above would be relocated away from sensitive land use receptors to eliminate predicted vibration impacts due to switches along the Washington Boulevard LRT Alternative alignment.

Mitigation Measure 4.9-xi, identified above, would address the adverse vibration effects under NEPA and significant vibration impacts under CEQA. (Refer to Appendix HH, Conceptual Engineering Drawings, for specific crossover locations and Appendix T, Noise and Vibration Technical

Memorandum, of this Draft EIS/EIR for specific mile marker locations of noise barriers.)

4.9.3.4.3 Impacts Remaining After Mitigation

NEPA Finding

With the implementation of mitigation measures, construction noise and vibration levels would be reduced below FTA noise and vibration thresholds. Therefore, no adverse construction noise or vibration effects would occur during construction of the Washington Boulevard LRT Alternative for the at-grade or aerial alignment and with the Maintenance Yard Options.

With the implementation of mitigation measures, operational noise and vibration levels at all impacted sites along the Washington Boulevard LRT Alternative for the at-grade or aerial alignment would be reduced below the FTA severe impact threshold. Therefore, no adverse effects from transit operations would occur.

CEQA Determination

With the implementation of mitigation measures, construction noise and vibration levels would be reduced below FTA noise and vibration thresholds. Therefore, no significant construction noise or vibration impacts would occur during construction of the Washington Boulevard LRT Alternative.

Along the Washington Boulevard LRT Alternative at-grade or aerial alignment and with the Maintenance Yard Options, implementation of mitigation measures would reduce the noise and vibration below the FTA severe impact threshold. Therefore, impacts would be less than significant.