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## 3.14 NOISE AND VIBRATION

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### Introduction

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This section assesses the potential impacts that noise and vibration from the proposed project could have on sensitive receptors, and proposes mitigation measures for reducing these potential impacts. This section includes a description of the fundamentals of noise and vibration, a discussion of noise and vibration standards and criteria, an assessment of expected noise and vibration levels with implementation of each alternative and under 2030 build-out conditions, and an analysis of appropriate mitigation measures, if warranted. Noise impacts were assessed in accordance with applicable procedures and criteria established by the Federal Transit Administration (FTA) since this agency has noise and vibration criteria specifically focusing on LRT and BRT modes of travel. Information in this section is based on the Noise and Vibration Study prepared for the Santa Clara-Alum Rock Corridor.<sup>1</sup>

### Fundamentals of Noise

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Sound is technically described in terms of amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the decibel (dB). Over the audible range of pitch, the human ear is less sensitive to low frequencies and is more sensitive to mid-level and high-pitched sound. Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. This A-weighted sound level is called the “noise level,” referenced in units of dBA. Table 3.14-1 lists dBA noise levels for common events in the environment.

Community noise environments are typically represented by noise levels measured throughout the day and night, or over a 24-hour period (i.e., by  $L_{dn}$ ). A one-hour measurement period is especially useful for characterizing noise caused by short-term events, such as operation of construction equipment or concert noise (i.e., with  $L_{eq}$ ). Community noise levels are generally perceived as quiet when the  $L_{dn}$  is below 45 dBA, moderate in the 45 dBA to 60 dBA range, and loud above 60 dBA. Very noisy urban residential areas are usually around 70 dBA  $L_{dn}$ . Along major thoroughfares, roadside noise levels are typically between 65 dBA and 75 dBA  $L_{dn}$ . Noise levels above 45 dBA at night can disrupt sleep, and levels greater than 85 dBA can cause temporary or permanent hearing loss.

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<sup>1</sup> MO’C Physics Applied, *Santa Clara-Alum Rock Transit Corridor Noise and Vibration Study*, July 1, 2008.

**Table 3.14-1  
Typical Sound Levels Measured in the Environment and Industry**

| <b>Noise Source (Distance)</b> | <b>A-Weighted Sound Level in Decibels (dBA)</b> | <b>Subjective Impression</b> |
|--------------------------------|---|------------------------------|
| Civil Defense Siren (100')     | 130   | Pain Threshold               |
| Jet Takeoff (200')             | 120   |                              |
| Rock Music Concert (50')       | 110   |                              |
| Pile Driver (50')              | 100   | Very Loud                    |
| Ambulance Siren (100')         | 90  |                              |
| Diesel Locomotive (25')        | 85  | Loud                         |
| Pneumatic Drill (50')          | 80  |                              |
| Freeway (100')                 | 70  | Moderately Loud              |
| Vacuum Cleaner (10')           | 60  |                              |
| Light Traffic (100')           | 50  |                              |
| Large Transformer (200')       | 40  | Quiet                        |
| Soft Whisper (5')              | 30-0  | Threshold of Hearing         |

*Source: Peterson & Gross, 1963.*

## **Sensitive Receptors**

Some land uses are more sensitive to ambient noise levels than others, due to the amount of noise exposure (in terms of both exposure time and shielding from noise sources) and the type of activities typically involved. Residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, and parks and outdoor recreation areas are more sensitive to noise than are commercial and industrial land uses.

## **Fundamentals of Groundborne Vibration**

Vibration is sound radiated through the ground. The rumbling sound caused by the vibration of room surfaces is called groundborne noise. The ground motion caused by vibration is measured as particle velocity in inches per second and, in the U.S., is referenced as vibration decibels (VdB). The background vibration velocity level in residential and educational areas is usually around 50 VdB. The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity level of 75 VdB is the approximate point at which vibration goes from barely perceptible level to a distinctly perceptible level for many people. Most perceptible indoor vibration is caused by sources within buildings, such as operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is rarely perceptible. Groundborne vibration levels vary from approximately 50 VdB, which is the typical background vibration velocity level that is barely perceptible by humans, to 100 VdB, which

is the general threshold where minor damage can occur in fragile buildings. The general human response to different levels of groundborne vibration velocity levels is described in Table 3.14-2.

**Airborne Noise.** Vibration is sound radiated through the ground or the rumbling sound caused by the vibration of a room. The intensity of airborne noise is customarily measured on a decibel scale which serves as an index of loudness. On this scale sounds as faint as 0 decibels are just barely audible, and only then in the absence of other louder sounds; intense sounds of 120 to 140 decibels are so loud that they are painful or cause damage to hearing with but a brief exposure.

**Table 3.14-2**  
**Human Response to Different Levels of Groundborne Vibration**

| Vibration Velocity Level | Human Reaction   |
|--------------------------|--|
| 65 VdB                   | Approximate threshold of perception for many people.   |
| 75 VdB                   | Approximate level when vibration becomes distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable. |
| 85 VdB                   | Vibration acceptable only if there are an infrequent number of events per day.   |

*Source:* Federal Railroad Administration, 1998.

## Existing Conditions

### Noise Measurements

Existing noise levels were monitored during the AM and PM peak commute periods at a number of locations along the Santa Clara-Alum Rock Corridor. Existing sampled noise levels are depicted in Table 3.14-3.

### Sensitive Receptors in the Project Vicinity

Along the extended Santa Clara-Alum Rock Corridor, all types of land uses can be found—residential, commercial, institutional, etc. Some of the residences are located in close proximity to the property line or to the edge of the public right-of-way. In particular, this occurs where living quarters or apartments above storefronts are located.

**Table 3.14-3  
Sampled Noise Levels**

| <b>Noise Measurement Location<sup>a</sup></b>            | <b>Date</b> | <b>Time</b> | <b>Duration (minutes)</b> | <b>L<sub>eq</sub> (decibels)</b> |
|--|-------------|-------------|---------------------------|----------------------------------|
| Westside: Laurel Grove Lane <sup>b</sup>                 | 3/28/08     | 7:33 AM     | 30                        | 57                               |
| Westside: Laurel Grove Lane <sup>b</sup>                 | 3/28/08     | 7:00 AM     | 30                        | 62                               |
| Northside: 8 <sup>th</sup> -9 <sup>th</sup> Street       | 2/10/04     | 5:06 PM     | 15                        | 66                               |
| Southside: 15 <sup>th</sup> -16 <sup>th</sup> Street     | 2/10/04     | 4:32 PM     | 15                        | 67                               |
| Northside: 17 <sup>th</sup> -19 <sup>th</sup> Street     | 2/9/04      | 4:46 PM     | 15                        | 66                               |
| Northside: 17 <sup>th</sup> -19 <sup>th</sup> Street     | 2/9/04      | 4:21 PM     | 15                        | 64                               |
| Northside: 24 <sup>th</sup> -25 <sup>th</sup> Street     | 2/5/04      | 5:14 PM     | 15                        | 68                               |
| Southside: 24 <sup>th</sup> -26 <sup>th</sup> Street     | 2/5/04      | 4:53 PM     | 15                        | 69                               |
| Northside: 28 <sup>th</sup> Street-U.S. 101              | 2/5/04      | 4:27 PM     | 15                        | 67                               |
| Southside: 28 <sup>th</sup> Street-U.S. 101 <sup>c</sup> | 2/5/04      | 7:31 AM     | 15                        | 73                               |
| Southside 31 <sup>st</sup> -33 <sup>rd</sup> Street      | 2/5/04      | 6:54 PM     | 15                        | 72                               |
| Northside:33 <sup>rd</sup> -34 <sup>th</sup> Street      | 2/4/04      | 5:53 PM     | 15                        | 70                               |
| Northside: Checkers-Sunset                               | 2/4/04      | 5:06 PM     | 15                        | 70                               |
| Southside: McCreery Avenue                               | 3/27/08     | 4:38 PM     | 30                        | 71                               |
| Southside: Sunset-Jose Figures Avenue                    | 2/4/04      | 4:42 PM     | 15                        | 71                               |
| Northside: Jose Figueres Avenue                          | 3/27/08     | 5:27 PM     | 30                        | 68                               |
| Southside: I-680-Muirfield Drive                         | 2/4/04      | 4:06 PM     | 15                        | 69                               |
| Northside: I-680-Muirfield Drive                         | 2/4/04      | 3:45 PM     | 15                        | 71                               |

Source: MO'C Physics Applied, 2008.

Notes:

- a. Measurement locations can be found in the Noise Study Report in Appendix H.
- b. Partly shielded by wall.
- c. Siren-Influenced.

## Noise Standards and Criteria

### Regulatory Setting

#### *Criteria for the Significance of Operational Impacts—Noise*

For projects such as the proposed project, FTA Guidelines Significance Criteria would apply because the project would not contribute to an increase in roadway traffic, and therefore noise impacts would be strictly from the noise generated by the transit vehicles. The principal criteria for significance are derived from the FTA's guidelines for the assessment of noise and vibration impacts from transit operations. There is a different criterion for each category of land use. The categories of land use for airborne noise are shown on Table 3.14-4.

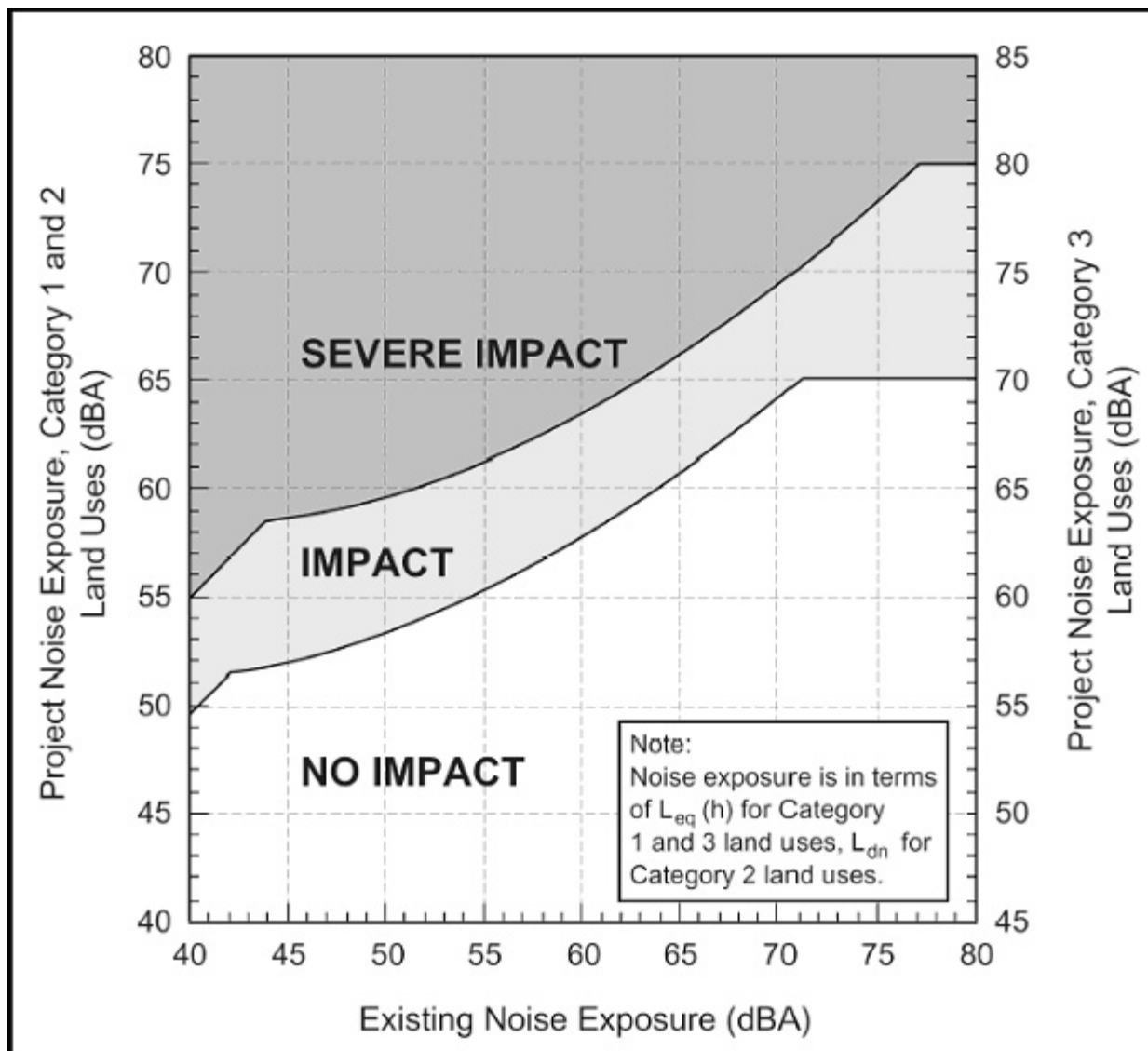
**Table 3.14-4  
Categories of Land Use for Noise Impact Assessment**

| <b>Land Use Category</b> | <b>Noise Metric (dBA)</b> | <b>Description of Land Use Category</b>   |
|--------------------------|---------------------------|---|
| 1                        | Outdoor $L_{eq}(h)^*$     | Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use.  |
| 2                        | Outdoor $L_{dn}$          | Residences and buildings where people normally sleep. This category includes homes, hospitals and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.  |
| 3                        | Outdoor $L_{eq}(h)^*$     | Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios and concert halls fall into this category. Places for meditation or study associated with cemeteries, monuments, museums. Certain historical sites, parks and recreational facilities are also included. |

*Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006*

The significant-impact criteria of VTA and the FTA are defined by the boundary between the “Impact” and “Severe Impact” zones depicted in Figure 3.14-1. This boundary represents the threshold of significance. The scale on the left side of the figure pertains to land use categories 1 and 2 (see Table 3.14-4); the scale on the right pertains to Land Use Category 3 uses. All of the noise levels are outdoor noise levels. For Land Use Categories 1 and 3, the descriptor that is used is the  $L_{dn}$ , whereas for Land Use Category 2, the descriptor is the  $L_{eq}$  of the peak hour for transit noise.

For example, a residence that is exposed to 65 dB [ $L_{dn}$ ] of existing noise may be exposed to 65 dB [ $L_{dn}$ ] of transit project noise. This is not a significant impact because the transit project noise level [left scale] would not be in the Severe Impact Zone, the lower boundary of which appears to lie at about 66 dB if the existing noise level is 65 dB. If the transit project noise level were instead to be in excess of 66 dB, then the impact would be declared to be adverse.



**Figure 3.14-1 Noise Impact Assessment Criteria (Outdoor Noise Levels)**

Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006.

### ***Criteria for the Significance of Operational Impacts—Groundborne Vibration***

Just as for noise, there is a different vibration criterion for each category of land use. The categories of land use for groundborne vibration and the criteria for adverse effects are both shown on Table 3.14-5.

For example, both build alternatives would involve more than 70 project specific transit vehicle trips per day in the Corridor. Consequently, only the columns that pertain to “Frequent Events” are relevant. For groundborne vibration impacts, the thresholds of significance for receptors of Land Use Categories 1, 2 and 3 are 65 VdB, 72 VdB and 75 VdB, respectively.

**Table 3.14-5  
Ground-Borne Vibration Impact Criteria (With Categories)**

| Land Use Category  | Ground-Borne Vibration Impact Levels<br>(VdB re 1 micro inch/sec) |                                   | Ground-Borne Noise Impact Levels<br>(dB re 20 micro Pascals) |                                   |
|--|---|-----------------------------------|--|-----------------------------------|
|  | Frequent <sup>a</sup><br>Events                                   | Infrequent <sup>b</sup><br>Events | Frequent <sup>a</sup><br>Events                              | Infrequent <sup>b</sup><br>Events |
| <b>Category 1:</b> Buildings where low ambient vibration is essential for interior operations. | 65 VdB <sup>c</sup>   | 65 VdB <sup>3</sup>               | d  | d                                 |
| <b>Category 2:</b> Residences and buildings where people normally sleep.                       | 72 VdB  | 80 VdB                            | 35 dBA   | 43 dBA                            |
| <b>Category 3:</b> Institutional land uses with primarily daytime use.                         | 75 VdB  | 83 VdB                            | 40 dBA   | 48 dBA                            |

Source Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006

Notes:

- “Frequent Events” is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category
- “Infrequent Events” is defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.
- This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
- Vibration- sensitive equipment is not sensitive to ground-borne noise.

Groundborne noise is a potentially adverse phenomenon that involves circumstances that can effectively exclude the propagation of airborne sound between the transit vehicle and the receptor. For example, in some metropolitan areas there are subway tunnels that pass near underground levels of occupied buildings. In such circumstances, sound can travel through the ground from the subway tunnel to an underground level of the building, where it can be reradiated as airborne sound in interior spaces. No such circumstances would occur with implementation of the proposed project. Under the proposed project, airborne noise would be predominant over groundborne noise in all cases. Hence, groundborne noise estimates are not presented in this discussion.

### ***Classification of Project Type According to FTA Guidelines***

FTA guidelines contain the following project-classification description:

*Rail and Bus Facilities: This category includes all rail projects (e.g., rail rapid transit, light rail transit, commuter rail, and automated guideway transit), as well as fixed facilities such as storage and maintenance yards, passenger stations and terminals, parking facilities, substations, etc. Also included are rail transit projects built within a highway or railroad corridor. Certain bus facilities are included in this category, such as bus rapid transit on separate roadways and bus operations on local streets and highways where the project does not include roadway construction or modification that significantly changes roadway capacity. The distinguishing feature in all these cases is that the existing noise levels generated by roadway traffic and other sources will not change as a result of the project; therefore the project noise is exclusively due to the new transit sources.*

The proposed project would not include any roadway construction or modification that would significantly change roadway capacity. Consequently the project should be classified as a rail-and-bus-facility type of project. The other available classification, the 'highway/transit' type of project, is for projects that involve not only new transit operations but also the construction of new roadway capacity. Also, the guidelines of Caltrans and FHWA provide that no noise assessment is needed for projects that do not substantially modify a roadway, which suggests that the guidelines of those agencies are not at all applicable. The analysis classified the proposed project as a rail-and-bus-facility. The analysis applies the guidelines of the FTA and not those of Caltrans and the FHWA.

## **Environmental Assessment**

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### **Approach and Methodology**

**BRT.** Under BRT service, stations would be constructed in lieu of ordinary bus stops and special provisions would be made to allow the buses priority over other vehicles in queues at stop lights. However, those elements of this alternative are not acoustically significant or significant with respect to potential vibration impacts.

Noise emissions of diesel buses are substantially higher when they are accelerating. Acceleration occurs after stopping or slowing down, after stops at stations, after stops at red lights, and after stopping or slowing down due to traffic delays. At any given point along the Corridor, the mode of operation of passing buses would be 67 percent acceleration (where this parameter is actually an input to a FTA formula for the resultant time-averaged airborne noise level). This is a conservative assumption, but this acceleration rate could be possible at some location near frequent stops. Consequently, this approach amounts to a “worst-case scenario” approach. Such worst-case approaches are specifically endorsed in the FTA’s guidelines for environmental review purposes, and no further analysis is required if no indications of significant impacts are consequently found. Similarly, the average operating speed was assumed to be 25 miles per hour (disregarding the time at stops), though that would actually be the maximum speed that buses could obtain, given the posted speed limit.

**Single Car LRT.** The primary component of noise from LRT train operations is wheel and rail noise resulting from steel wheels rolling on steel rails. Secondary sources, such as vehicle air conditioning and other ancillary equipment, would sometimes be audible but not expected to be significant factors. Single Car LRT service would also involve the construction of traction-power substations along the right-of-way. Substation equipment is typically housed in small buildings or underground vaults having dimensions of approximately 12 feet by 36 feet. The projection of noise from LRT train operations was based on several assumptions summarized below.

- The transit vehicles for Single Car LRT service would consist of the same electrically-powered, articulated light rail cars that are presently in use on other VTA light rail lines. Although cars can be connected together to form trains, a single 90-foot-long train is proposed for Single Car LRT service; therefore, the ‘trains’ would actually be ‘cars’.
- The planned frequency of service is for headways, times between vehicles travelling in the same direction, at 15 minute intervals during peak daytime hours and 30 minute intervals

during other hours. Operations would commence at 6:00 AM and end at 1:00 AM. At each wayside location along the Corridor there would be about 140 total passbys per day, half of which would travel in one direction. Approximately 85 percent of the trips would occur during the 7:00 AM and 10:00 PM daytime period of the  $L_{dn}$  descriptor.

- With Single Car LRT, the tracks would be embedded along most of the project alignment. West of 34<sup>th</sup> Street and east of Almaden Boulevard, the light rail tracks would be constructed in the outer through-lanes of the roadway. Under LRT Alignment Option 1 the tracks would continue in the outer through-lanes westward to Montgomery Street. That is, the vehicles would operate in the street similar to buses except for the limitations on movement due to the tracks. Automobiles and other rubber-tired vehicles would still use the outer travel lanes and would share these lanes with the light rail cars (hence the need to embed the tracks in the pavement).
- The speed of the LRT vehicles would not exceed the posted speed limit, which is 25 mph. The average operating speed would be considerably less than the maximum speed due to interactions with other traffic, delays at stop lights, etc.

## Standards of Significance

Based on the significance criteria used by VTA, the proposed alternatives may result in significant impacts related to noise and vibration if:

- transit-system operational noise contributes to a cumulative increase in noise levels that would be considered as a severe or moderate impact by Federal Transit Administration (FTA) criteria;
- ancillary equipment noise levels exceed 45 dBA at any residence; or
- operation of the transit system would result in vibration levels in buildings that exceed FTA criteria.

The FTA criteria referenced in these thresholds (noise impact criteria and vibration impact criteria) are described above (refer to Figure 3.14-1, Table 3.14-4, and Table 3.14-5).

## Environmental Analysis

In order to determine noise and vibration impacts due to construction and operation of the proposed project, a level of significance is determined and reported in the impact statement. Conclusions of significance are defined as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as “significant and unavoidable (SU).” For this section, NV refers to Noise and Vibration.

For the purposes of this analysis, the proposed project includes the implementation of BRT and Single Car LRT in the Santa Clara-Alum Rock Corridor in two phases. Phase 1 includes the implementation of BRT service and Phase 2 includes the implementation of Single Car LRT service. Potential noise

and vibration impacts associated with Phase 1 and Phase 2 of the proposed project, including project options, would be largely similar. Therefore, the analyses for the two project phases are discussed together. Areas in which the effects of the two phases differ are detailed within the discussion of each significance threshold.

Potential impacts associated with the extension of transit services in the Capitol Expressway Corridor were analyzed in the Capitol Expressway Light Rail Final Supplemental Environmental Impact Report (FSEIR) dated January 2007, which is incorporated herein by reference. Potential impacts of the proposed project not analyzed in the Capitol Expressway Light Rail FSEIR are described below, as necessary.

*NOI-1. The proposed project would not lead to operational noise levels that would be considered a severe impact by FTA criteria. (LTS)*

**Phase 1 - BRT.** Existing noise levels were based on traffic volume data provided by VTA and Korve Engineering, and on the noise contour map of the Norman Y. Mineta San Jose International Airport. The noise levels that would be produced by the BRT service were also estimated, under varying traffic conditions, amounting to a “worst-case scenario” approach specifically endorsed in the FTA guidelines (see Table 3.14-6).

Existing and project-generated noise levels were compared, applying the impact criteria described above. BRT generated noise levels ranged from 60 dBA  $L_{eq}$  to 62 dBA  $L_{eq}$  along the Corridor. Although Land Use Categories 1 and 3 in FTA Guidelines consider noise exposure according to dBA  $L_{eq}$ , Category 2 land uses under FTA Guidelines consider noise exposure according to dBA  $L_{dn}$ . The FTA criteria states that rail and bus facilities would only be required to determine if project generated noise would exceed the standard noise levels for the three separate land use categories (1 through 3). As shown in Table 3.14-6, the noise levels generated by BRT service would not exceed the standards established for Land Use Categories 1 through 3. Implementation of BRT service would not exceed the criterion for an adverse noise effect (“severe” or “moderate” impact according to FTA Guidelines) at any point along the Corridor. Therefore, impacts associated with BRT service would be less than significant.

**Phase 2 - Single Car LRT.** The same methodology was used to analyze impacts associated with Single Car LRT. Existing ambient noise levels were based on traffic volume data provided by VTA and DMJM Harris, and on the noise contour map of the Norman Y. Mineta San Jose International Airport. The noise levels resulting from Single Car LRT vehicles can be found in Table 3.14-8. As shown in Table 3.14-8, Single-Car LRT vehicles would generate noise levels ranging between 56 dBA  $L_{eq}$  to 60 dBA  $L_{eq}$ . Similar to BRT, the noise levels generated by Single Car LRT would not result in impacts that would result in a “severe” or “moderate” impact to sensitive receptors along the Corridor. Therefore, impacts associated with Single Car LRT would also be less than significant.

*NOI-2. Implementation of the proposed project would not result in vibration levels in buildings that exceed FTA criteria. (LTS)*

Vibration levels for BRT and for Single Car LRT were modeled using FTA guidelines and “force density” data that were provided by VTA (see Table 3.14-8 and Table 3.14-9). The estimates were done, first using a “general” assessment approach as prescribed by FTA, and then incorporating the force density data of VTA. The general approach yielded somewhat higher estimates for the groundborne vibrations than did the approach that incorporated the force density data, yet there were also no indications of impacts with that approach. Vibration levels for the BRT ranged from 55 VdB to 64 VdB along the Corridor. None of the measured vibration levels under Category 1 as defined by FTA Guidelines was exposed to transit-generated vibration levels above 65 VdBA (for comparison, 64 VdBA was the highest level identified for the Capitol Expressway Light Rail Project). Considering Category 1, 2, and 3 land uses along the Corridor, implementation of BRT would not exceed the criterion for an adverse vibration effect at any point along the Corridor. Therefore, groundborne vibration effects associated with BRT would be less than significant.

Vibration levels for Single Car LRT would range from 49 VdBA to 72 VdBA. The highest vibration levels of 72 VdBA were modeled to occur along Almaden Boulevard to Notre Dame and the East and West of SR 87 segments of the Single Car LRT Alternative (refer to Table 3.14-9). Surrounding land uses within the area primarily include commercial retail and office buildings. However, Hotel De Anza, at the corner of Notre Dame Street and West Santa Clara Avenue, is classified as a Category 2 land use with a significance threshold of 72 VdBA. By definition, a Category 2 Land use includes “residences and buildings where people normally sleep.” However, the proposed project would not exceed the standard of 72 VdBA; therefore, impacts would be considered less than significant.

**Table 3.14-6  
Noise Decibel Projections, Phase 1 - BRT**

| Segment   | Side of Street | Existing | Land Use Category 1 |           | Land Use Category 2 |           | Land Use Category 3 |           |
|---|----------------|----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|
|   |                |          | Criterion           | Generated | Criterion           | Generated | Criterion           | Generated |
| <b>Santa Clara Street</b>   |                |          |                     |           |                     |           |                     |           |
| Monterey Street to Delmas Avenue  | North          | 69       | 69                  | 59        | 69                  | 59        | 74                  | 59        |
|   | South          | 69       | 69                  | 60        | 69                  | 60        | 69                  | 60        |
| West of SR 87   | North          | 70       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
|   | South          | 69       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
| SR 87 to Almaden Boulevard  | North          | 70       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
|   | South          | 70       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
| Almaden Boulevard to Notre Dame Street                                      | North          | 69       | 69                  | 60        | 69                  | 59        | 74                  | 60        |
|   | South          | 69       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
| East of Notre Dame Street   | North          | 69       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
|   | South          | 69       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
| West of Market Street   | North          | 69       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
|   | South          | 69       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
| East of Market Street   | North          | 68       | 68                  | 61        | 68                  | 60        | 73                  | 61        |
|   | South          | 68       | 68                  | 60        | 68                  | 60        | 73                  | 60        |
| 2nd Street to 6 <sup>th</sup> Street  | North          | 68       | 68                  | 60        | 68                  | 60        | 73                  | 60        |
|   | South          | 68       | 68                  | 60        | 68                  | 60        | 73                  | 60        |
| 2nd Street to 6 <sup>th</sup> Street<br>(BRT Station Option 1)              | North          | 68       | 63                  | 60        | 68                  | 60        | 68                  | 60        |
|   | South          | 68       | 63                  | 60        | 68                  | 60        | 68                  | 60        |
| 6 <sup>th</sup> Street to 10 <sup>th</sup> Street                           | North          | 68       | 63                  | 60        | 63                  | 60        | 68                  | 60        |
|   | South          | 68       | 63                  | 60        | 63                  | 60        | 68                  | 60        |
| 6 <sup>th</sup> Street to 10 <sup>th</sup> Street (BRT Station<br>Option 1) | North          | 68       | 63                  | 60        | 63                  | 60        | 68                  | 60        |
|   | South          | 68       | 63                  | 60        | 63                  | 60        | 68                  | 60        |
| 10 <sup>th</sup> Street to 15 <sup>th</sup> Street                          | North          | 68       | 68                  | 60        | 68                  | 60        | 73                  | 60        |
|   | South          | 67       | 67                  | 60        | 67                  | 60        | 72                  | 60        |
| East of 15 <sup>th</sup> Street   | North          | 69       | 69                  | 61        | 69                  | 61        | 74                  | 61        |
|   | South          | 68       | 68                  | 61        | 68                  | 61        | 73                  | 61        |

**Table 3.14-6 (Continued)**  
**Noise Decibel Projections, Phase 1 - BRT**

| Segment                         | Side of Street | Existing | Land Use Category 1 |           | Land Use Category 2 |           | Land Use Category 3 |           |
|---------------------------------|----------------|----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|
|                                 |                |          | Criterion           | Generated | Criterion           | Generated | Criterion           | Generated |
| West of 24 <sup>th</sup> Street | North          | 69       | 69                  | 61        | 69                  | 61        | 74                  | 61        |
|                                 | South          | 68       | 68                  | 61        | 68                  | 61        | 73                  | 61        |
| East of 24 <sup>th</sup> Street | North          | 68       | 68                  | 60        | 68                  | 60        | 73                  | 60        |
|                                 | South          | 68       | 68                  | 61        | 68                  | 60        | 73                  | 61        |
| West of 28 <sup>th</sup> Street | North          | 68       | 68                  | 60        | 68                  | 60        | 73                  | 60        |
|                                 | South          | 68       | 68                  | 60        | 68                  | 59        | 73                  | 61        |
| <b>Alum Rock Avenue</b>         |                |          |                     |           |                     |           |                     |           |
| East of 28 <sup>th</sup> Street | North          | 68       | 68                  | 60        | 68                  | 59        | 73                  | 60        |
|                                 | South          | 69       | 69                  | 61        | 69                  | 60        | 74                  | 61        |
| West of US 101                  | North          | 68       | 68                  | 60        | 68                  | 60        | 73                  | 60        |
|                                 | South          | 69       | 69                  | 61        | 69                  | 60        | 74                  | 61        |
| East of US 101                  | North          | 68       | 68                  | 60        | 68                  | 60        | 73                  | 60        |
|                                 | South          | 68       | 68                  | 60        | 68                  | 59        | 73                  | 60        |
| West of 34 <sup>th</sup> Street | North          | 68       | 63                  | 60        | 63                  | 60        | 68                  | 60        |
|                                 | South          | 68       | 63                  | 60        | 63                  | 59        | 68                  | 60        |
| East of 34 <sup>th</sup> Street | North          | 67       | 62                  | 59        | 62                  | 58        | 67                  | 59        |
|                                 | South          | 68       | 63                  | 59        | 63                  | 59        | 68                  | 59        |
| West of Eastgate Avenue         | North          | 67       | 68                  | 59        | 68                  | 58        | 73                  | 59        |
|                                 | South          | 68       | 68                  | 59        | 68                  | 59        | 73                  | 59        |
| East of Eastgate Avenue         | North          | 67       | 68                  | 59        | 68                  | 58        | 73                  | 59        |
|                                 | South          | 69       | 69                  | 59        | 69                  | 59        | 74                  | 59        |
| East of Checker Drive           | North          | 69       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
|                                 | South          | 69       | 69                  | 59        | 69                  | 59        | 74                  | 59        |
| West of Jackson Avenue          | North          | 69       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
|                                 | South          | 69       | 69                  | 59        | 69                  | 59        | 74                  | 59        |
| Jackson Avenue to Foss Avenue   | North          | 68       | 68                  | 58        | 69                  | 60        | 74                  | 60        |
|                                 | South          | 68       | 68                  | 59        | 68                  | 58        | 73                  | 59        |

**Table 3.14-6 (Continued)**  
**Noise Decibel Projections, Phase 1 - BRT**

| Segment   | Side of Street | Existing | Land Use Category 1 |           | Land Use Category 2 |           | Land Use Category 3 |           |
|---|----------------|----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|
|   |                |          | Criterion           | Generated | Criterion           | Generated | Criterion           | Generated |
| Foss Avenue I-680   | North          | 70       | 69                  | 60        | 70                  | 69        | 74                  | 60        |
|   | South          | 69       | 69                  | 59        | 69                  | 59        | 74                  | 59        |
| I-680 to West of Alexander/Muirfield Drive                      | North          | 70       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
|   | South          | 70       | 69                  | 59        | 70                  | 69        | 74                  | 59        |
| West of Alexander Avenue/Muirfield Drive (BRT Station Option 2) | North          | 70       | 64                  | 60        | 64                  | 60        | 69                  | 60        |
|   | South          | 70       | 64                  | 59        | 64                  | 59        | 69                  | 59        |
| East of Alexander Avenue/Muirfield Drive (BRT Station Option 2) | North          | 71       | 65                  | 60        | 65                  | 59        | 70                  | 60        |
|   | South          | 70       | 64                  | 60        | 64                  | 59        | 69                  | 60        |
| West of Capitol Avenue  | North          | 70       | 69                  | 60        | 69                  | 60        | 74                  | 60        |
|   | South          | 70       | 69                  | 59        | 69                  | 59        | 74                  | 59        |
| <b>Capitol Avenue</b>   |                |          |                     |           |                     |           |                     |           |
| North of Westboro Drive   | East           | 67       | 62                  | 61        | 62                  | 61        | 67                  | 61        |
|   | West           | 67       | 62                  | 61        | 62                  | 61        | 67                  | 61        |
| <b>Capitol Expressway</b>                                       |                |          |                     |           |                     |           |                     |           |
| Near Story Road   | East           | 73       | 72                  | 58        | 72                  | 58        | 77                  | 58        |
|   | West           | 73       | 72                  | 58        | 72                  | 58        | 77                  | 58        |
| New Ocala Avenue  | East           | 73       | 72                  | 58        | 72                  | 58        | 77                  | 58        |
|   | West           | 73       | 72                  | 58        | 72                  | 58        | 77                  | 58        |
| Near Cunningham Avenue  | East           | 73       | 72                  | 58        | 72                  | 58        | 77                  | 58        |
|   | West           | 73       | 72                  | 58        | 72                  | 58        | 77                  | 58        |

Source: MO'C Physics Applied, *Santa Clara-Alum Rock Transit Corridor Noise & Vibration Study*, July 1, 2008.

Note: All units in dB.

**Table 3.14-7  
Noise Decibel Projections, Phase 2 - Single Car LRT**

| Segment   | Side of Street | Existing | Land Use Category 1 |           | Land Use Category 2 |           | Land Use Category 3 |           |
|---|----------------|----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|
|   |                |          | Criterion           | Generated | Criterion           | Generated | Criterion           | Generated |
| <b>Santa Clara Avenue</b>   |                |          |                     |           |                     |           |                     |           |
| North of Park Avenue  | West           | 70       | 69                  | 56        | 69                  | 58        | 74                  | 56        |
| East & West of SR 87  | North          | 66       | 67                  | 58        | 67                  | 60        | 72                  | 58        |
|   | South          | 66       | 67                  | 58        | 67                  | 60        | 72                  | 58        |
| Montgomery Street to Delmas Avenue<br>(LRT Alignment Option 1 Only)                             | North          | 69       | 69                  | 59        | 69                  | 61        | 74                  | 57        |
|   | South          | 69       | 69                  | 57        | 69                  | 60        | 74                  | 57        |
| S. Fernando Street to Santa Clara<br>Street (Along Montgomery)<br>(LRT Alignment Option 1 Only) | East           | 65       | 66                  | 54        | 66                  | 56        | 71                  | 54        |
| San Fernando Street to Santa Clara<br>Street  | West           | 68       | 68                  | 56        | 68                  | 58        | 73                  | 56        |
|   | East           | 68       | 68                  | 56        | 68                  | 58        | 73                  | 56        |
| Almaden Boulevard to Notre Dame<br>Street   | North          | 69       | 69                  | 59        | 69                  | 61        | 74                  | 59        |
|   | South          | 69       | 69                  | 58        | 69                  | 60        | 74                  | 58        |
| East & West of SR 87<br>(LRT Option 1 only)   | North          | 70       | 69                  | 59        | 69                  | 61        | 74                  | 59        |
|   | South          | 70       | 69                  | 58        | 69                  | 60        | 74                  | 58        |
| West and East of Market Street  | North          | 68       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
|   | South          | 68       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
| 2 <sup>nd</sup> Street to 5 <sup>th</sup> Street  | North          | 68       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
|   | South          | 68       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
| 6 <sup>th</sup> Street to 10 <sup>th</sup> Street   | North          | 68       | 68                  | 58        | 60                  | 68        | 73                  | 58        |
|   | South          | 68       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
| 10 <sup>th</sup> Street to 15 <sup>th</sup> Street  | North          | 68       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
|   | South          | 67       | 67                  | 58        | 67                  | 60        | 72                  | 58        |
| West of 17 <sup>th</sup> Street   | North          | 68       | 68                  | 58        | 68                  | 68        | 72                  | 58        |
|   | South          | 67       | 67                  | 59        | 69                  | 61        | 74                  | 59        |
| East of 17 <sup>th</sup> Street   | North          | 69       | 69                  | 59        | 69                  | 61        | 74                  | 59        |
|   | South          | 69       | 69                  | 59        | 69                  | 61        | 74                  | 59        |

**Table 3.14-7 (Continued)**  
**Noise Decibel Projections, Phase 2 - Single Car LRT**

| Segment                         | Side of Street | Existing | Land Use Category 1 |           | Land Use Category 2 |           | Land Use Category 3 |           |
|---------------------------------|----------------|----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|
|                                 |                |          | Criterion           | Generated | Criterion           | Generated | Criterion           | Generated |
| West of 24 <sup>th</sup> Street | North          | 69       | 69                  | 59        | 69                  | 61        | 74                  | 59        |
|                                 | South          | 69       | 69                  | 59        | 69                  | 61        | 74                  | 59        |
| East of 24 <sup>th</sup> Street | North          | 68       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
|                                 | South          | 68       | 68                  | 58        | 68                  | 61        | 73                  | 58        |
| West of 28 <sup>th</sup> Street | North          | 68       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
|                                 | South          | 68       | 68                  | 58        | 68                  | 61        | 73                  | 58        |
| East of 28 <sup>th</sup> Street | North          | 69       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
|                                 | South          | 69       | 69                  | 59        | 69                  | 61        | 74                  | 59        |
| West of US 101                  | North          | 68       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
|                                 | South          | 69       | 69                  | 59        | 69                  | 61        | 74                  | 59        |
| <b>Alum Rock Avenue</b>         |                |          |                     |           |                     |           |                     |           |
| East of US 101                  | North          | 68       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
|                                 | South          | 68       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
| West of King Road               | North          | 68       | 68                  | 58        | 68                  | 69        | 73                  | 58        |
|                                 | South          | 68       | 68                  | 58        | 68                  | 60        | 73                  | 58        |
| East of King Road               | North          | 67       | 68                  | 57        | 68                  | 59        | 73                  | 57        |
|                                 | South          | 68       | 68                  | 57        | 68                  | 59        | 73                  | 57        |
| West of Eastgate Avenue         | North          | 67       | 68                  | 57        | 68                  | 59        | 73                  | 57        |
|                                 | South          | 68       | 68                  | 57        | 68                  | 59        | 73                  | 57        |
| East of Eastgate Avenue         | North          | 69       | 69                  | 58        | 69                  | 60        | 74                  | 58        |
|                                 | South          | 69       | 69                  | 57        | 69                  | 59        | 74                  | 57        |
| Sunset Avenue to Scharff Avenue | North          | 69       | 69                  | 58        | 69                  | 69        | 47                  | 58        |
|                                 | South          | 69       | 69                  | 57        | 69                  | 59        | 74                  | 57        |
| West of Jackson Avenue          | North          | 69       | 69                  | 58        | 69                  | 60        | 74                  | 58        |
|                                 | South          | 69       | 69                  | 57        | 69                  | 59        | 74                  | 57        |
| Jackson Avenue to West I-680    | North          | 68       | 68                  | 56        | 58                  | 59        | 73                  | 56        |
|                                 | South          | 68       | 68                  | 57        | 68                  | 59        | 73                  | 57        |

**Table 3.14-7 (Continued)**  
**Noise Decibel Projections, Phase 2 - Single Car LRT**

| Segment                | Side of Street | Existing | Land Use Category 1 |           | Land Use Category 2 |           | Land Use Category 3 |           |
|------------------------|----------------|----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|
|                        |                |          | Criterion           | Generated | Criterion           | Generated | Criterion           | Generated |
| East of West I-680     | North          | 70       | 69                  | 58        | 69                  | 58        | 74                  | 58        |
|                        | South          | 69       | 69                  | 57        | 69                  | 59        | 74                  | 57        |
| East of I-680          | North          | 70       | 69                  | 58        | 69                  | 60        | 74                  | 58        |
|                        | South          | 70       | 69                  | 57        | 69                  | 59        | 74                  | 57        |
| West of Capitol Avenue | North          | 70       | 69                  | 58        | 69                  | 60        | 74                  | 58        |
|                        | South          | 70       | 69                  | 57        | 69                  | 59        | 74                  | 57        |

Source: MO'c Physics Applied, *Santa Clara-Alum Rock Transit Corridor Noise & Vibration Study*, July 1, 2008.

Note: All units in dB.

**Table 3.14-8**  
**BRT Alternative Vibration Levels at Property Line (VdB)<sup>a</sup>**

| Segment                                | Side of Street | Category 1 |    | Category 2 |    | Category 3 |    |
|--|----------------|------------|----|------------|----|------------|----|
| <b>Santa Clara Avenue</b>              |                |            |    |            |    |            |    |
| Monterey Street to Delmas Avenue       | North          | 65         | 59 | 72         | 64 | 75         | 62 |
|  | South          | 65         | 61 | 72         | 66 | 75         | 64 |
| West of SR 87                          | North          | 65         | 58 | 72         | 63 | 75         | 61 |
|  | South          | 65         | 60 | 72         | 65 | 75         | 63 |
| SR 87 to Almaden Boulevard             | North          | 65         | 60 | 72         | 65 | 75         | 63 |
|  | South          | 65         | 59 | 72         | 64 | 75         | 62 |
| Almaden Boulevard to Notre Dame Street | North          | 65         | 59 | 72         | 64 | 75         | 62 |
|  | South          | 65         | 61 | 72         | 66 | 75         | 64 |
| East of Notre Dame Street              | North          | 65         | 60 | 72         | 65 | 75         | 63 |
|  | South          | 65         | 60 | 72         | 65 | 75         | 63 |
| West of Market Street                  | North          | 65         | 60 | 72         | 65 | 75         | 63 |
|  | South          | 65         | 60 | 72         | 65 | 75         | 63 |

**Table 3.14-8 (Continued)**  
**BRT Alternative Vibration Levels at Property Line (VdB)<sup>a</sup>**

| Segment  | Side of Street | Category 1 |    | Category 2 |    | Category 3 |    |
|--|----------------|------------|----|------------|----|------------|----|
| East of Market Street  | North          | 65         | 61 | 72         | 66 | 75         | 64 |
|  | South          | 65         | 60 | 72         | 65 | 75         | 63 |
| 2 <sup>nd</sup> Street to 6 <sup>th</sup> Street                         | North          | 65         | 61 | 72         | 66 | 75         | 64 |
|  | South          | 65         | 60 | 72         | 65 | 75         | 63 |
| 6 <sup>th</sup> Street to 10 <sup>th</sup> Street                        | North          | 65         | 60 | 72         | 65 | 75         | 63 |
|  | South          | 65         | 60 | 72         | 65 | 75         | 63 |
| 2 <sup>nd</sup> Street to 6 <sup>th</sup> Street (BRT Station Option 1)  | North          | 65         | 61 | 72         | 66 | 75         | 64 |
|  | South          | 65         | 60 | 72         | 65 | 75         | 63 |
| 6 <sup>th</sup> Street to 10 <sup>th</sup> Street (BRT Station Option 1) | North          | 65         | 60 | 72         | 65 | 75         | 63 |
|  | South          | 65         | 60 | 72         | 65 | 75         | 63 |
| 10 <sup>th</sup> Street to 15 <sup>th</sup> Street                       | North          | 65         | 60 | 72         | 65 | 75         | 63 |
|  | South          | 65         | 60 | 72         | 65 | 75         | 63 |
| East of 15 <sup>th</sup> Street  | North          | 65         | 62 | 72         | 67 | 75         | 65 |
|  | South          | 65         | 62 | 72         | 67 | 75         | 65 |
| West of 24 <sup>th</sup> Street  | North          | 65         | 62 | 72         | 67 | 75         | 65 |
|  | South          | 65         | 62 | 72         | 67 | 75         | 65 |
| East of 24 <sup>th</sup>   | North          | 65         | 59 | 72         | 64 | 75         | 62 |
|  | South          | 65         | 61 | 72         | 66 | 75         | 64 |
| West of 28 <sup>th</sup>   | North          | 65         | 59 | 72         | 64 | 75         | 62 |
|  | South          | 65         | 61 | 72         | 66 | 75         | 64 |
| <b>Alum Rock Avenue</b>  |                |            |    |            |    |            |    |
| East of 28 <sup>th</sup> Street  | North          | 65         | 59 | 72         | 64 | 75         | 62 |
|  | South          | 65         | 62 | 72         | 67 | 75         | 65 |
| West of U.S. 101   | North          | 65         | 59 | 72         | 64 | 75         | 62 |
|  | South          | 65         | 62 | 72         | 67 | 75         | 65 |
| East of U.S. 101   | North          | 65         | 60 | 72         | 65 | 75         | 63 |

**Table 3.14-8 (Continued)**  
**BRT Alternative Vibration Levels at Property Line (VdB)<sup>a</sup>**

| Segment  | Side of Street | Category 1 |    | Category 2 |    | Category 3 |    |
|--|----------------|------------|----|------------|----|------------|----|
| West of 34 <sup>th</sup>   | South          | 65         | 58 | 72         | 63 | 75         | 61 |
|  | North          | 65         | 60 | 72         | 65 | 75         | 63 |
| East of 34 <sup>th</sup> Street  | South          | 65         | 58 | 72         | 63 | 75         | 61 |
|  | North          | 65         | 55 | 72         | 60 | 75         | 58 |
| West of Eastgate Avenue  | South          | 65         | 56 | 72         | 61 | 75         | 59 |
|  | North          | 65         | 55 | 72         | 60 | 75         | 58 |
| East of Eastgate Avenue  | South          | 65         | 56 | 72         | 61 | 75         | 59 |
|  | North          | 65         | 58 | 72         | 63 | 65         | 61 |
| East of Checker Drive  | South          | 65         | 56 | 72         | 61 | 75         | 59 |
|  | North          | 65         | 58 | 72         | 63 | 75         | 61 |
| West of Jackson Avenue   | South          | 65         | 56 | 72         | 61 | 75         | 59 |
|  | North          | 65         | 58 | 72         | 63 | 75         | 61 |
| Jackson Avenue to Foss Avenue  | South          | 65         | 56 | 72         | 61 | 75         | 59 |
|  | North          | 65         | 54 | 72         | 59 | 75         | 57 |
| Foss Avenue to I-680   | South          | 65         | 55 | 72         | 60 | 75         | 58 |
|  | North          | 65         | 57 | 72         | 62 | 75         | 60 |
| I-680 to West of Alexander/Muirfield                                       | South          | 65         | 56 | 72         | 61 | 75         | 59 |
|  | North          | 65         | 58 | 72         | 63 | 75         | 61 |
| West of Alexander Avenue to Muirfield Drive<br>(BRT Station Option 2 Only) | South          | 65         | 56 | 72         | 61 | 75         | 59 |
|  | North          | 65         | 58 | 72         | 63 | 75         | 61 |
| East of Alexander Avenue to Muirfield Drive<br>(BRT Station Option 2 Only) | South          | 65         | 58 | 72         | 63 | 75         | 61 |
|  | North          | 65         | 58 | 72         | 63 | 75         | 61 |
| West of Capitol Avenue   | South          | 65         | 56 | 72         | 61 | 75         | 59 |
|  | North          | 65         | 58 | 72         | 63 | 75         | 61 |
| <b>Capitol Avenue</b>  |                |            |    |            |    |            |    |
| West of Westboro Drive   | East           | 65         | 63 | 72         | 68 | 75         | 66 |

**Table 3.14-8 (Continued)**  
**BRT Alternative Vibration Levels at Property Line (VdB)<sup>a</sup>**

| Segment                   | Side of Street | Category 1 |    | Category 2 |    | Category 3 |    |
|---------------------------|----------------|------------|----|------------|----|------------|----|
|                           | West           | 65         | 63 | 72         | 68 | 75         | 66 |
| <b>Capitol Expressway</b> |                |            |    |            |    |            |    |
| Near Story Road           | East           | 65         | 64 | 72         | 69 | 75         | 67 |
|                           | West           | 65         | 64 | 72         | 69 | 75         | 67 |
| Near Ocala Avenue         | East           | 65         | 64 | 72         | 69 | 75         | 67 |
|                           | West           | 65         | 64 | 72         | 69 | 75         | 67 |
| Near Cunningham Avenue    | East           | 65         | 64 | 72         | 69 | 75         | 67 |
|                           | West           | 65         | 64 | 72         | 69 | 75         | 67 |

Source: MO'C Physics Applied, Santa Clara-Alum Rock Transit Corridor Noise & Vibration Study, July 1, 2008.

Note:

a. Vibration entries for the different categories represents the “Criterion” and “Transit-Vehicle Generated Levels”

**Table 3.14-9**  
**Phase 2 - Single Car LRT Vibration Levels at Property Line (VdB)<sup>a</sup>**

| Segment   | Side of Street | Category 1 |    | Category 2 |    | Category 3 |    |
|---|----------------|------------|----|------------|----|------------|----|
|   | West           | 65         | 49 | 72         | 54 | 75         | 52 |
| <b>Santa Clara Avenue</b>   |                |            |    |            |    |            |    |
| North of Park Avenue  | West           | 65         | 49 | 72         | 54 | 75         | 52 |
| East & West of SR 87  | North          | 65         | 57 | 72         | 58 | 75         | 60 |
|   | South          | 65         | 53 | 72         | 58 | 75         | 56 |
| Montgomery Street to Delmas (LRT Alignment Option 1 Only)                                 | North          | 65         | 64 | 72         | 69 | 75         | 67 |
|   | South          | 65         | 58 | 72         | 63 | 75         | 61 |
| S. Fernando Street to Santa Clara Street (Along Montgomery) (LRT Alignment Option 1 Only) | East           | 65         | 48 | 72         | 53 | 75         | 51 |
| San Fernando Street to Santa Clara Street   | West           | 65         | 49 | 72         | 54 | 75         | 52 |
|   | East           | 65         | 49 | 72         | 54 | 75         | 52 |







