3.14 Noise

Information presented in this section is based on the Noise Study prepared for the project.

3.14.1 Regulatory Setting

The National Environmental Policy Act (NEPA) of 1969 and the California Environmental Quality Act (CEQA) provide the broad basis for analyzing and abating highway traffic noise effects. The intent of these laws is to promote the general welfare and to foster a healthy environment. The requirements for noise analysis and consideration of noise abatement and/or mitigation, however, differ between NEPA and CEQA.

3.14.1.1 California Environmental Quality Act

CEQA requires a strictly no-build versus build analysis to assess whether a project will have a noise impact. If a project is determined to have an adverse noise impact under CEQA, then CEQA dictates that mitigation measures must be incorporated into the project unless such measures are not feasible. The rest of this section will focus on the NEPA-23 CFR 772 noise analysis; please see Chapter 4, CEQA Evaluation, for further information on noise analysis under CEQA.

3.14.1.2 National Environmental Policy Act and 23 CFR 772

For highway transportation projects with FHWA involvement, the Federal-Aid Highway Act of 1970 and the associated implementing regulations (23 CFR 772) govern the analysis and abatement of traffic noise impacts. The regulations require that potential noise impacts in areas of frequent human use be identified during the planning and design of a highway project. The regulations contain noise abatement criteria (NAC) that are used to determine when a noise impact would occur. The NAC differ depending on the type of land use under analysis. For example, the NAC for residences (67 dBA) is lower than the NAC for commercial areas (72 dBA). Table 3.14-1 lists the noise abatement criteria for use in the NEPA-23 CFR 772 analysis.

Figure 3.14-1 lists the noise levels of common activities to enable readers to compare the actual and predicted highway noise-levels discussed in this section with common activities.

In accordance with the Department's *Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects* (Protocol) (Caltrans 2006), a noise impact occurs when the future noise level with the project results in a substantial increase in noise level (defined as a 12 dBA or more increase) or when the future noise level with the project approaches or exceeds the NAC. Approaching the NAC is defined as coming within 1 dBA of the NAC.

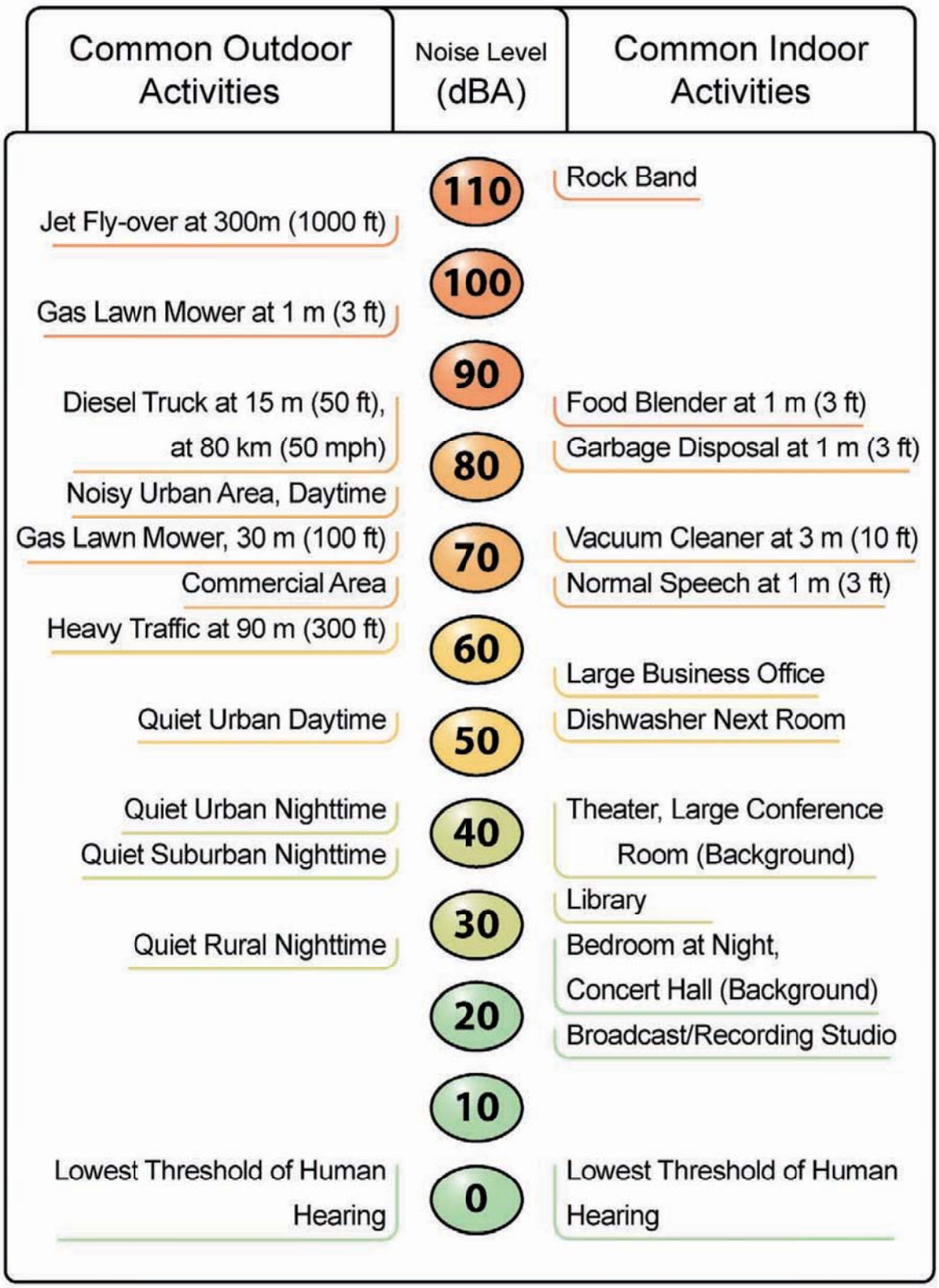

Figure 3.14-1
Representative Environmental Sound Levels

Table 3.14-1
Activity Categories and Noise Abatement Criteria

Activity Category	NAC, Hourly A-Weighted Noise Level (dBA-L_{eq} [h])	Description of Activities
A	57 Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 Exterior	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 Exterior	Developed lands, properties, or activities not included in categories A or B above
D	—	Undeveloped lands
E	52 Interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Source: California Department of Transportation Environmental Program. *Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects*. Table 2-1, Activity Categories and Noise Abatement Criteria, 2006.

If it is determined that the project will have noise impacts, then potential abatement measures must be considered. Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the project plans and specifications. This document discusses noise abatement measures that would likely be incorporated in the project.

The Department's *Protocol* sets forth the criteria for determining when an abatement measure is reasonable and feasible. Feasibility of noise abatement is basically an engineering concern. A minimum 5 dBA reduction in the future noise level must be achieved for an abatement measure to be considered feasible. Other considerations include topography, access requirements, other noise sources and safety considerations. Some factors used in determining whether a proposed noise abatement measure is reasonable include: residents acceptance, the absolute noise level, build versus existing noise, environmental impacts of abatement, public and local agencies input, newly constructed development versus development pre-dating 1978, and the cost per benefited residence.

3.14.2 Affected Environment

Noise Background and Terminology

The following is a brief discussion of general noise terminology.

- **Sound:** A vibratory disturbance created by a vibrating object that when transmitted by pressure waves through a medium such as air is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise:** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

- **Decibel (dB):** A unitless measure of sound on a logarithmic scale that indicates the squared ratio of sound-pressure amplitude to a reference sound-pressure amplitude. The reference pressure is 20 micro-pascals.
- **A-Weighted Decibel (dBA):** An overall frequency-weighted sound level in dB that approximates the frequency response of the human ear.
- **Equivalent Sound Level (L_{eq}):** L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level that in a stated period would contain the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour A-weighted equivalent sound level ($L_{eq}[h]$), is the energy average of the A-weighted sound levels occurring during a 1-hour period and is the basis for noise abatement criteria (NAC) used by Caltrans and FHWA.
- **Percentile-Exceeded Sound Level (L_x):** L_x represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10 percent of the time, L_{90} is the sound level exceeded 90 percent of the time).
- **Maximum Sound Level (L_{max}):** L_{max} is the highest instantaneous sound level measured during a specified period.
- **Day-Night Level (L_{dn}):** L_{dn} is the energy average of the A-weighted sound levels occurring during a 24-hour period with 10 dB added to the A-weighted sound levels occurring between 10:00 p.m. and 7:00 a.m.
- **Community Noise Equivalent Level (CNEL):** CNEL is the energy average of the A-weighted sound levels occurring during a 24-hour period with 10 dB added to the A-weighted sound levels occurring between 10:00 p.m. and 7:00 a.m. and 5 dB added to the A-weighted sound levels occurring between 7:00 p.m. and 10:00 p.m.

Sound Propagation

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

- **Geometric Spreading:** Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (or drops off) at a rate of 6 dBA for each doubling of distance. Highway noise is not a single, stationary point source of sound. The movement of the vehicles on a highway makes the source of the sound appear to emanate from a line (i.e., a line source) rather than a point. This line source results in cylindrical spreading rather than the spherical spreading that results from a point source. The change in sound level from a line source is 3 dBA per doubling of distance.
- **Ground Absorption:** The noise path between the highway and the observer is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is done for

simplification only because prediction results based on this scheme are sufficiently accurate for distances of less than 200 feet. For acoustically hard sites (i.e., those sites with a reflective surface, such as a parking lot or a smooth body of water, between the source and the receiver), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, between the source and the receiver), an excess ground-attenuation value of 1.5 dBA per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dBA per doubling of distance for a line source and 7.5 dBA per doubling of distance for a point source.

- **Atmospheric Effects:** Research by Caltrans and others has shown that atmospheric conditions can have an adverse effect on noise levels within 200 feet of a highway. Wind has been shown to be the most important meteorological factor within approximately 500 feet of the source, whereas vertical air-temperature gradients are more important for greater distances. Other factors such as air temperature, humidity, and turbulence also have adverse effects. Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lower noise levels. Increased sound levels can also occur as a result of temperature inversion conditions (i.e., increasing temperature with elevation).
- **Shielding by Natural or Human-Made Features:** A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by this shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction. A taller barrier may provide as much as 20 dB of noise reduction.

Existing Noise Environment

The existing noise environment in the corridor is dominated by noise from traffic traveling on roadways within the corridor, industrial activities, and aircraft overflights from Travis AFB. Table 3.14-2 summarizes short-term sound-level measurements taken in the corridor. As shown, noise levels at most of the measured locations within the corridor approach or exceed the NAC of 67 dBA under existing conditions. Long-term measurements were also taken in the corridor, which resulted in noise levels of 70.4 to 71.5 dBA L_{dn}.

Table 3.14-2
Summary of Field-Measured Data (Short-Term Monitoring Results)

Receiver[a]	Roadway Segment	Measurement[b]	Measured Sound Level (dBA-L_{eq})[c]
A	Peabody Road between Berryessa Drive and Cliffside Drive about 100 feet from eastern roadway edge	1	66.2
		2	66.3
B	Peabody Road between Marshall Road and Beelard Drive about 50 feet from western roadway edge	1	65.7
		2	66.1
C	Peabody Road between Beelard Drive and Southwood Drive about 40 feet from western roadway edge	1	69.2
		2	69.4
D	Peabody Road between California Drive and Caldwell Drive about 50 feet from western roadway edge	1	66.1
		2	66.3
E	Peabody Road between Morning Glory Drive and Foxboro Parkway about 250 feet from eastern roadway edge	1	56.3
		2	56.6
G	Walters Road between Montebello Drive and Peterson Road about 80 feet from eastern roadway edge	1	59.9
		2	60.4
H	Leisure Town Road south of Fallbrook Avenue about 20 feet from eastern roadway edge	1	67.9
		2	68.5
I	Leisure Town Road south of Ulatis Road about 50 feet from eastern roadway edge	1	66.2
		2	66.4
J	Leisure Town Road south of Poplar Drive about 50 feet from western roadway edge	1	63.0
		2	63.3

Notes:

a. Receiver locations are identified in the noise technical report Appendix A.

b. Measurements were repeated at all locations to verify the measurements. Measurements were taken in June 2004.

c. These measurements were used primarily as calibration for the traffic noise modeling.

3.14.3 Impacts (including Permanent, Temporary, Direct, Indirect, and Construction)

Methodology

Construction Noise

There are no commonly accepted thresholds for acceptable levels of noise from construction activities. However, noise guidelines recommended by the U.S. Department of Transportation (Federal Transit Administration, 1995) for construction noise are shown below for reference. These guidelines state that there may be an adverse community reaction if the 1-hour L_{eq} value (measured in dBA) from construction noise would exceed the values shown in Table 3.14-3.

Table 3.14-3
U.S. Department of Transportation Construction Noise Guidelines

Land Use	1-Hour L_{eq} (dBA)	
	Day	Night
Residential	90	80
Commercial	100	100
Industrial	100	100

Source: Federal Transit Administration, 1995.

Table 3.14-4 summarizes noise levels produced by construction equipment that are commonly used for roadway-construction projects. As shown in the table, most construction equipment is expected to generate noise levels ranging from 70 to 90 dB at a distance of 50 feet. Pile driving is expected to generate noise levels up to 101 dB at a distance of 50 feet. Construction equipment is considered a stationary source; therefore, noise produced by construction equipment would be reduced at a rate of about 6 dB per doubling of distance.

Operational Noise

Study methods and procedures used in this analysis are consistent with requirements and guidance provided in 23 CFR 772 and the *Protocol*. The steps to evaluate traffic-noise impacts and abatement are summarized below and are discussed in detail in the Noise Study for the project.

1. **Identify Potential Receiver Locations:** Locations in the corridor that could be exposed to traffic-noise impacts resulting from the project were identified. Areas where receivers were identified are shown in Figure 3.14-2.

2. **Measure Existing Sound Levels:** Sound-level measurements were taken at locations potentially exposed to traffic-noise impacts (shown in Table 3.14-2, above). Traffic counts and speeds were measured simultaneously.

3. **Digitize Geometric Features:** Geometric features, including roadway lanes, receiver locations, existing terrain, and existing walls in the detailed impact assessment area, were digitized into a three-dimensional, scaled reference coordinate system for existing and project conditions. Figure 3.14-2 indicates the noise modeling locations for the identified receiver areas from Step 1, above.

4. **Calibrate Noise Model:** The traffic-noise model was calibrated as necessary using the measured sound-level data, actual traffic counts, and digitized geometric features for existing conditions from Steps 2 and 3, above.

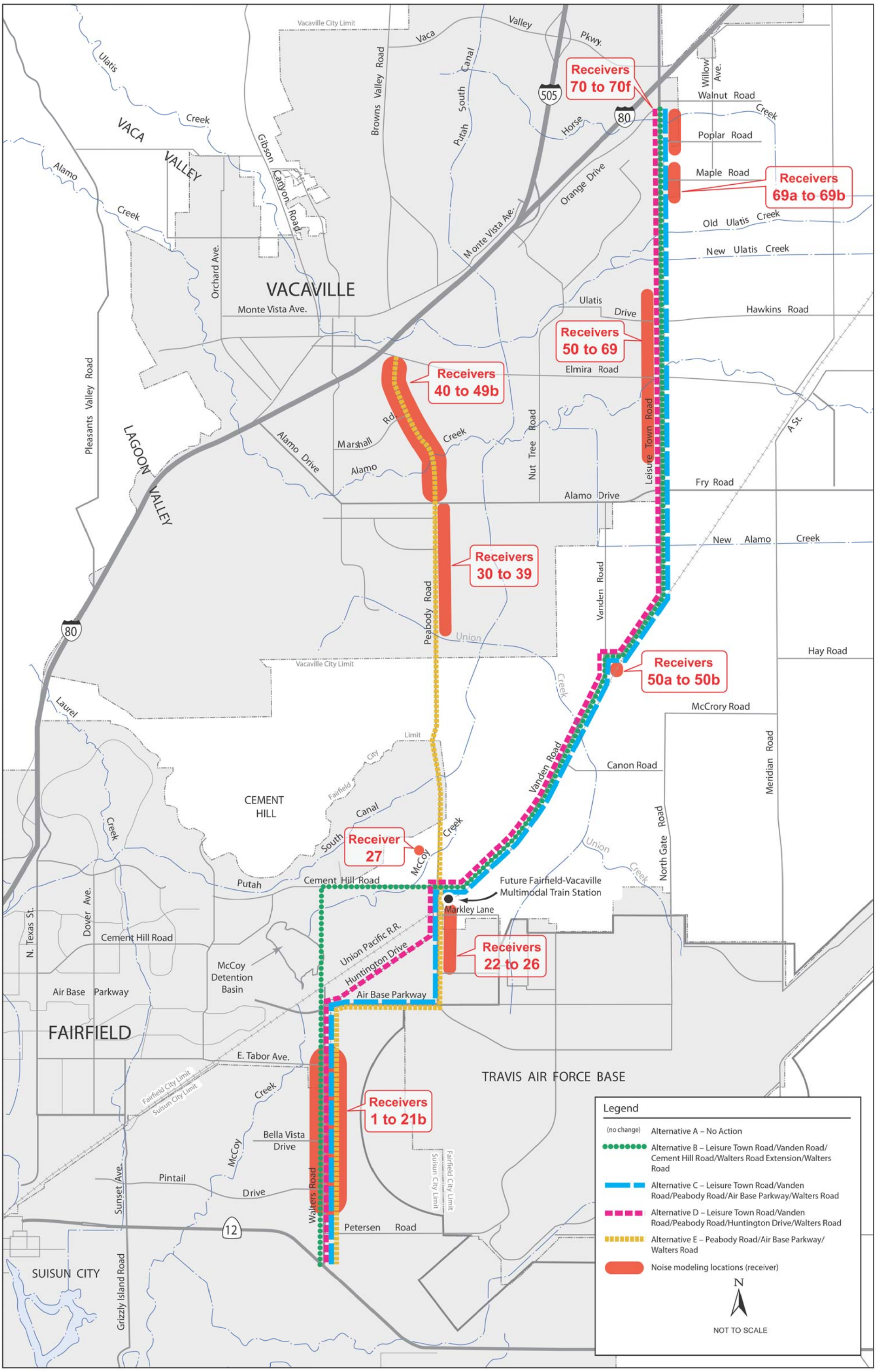

Figure 3.14-2
Noise Monitoring Locations

Table 3.14-4
Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source
Air compressor	81
Backhoe	80
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Crane, derrick	88
Crane, mobile	83
Dozer	85
Generator	81
Grader	85
Impact wrench	85
Jack hammer	88
Loader	85
Paver	89
Pile driver (impact)	101
Pile driver (sonic)	96
Pneumatic tool	85
Pump	76
Rock drill	98
Roller/sheep's foot	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Truck	88

Source: FTA, 1995.

5. **Predict Traffic-Noise Levels:** Using peak-noise-hour traffic volumes under existing, year 2010, and year 2030 cumulative conditions, the traffic-noise model was used to predict peak-noise-hour noise levels under existing, year 2010, and year 2030 conditions for each alternative. Traffic noise levels were predicted for each of the identified receiver locations.

6. **Identify Traffic-Noise Impacts and Consider Abatement:** The traffic-noise modeling results for existing, year 2010, and year 2030 conditions were used to determine whether traffic-noise impacts would occur under each alternative (i.e., where the project would exceed the NAC or result in an increase of 12 dB or more). Where impacts are identified, abatement is considered.

Noise Abatement

As discussed above, noise-abatement measures must be identified for all areas that are reasonable, feasible, and likely to be incorporated into the project. Noise impacts for which no apparent solution is available must also be identified. Primary consideration for abatement is given to exterior areas. In situations in which no exterior activities are affected by traffic noise, the interior criterion (Activity Category E) is used as the basis for noise-abatement consideration.

Based on the configuration and location of the project, noise barrier abatement is considered the primary form of noise abatement to be considered. Barrier heights ranging from 6 feet to 16 feet high in 2-foot increments are considered as part of this study. Barrier heights are relative to the elevation at the edge of shoulder. Based on guidance in Chapter 1100 of the Caltrans' *Highway Design Manual*, barriers at the edge of pavement are limited to 16 feet high. Additional studies will be conducted for residential areas that have been recently completed, are currently under construction, or are planned, designed, and programmed.

Summary of Impacts to Noise

Table 3.14-5 summarizes the potential for each alternative to result in noise impacts. All four build alternatives would result in construction noise impacts within the corridor. These construction activities would be temporary and intermittent; therefore, there would be short-term noise impacts associated with each of the alternatives.

Table 3.14-5
Impacts from Noise by Alternative

Impact	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Construction Noise	NA	Temporary, intermittent and short-term impacts to residents along Walters Road and Leisure Town Road	Temporary, intermittent and short-term impacts to residents along Walters Road and Leisure Town Road	Temporary, intermittent and short-term impacts to residents along Walters Road and Leisure Town Road	Temporary, intermittent and short-term impacts to residents along Peabody Road
Noise Levels above the NAC or a Substantial Increase in Traffic Noise Levels	Approach or exceed NAC along Walters Road and Leisure Town Road	Approach or exceed NAC along Walters Road and Leisure Town Road	Approach or exceed NAC along Walters Road and Leisure Town Road	Approach or exceed NAC along Walters Road and Leisure Town Road	Approach or exceed NAC along Walters Road and Peabody Road

As discussed above, in accordance with the Department's *Protocol*, a noise impact occurs when the future noise level with the project results in a substantial increase in noise level (defined as a 12 dBA or more increase) or when the future noise level with the project approaches or exceeds the NAC. Approaching the NAC is defined as coming within 1 dBA of the NAC. None of the build alternatives

would result in substantial increases in noise levels. However, as described below and in the Noise Study, Alternatives B, C, and D would result in areas of the corridor where noise levels would approach or exceed the NAC. These noise impacts would require noise abatement considerations. With implementation of Alternatives B, C, or D, noise levels would approach or exceed the NAC in four areas: one along Walters Road and three along Leisure Town Road. Three noise barriers were considered feasible for these alternatives. Implementation of Alternative E would also result in noise levels that would approach or exceed the NAC and noise abatement considerations would also be required. Alternative E would result in noise levels that approach or exceed the NAC in eight areas: one along Walters Road and seven along Peabody Road. Five noise barriers were considered feasible for this alternative.

Impact N-1: Would the Alternatives Result in the Exposure of Noise-Sensitive Land Uses to Construction Noise?

Alternative A. Under this alternative, the project would not be constructed. Therefore, there would be no effects related to construction noise.

Alternative B. During construction of the project, noise from construction activities (primarily operation of heavy equipment) may intermittently dominate the noise environment in the immediate area of construction. In general, adverse noise impacts from construction are not anticipated because construction would be short-term, intermittent, and dominated by local traffic noise.

A reasonable worst-case assumption is that the three loudest pieces of equipment anticipated for use on the project (paver, loader, and truck) would operate simultaneously and continuously for at least a 1-hour period. Under these conditions, at 50 feet from the source, the combined sound level would be 92 dBA. Table 3.14-6 summarizes predicted noise levels at various distances from an active construction site, assuming this combined source level, distance attenuation (6 dB per doubling of distance), and attenuation from ground absorption (1 to 2 dB per doubling of distance).[1]

The results in Table 3.14-6 indicate that noise-sensitive land uses located within about 55 feet of an active construction site may be exposed to construction noise that exceeds the daytime construction threshold of 90 dBA for residential uses. Noise-sensitive land uses located within about 135 feet of an active construction site may be exposed to construction noise in excess of the nighttime construction threshold of 80 dBA. The table also indicates that commercial or industrial receptors within about 55 feet may be exposed to construction noise from pile driving that exceeds the daytime construction standard of 100 dBA. Noise sensitive uses within about 150 feet may be exposed to construction noise from pile driving that exceeds the daytime construction threshold of 90 dBA.

[1] Hoover, R.M., R.H. Keith. 1996. Noise control for buildings, manufacturing plants, equipment and products. Hoover & Keith, Inc. Houston, TX.

Table 3.14-6
Estimated Construction Noise from Construction Activities

Distance Between Source and Receiver	Calculated Sound Level (dBA)	
	Construction Equipment	Pile Driving
50 feet	92	101
100 feet	84	93
200 feet	76	85
300 feet	71	80
400 feet	68	77
500 feet	65	75
600 feet	63	72
700 feet	62	71
800 feet	60	70
900 feet	59	68
1,000 feet	58	67

Note: Calculations based on FTA 1995 guidance. This calculation includes geometric attenuation and ground effect; it does not include the effects, if any, of local shielding, which may reduce sound levels further.

However, there may be instances where construction activity in proximity to noise-sensitive land uses could result in noise levels that exceed the thresholds defined above. This would be considered an adverse effect for the following noise sensitive land uses, which are located along Leisure Town Road and Walters Road for the Alternative B alignment:

- Noise-sensitive land uses on both the east and west sides of Leisure Town Road in Vacaville. These include residential development on the west side of Leisure Town Road between Alamo Drive and Kingswood Avenue, and between Ulatis Drive and Stonegate Drive. These developments have existing barriers.
- The residential development on the west side of Leisure Town Road between Kingswood Avenue and approximately Arbor Oaks Drive, and a mobile-home park on the east side of Leisure Town Road between Poplar Drive and Horse Creek in Vacaville. These developments do not have any barriers in place.
- A residential subdivision on the west side of Leisure Town Road between Commerce Place and Ulatis Drive and between New Alamo Creek and Alamo Drive in Vacaville.
- Residential subdivisions and churches located on both sides of Walters Road between Petersen Road and Air Base Parkway in Fairfield. There are existing barriers from Petersen Road to approximately East Tabor Avenue.

Mitigation Measures N-1 to N-3 have been identified to reduce the effects of construction noise.

Alternative C. Noise levels for construction under Alternative C would be similar to that discussed for Alternative B. Noise-sensitive land uses under this alternative along Leisure Town Road and Walters Road are the same as under Alternative B, with the addition of the following along Peabody Road:

- A residential subdivision on the east side of Peabody Road between Dobe Lane and to the north of Whitney Drive just south of Markeley Lane in Fairfield. There is an existing noise barrier in this area.

As described for Alternative B, Mitigation Measures N-1 to N-3 has been identified to reduce this effect.

Alternative D. Noise levels for construction under Alternative D would be similar to that discussed for Alternative B. Noise-sensitive land uses under this alternative along Leisure Town Road and Walters Road are the same as under Alternative B, with the addition of the subdivision along Peabody Road between Whitney Drive and Markeley Lane, which is also listed under Alternative C.

As described for Alternative B, Mitigation Measures N-1 to N-3 has been identified to reduce this effect.

Alternative E. Noise levels for construction under Alternative E would be similar to that discussed for Alternative B. Noise-sensitive land uses under this alternative alignment along Peabody Road and Walters Road are listed below:

- Residential developments, a senior housing complex, Will C. Wood High School, and a bike path on both sides of Peabody Road north of Alamo Drive in Vacaville. There are no existing noise barriers.
- North of Caldwell Drive, various noise-sensitive land uses on both sides of Peabody Road, including the Al Patch Memorial Park on the west and residential subdivisions on the east in Vacaville. The subdivisions have an existing noise barrier.
- Residential subdivisions and parks primarily on the east side of Peabody Road north of Foxboro Parkway in Vacaville. These are surrounded by existing barriers.
- A residential subdivision on the west side of Peabody Road just south of the Putah South Canal in Fairfield. These are surrounded by existing barriers.
- A residential subdivision on the east side of Peabody Road between Dobe Lane and to the north of Whitney Drive just south of Markeley Lane in Fairfield. There is an existing noise barrier in this area.
- Residential subdivisions and churches on both sides of Walters Road between Petersen Road and Air Base Parkway in Fairfield. There are existing barriers from Petersen Road to approximately East Tabor Avenue.

As described for Alternative B, Mitigation Measures N-1 to N-3 has been identified to reduce this effect.

Impact N-2: Would the Alternatives Result in the Exposure of Noise-Sensitive Land Uses to Noise Levels above the NAC or a Substantial Increase in Traffic Noise?

Peak-noise-hour noise levels under existing, year 2010, and year 2030 conditions for each alternative were predicted for each of the identified receiver locations. Tables 3.14-7 and 3.14-8 provide a summary of the noise level predictions under year 2010 and year 2030 presented in the Noise Study, with a range of noise levels for each group of receivers. Individual receivers were analyzed in the Noise Study, and are grouped in the table based on location of the receiver along the project alignment. The locations of each receiver group are shown in Figure 3.14-2. As shown in the tables, areas along the project alignment exceed or approach the FHWA NAC for residential uses under existing conditions.

Alternative A. Traffic noise levels within the corridor under existing and future no project conditions would result in noise levels that approach or exceed the FHWA NAC. However, under this alternative, noise abatement measures would not be required. Because the project would not be constructed under this alternative, Alternative A would result in no substantial increases in traffic noise levels. Therefore, there would be no adverse impacts related to traffic noise.

Alternative B. Traffic noise levels within the corridor under existing and future no build conditions would result in noise levels that approach or exceed the FHWA NAC. Traffic noise levels within the corridor would increase compared to existing and future no-project conditions under Alternative B. The noise levels for Alternative B under existing and future conditions are summarized in Tables 3.14-7 and 3.14-8 and shown in detail in the Noise Study. Information presented in Tables 3.14-7 and 3.14-8 and the Noise Study indicate that implementation of Alternative B would result in noise impacts at the following noise-sensitive areas as a result of noise levels that would approach or exceed the FHWA NAC:

- Residential land uses in Fairfield on the west side of Walters Road between East Tabor Avenue and approximately Granada Drive (Receiver Group 1 to 21b). This development has existing barriers near Granada Drive; these barriers end and there are no barriers approximately 150 feet and farther south of Granada Drive.

Table 3.14-7
Summary of Year 2010 Traffic Noise Impacts under 23 CFR 772 (L_{eq})

Receiver Group [a, b]	Major Roadway	Existing Worst Noise Hour Noise Level (dB-L_{eq} [h])	Predicted Worst Noise Hour Noise Level (dB-L_{eq} [h])[c]					Noise Increase (dB) Relative to Existing Conditions				
			Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
All Alternatives												
1-21b	Walters Road	53-64	54-65	54-64	54-65	54-65	54-65	0-2	0-2	0-2	0-2	0-2
Alternative E												
22-26	Peabody Road	57-62	58-63	—	—	—	57-61	1-2	—	—	—	-1-1
27	Peabody Road	63	64	—	—	—	64	1	—	—	—	1
30-39	Peabody Road	57-65	57-63	—	—	—	57-65	0-1	—	—	—	0-2
40-49b	**Peabody Road**	**61-70**	**61-71**	**—**	**—**	**—**	**61-72**	**0-1**	**—**	**—**	**—**	**-1-2**
Alternatives B, C, and D												
50a-50b	Vanden Road	61-71	63-72	64-71	64-71	64-71	—	1-2	0-3	0-3	0-3	—
50-69	**Leisure Town Road**	**53-68**	**55-70**	**56-68**	**56-68**	**56-68**	**—**	**1-2**	**-1-3**	**-1-3**	**-1-4**	**—**
69a-69b	**Leisure Town Road**	**67-69**	**69-71**	**70-73**	**70-73**	**70-73**	**—**	**2**	**3-4**	**3-4**	**3-4**	**—**
70-70f	**Leisure Town Road**	**60-68**	**62-70**	**62-70**	**62-70**	**62-70**	**—**	**2**	**2**	**2**	**2**	**—**

Notes:

— = not applicable

Bold = Impacts identified. Impacts only identified for noise abatement criterion thresholds which are approached or exceeded under existing and/or 2010 conditions. No impacts are identified under Alternative A, as this is the No Build Alternative.

a. All receptor locations were residential developments that would be considered within the FHWA Activity Category B. Applicable Noise Abatement Criteria (NAC) for the residences would be 67 dBA.

b. See Figure 3.14-2 for receiver locations.

c. Predicted design year 2010.

Table 3.14-8
Summary of Year 2030 Traffic Noise Impacts under 23 CFR 772 (L_{eq})

Receiver Group[a, b]	Major Roadway	Existing Worst Noise Hour Noise Level (dB-L_{eq} [h])	Predicted Worst Noise Hour Noise Level (dB-L_{eq} [h])[c]					Noise Increase (dB) Relative to Existing Conditions				
			Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
All Alternatives												
1-21b	**Walters Road**	**53-64**	**57-68**	**56-67**	**57-67**	**57-67**	**57-67**	**3-5**	**2-4**	**2-5**	**2-4**	**3-4**
Alternative E												
22-26	Peabody Road	57-62	60-66	—	—	—	57-61	3-4	—	—	—	-1-1
27	**Peabody Road**	**63**	**66**	**—**	**—**	**—**	**67**	**3**	**—**	**—**	**—**	**4**
30-39	**Peabody Road**	**56-65**	**58-66**	**—**	**—**	**—**	**60-68**	**1-2**	**—**	**—**	**—**	**3-4**
40-49b	**Peabody Road**	**61-70**	**62-71**	**—**	**—**	**—**	**62-73**	**0-1**	**—**	**—**	**—**	**0-2**
Alternatives B, C, and D												
50a-50b	**Vanden Road**	**61-71**	**66-75**	**64-72**	**64-72**	**64-72**	**—**	**4-5**	**1-3**	**1-3**	**1-3**	**—**
50-69	**Leisure Town Road**	**53-68**	**58-73**	**58-71**	**58-71**	**58-71**	**—**	**4-5**	**3-6**	**2-6**	**2-6**	**—**
69a-69b	**Leisure Town Road**	**67-69**	**71-73**	**72-75**	**72-75**	**72-75**	**—**	**4**	**5-6**	**5-6**	**5-6**	**—**
70-70f	**Leisure Town Road**	**60-68**	**64-72**	**65-72**	**65-72**	**65-72**	**—**	**4**	**4-5**	**4-5**	**4-5**	**—**

Notes:

— = not applicable.

Bold = Impacts identified. Impacts only identified for noise abatement criterion thresholds which are approached or exceeded under existing and/or 2030 conditions. No impacts are identified under Alternative A, as this is the No Build Alternative.

a. All receptor locations were residential developments that would be considered within the FHWA Activity Category B. Applicable Noise Abatement Criteria (NAC) for the residences would be 67 dBA.

b. See Figure 3.14-2 for receiver locations.

c. Predicted design year 2030.

- Scattered residential land uses in unincorporated Solano County on the east side of Vanden Road near the intersection of Vanden Road and Leisure Town Road (Receiver Group 50a to 50b). These developments do not have any barriers in place.
- Residential developments in Vacaville on the west side of Leisure Town Road between Alamo Drive and approximately Stonegate Drive (Receiver Group 50 to 69). These developments do not have any barriers in place.
- Residential developments in unincorporated Solano County on the west side of Leisure Town Road between Kingswood Avenue and approximately Arbor Oaks Drive (Receiver Group 69a to 69b). These developments do not have any barriers in place.
- Mobile-home park in Vacaville on the east side of Leisure Town Road between Poplar Drive and Horse Creek (Receiver Group 70 to 70f). This development does not have any barriers in place.

For existing conditions in the corridor, existing peak-hour traffic noise levels are typically less than 67 dB-L_{eq}(h). Existing peak-hour traffic noise levels more than 67 dB-L_{eq}(h) occur predominantly in the areas along Peabody and Leisure Town Roads where the traffic-noise impacts listed above were identified. This indicates that where noise impacts are identified under FHWA 23 CFR 772 guidance, existing traffic noise levels already approach or exceed the NAC. At the identified locations where noise levels approach or exceed the NAC, the noise level increase due to the project would not result in a substantial increase. Noise levels at these locations would result in increases of less than 3 dB under Alternative B. Therefore, even though there would be noise impacts at these locations, the impacts would not be considered a substantial adverse impact compared to existing conditions.

FHWA requires that noise abatement be considered for all areas that exceed the NAC, even when the project would not result in a substantial change in the existing noise environment. Because noise levels under existing conditions and under Alternative B exceed the NAC, noise abatement measures must be considered with implementation of the project.

Alternative C. Traffic noise levels within the corridor under existing and future no build conditions would result in noise levels that approach or exceed the FHWA NAC. Traffic noise levels within the corridor would increase compared to existing and future no build conditions under Alternative C. The noise levels for Alternative C under existing and future conditions are shown in Tables 3.14-7 and 3.14-8 and in detail in the Noise Study. Traffic noise impacts under Alternative C would be similar to that discussed above for Alternative B. Because noise level increases under this alternative would not be substantial, this alternative would not result in substantial adverse impacts compared to existing conditions.

Abatement considerations would also be similar to those for Alternative B.

Alternative D. Traffic noise levels within the corridor under existing and future no project conditions would result in noise levels that approach or exceed the FHWA NAC. Traffic noise levels within the corridor would increase compared to existing and future no-project conditions under Alternative D. The noise levels for Alternative D under existing and future conditions are shown in Tables 3.14-7 and

3.14-8 and in detail in the Noise Study. Traffic noise impacts under Alternative D would be similar to that discussed above for Alternative B. Because noise level increases under this alternative would not be substantial, this alternative would not result in substantial adverse impacts compared to existing conditions.

Abatement considerations would also be similar to those for Alternative B.

Alternative E. Traffic noise levels within the corridor under existing and future no build conditions would result in noise levels that approach or exceed the FHWA NAC. Traffic noise levels within the corridor would increase compared to existing and future no build conditions under Alternative E. The noise levels for Alternative E under existing and future conditions are shown in Tables 3.14-7 and 3.14-8 and in detail in the Noise Study. Traffic noise impacts under Alternative E would be similar to that discussed above for Alternative B. Noise-sensitive land uses that would result in noise impacts under this alternative in the following noise-sensitive areas:

- Residential land uses in Fairfield on the west side of Walters Road between East Tabor Avenue and approximately Granada Drive (Receiver Group 1 to 21b). This development has existing barriers near Granada Drive; these barriers end and there are no barriers approximately 150 feet and farther south of Granada Drive.
- Residential developments in Vacaville on the east side of Peabody Road from approximately the Solano County Society for the Prevention of Cruelty to Animals (SPCA) to approximately California Drive (Receiver Group 30-39). These developments have existing noise barriers.
- Residential developments on the east and west side of Peabody Road from Alamo Drive to approximately Berryessa Drive, and Will C. Wood High School on the west side of Peabody Road north of Marshall Road in Vacaville (Receiver Group 40-49b). These developments do not have existing noise barriers.

For existing conditions in the corridor, existing peak-hour traffic noise levels are typically less than 67 dB-L_{eq}(h). Existing peak-hour traffic noise levels more than 67 dB-L_{eq}(h) occur predominantly in the areas along Peabody Road and Leisure Town Road where the traffic-noise impacts listed above were identified. This indicates that where noise impacts are identified under FHWA 23 CFR 772 guidance, existing traffic noise levels already approach or exceed the NAC. At the identified locations where noise levels approach or exceed the NAC, the noise level increase due to Alternative E would not result in a substantial increase. Noise levels at these locations would result in increases of less than 3 dB under Alternative E. Therefore, even though there would be noise impacts at these locations, the increases would not be considered a substantial adverse impact compared to existing conditions.

Abatement considerations would be required, as described for Alternative B.

Impact N-3: Would the Alternatives Result in Cumulative Noise Effects?

Traffic levels for the years 2010 and 2030 that were used to determine the traffic noise within the corridor include traffic levels from cumulative projects. Based on the noise levels determined in the Noise Study, the project plus cumulative development would result in noise levels that would approach

or exceed the NAC for the areas identified above under Impact N-2. The cumulative noise levels with the project would not result in a substantial increase of 12 dB over existing noise levels. Therefore, even though there would be noise impacts because the project would approach or exceed the NAC, the increases would not be considered a substantial adverse cumulative impact. However, because there would be an exceedance of the NAC, noise abatement was considered for the project at the locations listed in Impact N-2. Prior to approval of the project, STA or the appropriate local agency would evaluate the cost reasonableness of noise barriers in these locations based on the estimated cost of the barrier and reasonableness allowances presented in the Noise Study.

3.14.4 Avoidance, Minimization, and/or Abatement Measures

FHWA requires that noise abatement be considered for all noise impacts, even when the project would not result in a substantial change in the surrounding noise environment. As discussed above, existing noise levels already exceed the NAC for the sensitive receptors within the project limits; therefore, noise abatement measures must be considered. Noise abatement in the form of noise barriers was considered in the Noise Study and was determined to be feasible at several locations along the corridor.

While there are areas with existing soundwalls which exceed the NAC, noise abatement was not considered for these locations. Noise abatement for these areas would require replacement of the existing soundwalls with higher walls. However, experience has shown that it is difficult to achieve an additional 5 dBA reduction beyond that which is provided by the existing soundwalls. Therefore, the new, higher walls would not be considered feasible.

The following is a discussion of noise abatement measures considered for the project; it has been determined that soundwalls are considered the most feasible abatement for the project. Based on studies so far accomplished, the following noise abatement measures in the form of barriers are intended to be incorporated into the project. If the project substantially changes during final design, noise barriers might not be provided. The final decision on the noise barriers will be made by STA or the appropriate local agency after completion of the public involvement process during the final project design process.

Abatement Measures for Alternatives B, C, and D

Construction of new noise barriers under Alternatives B, C, and D was considered at three locations where there are currently no noise barriers. The locations of the prospective noise barriers are shown in Figure 3.14-3. Noise barriers between 6 feet and 16 feet, cost allowance, and projected cost for these barriers is shown below in Table 3.14-9. The cost allowance for noise barrier walls of 6 feet and 8 feet are presented below, as Vacaville has committed to building walls of at least 6 to 8 feet at the locations identified. The following is a description of each preliminary noise barrier configuration considered:

Prospective Noise Barriers

Project Location

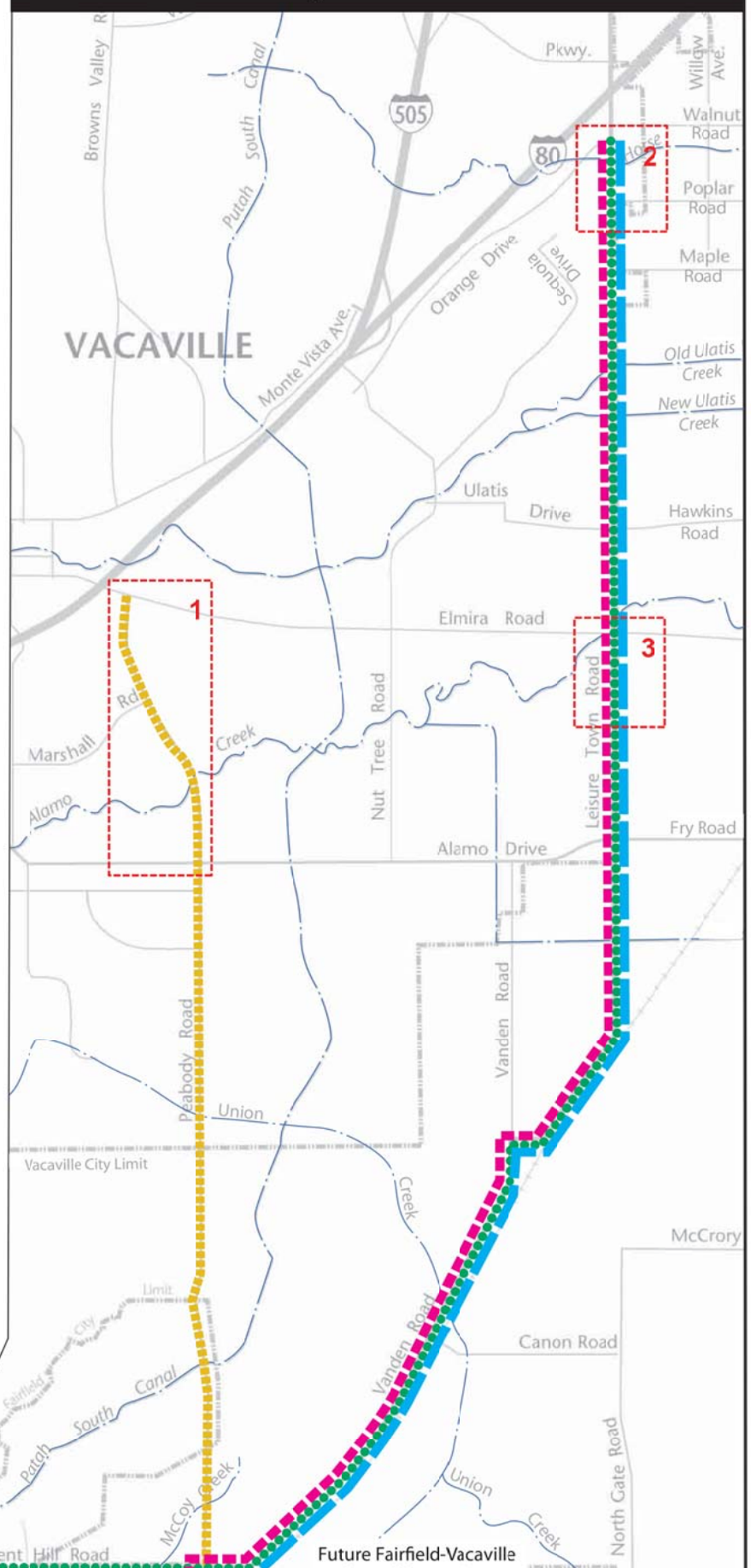

Figure 3.14-3
Prospective Noise Barriers

Table 3.14-9
Summary of Jepson Parkway Project Soundwall Feasibility and Reasonableness Allowances under Alternatives B, C, and D

Noise Barrier	Height (feet)	Provides 5 dB of Noise Reduction?	Impacted Residences	Benefited Residences	Reasonable Allowance per Residence[a]	Total Reasonable Allowance[a, b]	Projected Cost of Construction[c]	Reasonable and Feasible?
West of Leisure Town Road— Kingswood Avenue to Fallbrook Avenue	6	Yes	32	16	$42,000	$672,000	$271,620	Yes
	8	Yes		16	$42,000	$672,000	$362,160	Yes
	10	Yes		16	$44,000	$704,000	$452,700	Yes
	12	Yes		21	$46,000	$966,000	$543,240	Yes
	14	Yes		21	$46,000	$966,000	$633,780	Yes
	16	Yes		24	$46,000	$1,104,000	$724,320	Yes
West of Leisure Town Road— Fallbrook Avenue to Arbor Oaks Drive	6	Yes	13	4	$44,000	$176,000	$185,787	No
	8	Yes		4	$44,000	$176,000	$247,716	No
	10	Yes		7	$46,000	$322,000	$309,645	Yes
	12	Yes		7	$48,000	$336,000	$371,574	No
	14	Yes		7	$48,000	$336,000	$433,503	No
	16	Yes		7	$48,000	$336,000	$495,432	No
East of Leisure Town Road— Poplar Drive to Horse Creek	6	Yes	49	11	$54,000	$594,000	$283,338	Yes
	8	Yes		11	$54,000	$594,000	$377,784	Yes
	10	Yes		19	$56,000	$1,064,000	$472,230	Yes
	12	Yes		26	$58,000	$1,508,000	$566,676	Yes
	14	Yes		26	$58,000	$1,508,000	$661,122	Yes
	16	Yes		26	$58,000	$1,508,000	$755,568	Yes

Note:

a. Cost in 2007 dollars.

b. Based on Caltrans guidance, no modification to the reasonable allowance is required as the barrier costs for each alternative would be less than 50 percent of the construction cost without abatement; see Appendix B in the Noise Study.

c. Cost prediction based on $45 per square foot.

- **West of Leisure Town Road—Kingswood Avenue to Fallbrook Avenue:** This barrier would be constructed at the edge of the property line adjacent to southbound Leisure Town Road. The barrier would extend from Kingswood Avenue to Fallbrook Avenue. Vacaville has committed to construct concrete masonry unit walls along this stretch of roadway; with heights of 6 feet and 8 feet being proposed. However, as of publication of this document, the exact height of the wall the City has committed to construct is unknown. To achieve a 5 dBA reduction a wall of at least 6 feet would be needed. Construction of a 6- or 8-foot wall would achieve a 5 dBA reduction at 16 of the 37 impacted residences. If the total cost of the wall at this location is less than the total cost allowance, then the wall would likely be incorporated into the project. The total cost allowance for the 6-foot wall, calculated in accordance with the Department's *Protocol*, is $672,000. The current estimated cost of the wall at a height of 6 feet is about $271,620. The total cost allowance for a 8-foot wall, calculated in accordance with the Department's *Protocol*, is also $672,000. The current estimated cost of the wall at a height of 8 feet is about $362,160.

- **West of Leisure Town Road—Fallbrook Avenue to Arbor Oaks Drive:** This barrier would be constructed at the edge of the property line adjacent to southbound Leisure Town Road. The barrier would extend from Fallbrook Avenue to Arbor Oaks Drive, and north of Arbor Oaks Drive along the property line. Vacaville has committed to construct concrete masonry unit walls along this stretch of roadway; with heights of 6 feet and 8 feet being proposed. However, as of publication of this document, the exact height of the wall the City has committed to construct is unknown. To achieve a 5 dBA reduction a wall of at least 6 feet would be needed. Construction of a 6- or 8-foot wall would achieve a 5 dBA reduction at 4 of the 13 impacted residences. If the total cost of the wall at this location is less than the total cost allowance, then the wall would likely be incorporated into the project. The total cost allowance for the 6- or 8-foot wall, calculated in accordance with the Department's *Protocol*, is $176,000. The current estimated cost of the 6-foot wall is $185,787; the estimated cost the 8-foot wall is $247,716.

- **East of Leisure Town Road—Poplar Drive to Horse Creek:** This barrier would be constructed at the edge of the property line adjacent to northbound Leisure Town Road. The barrier would extend from Poplar Drive to Horse Creek. Vacaville has committed to construct concrete masonry unit walls along this stretch of roadway; with a height of 8 feet being proposed. However, as of publication of this document, the exact height of the wall the City has committed to construct is unknown. To achieve a 5 dBA reduction a wall of at least 6 feet would be needed. Construction of a 6- or 8-foot wall would achieve a 5 dBA reduction at 11 of the 49 impacted residences. If the total cost of the wall at this location is less than the total cost allowance, then the wall would likely be incorporated into the project. The total cost allowance for the 6- or 8-foot wall, calculated in accordance with the Department's *Protocol*, is $594,000. The current estimated cost of the 6-foot wall is $283,338; the estimated cost of the 8-foot wall is $377,784.

Abatement Measures for Alternative E

Construction of new noise barriers under Alternative E was considered at the following five locations where there are currently no noise barriers. Noise barriers between 6 and 16 feet were considered for the following locations, and cost allowance projected for these barriers is shown below in Table 3.14-10. The following is a description of each preliminary noise barrier configuration considered:

- **West of Peabody Road—Alamo Drive to north of Southwood Drive:** This barrier would be a new barrier constructed at the edge of the property line adjacent to southbound Peabody Road. The barrier would extend from the existing soundwall to the area north of Southwood Drive. To achieve a 5 dBA reduction a wall of at least 6 feet would be needed. Construction of a 6-foot wall would achieve a 5 dBA reduction at 6 of the 19 impacted residences. If the total cost of the wall at this location is less than the total cost allowance, then the wall would likely be incorporated into the project. The total cost allowance for the 6-foot wall, calculated in accordance with the Department's *Protocol*, is $312,000. The current estimated cost of the wall is $323,676.

- **East of Peabody Road—Southwood Drive to Old Alamo Creek:** This barrier would be a new barrier constructed at the edge of the property line adjacent to northbound Peabody Road. The barrier would extend from Southwood Drive to the end of the subdivision south of Old Alamo Creek. To achieve a 5 dBA reduction a wall of at least 6 feet would be needed. Construction of a 6-foot wall would achieve a 5 dBA reduction at 14 of the 27 impacted residences. If the total cost of the wall at this location is less than the total cost allowance, then the wall would likely be incorporated into the project. The total cost allowance for the 6-foot wall, calculated in accordance with the Department's *Protocol*, is $728,000. The current estimated cost of the wall is $281,043.

- **East of Peabody Road—Beelard Drive to first subdivision entrance:** This new barrier would be constructed at the edge of the property line adjacent to northbound Peabody Road. The barrier would extend from Beelard Drive to the first entrance in the subdivision. No other sound barriers are proposed at this location, as gaps in the noise barrier for site access issues would make further extension of the barrier to the north infeasible. To achieve a 5 dBA reduction a wall of at least 6 feet would be needed. Construction of a 6-foot wall would achieve a 5 dBA reduction at 2 of the 16 impacted residences. If the total cost of the wall at this location is less than the total cost allowance, then the wall would likely be incorporated into the project. The total cost allowance for the 6-foot wall, calculated in accordance with the Department's *Protocol*, is $104,000. The current estimated cost of the wall is $56,079.

Table 3.14-10
Summary of Jepson Parkway Project Soundwall Feasibility and Reasonableness Allowances under Alternative E

Noise Barrier	Height (feet)	Provides 5 dB of Noise Reduction?	Impacted Residences	Benefited Residences	Reasonable Allowance per Residence[a]	Total Reasonable Allowance[a, b]	Projected Cost of Construction[c]	Reasonable and Feasible?
West of Peabody Road— Alamo Drive to north of Southwood Drive	6	Yes	19	6	$52,000	$312,000	$323,676	No
	8	Yes		6	$54,000	$324,000	$431,568	No
	10	Yes		6	$56,000	$336,000	$539,460	No
	12	Yes		9	$56,000	$504,000	$647,352	No
	14	Yes		9	$56,000	$504,000	$755,244	No
	16	Yes		9	$56,000	$504,000	$863,136	No
East of Peabody Road— Southwood Drive to Old Alamo Creek	6	Yes	27	14	$52,000	$728,000	$281,043	Yes
	8	Yes		14	$52,000	$728,000	$374,724	Yes
	10	Yes		17	$54,000	$918,000	$468,405	Yes
	12	Yes		17	$56,000	$952,000	$562,086	Yes
	14	Yes		17	$56,000	$952,000	$655,767	Yes
	16	Yes		17	$56,000	$952,000	$749,448	Yes
East of Peabody Road— Beelard Drive to first subdivision entrance	6	Yes	16	2	$52,000	$104,000	$56,079	Yes
	8	Yes		2	$54,000	$108,000	$74,772	Yes
	10	Yes		2	$56,000	$112,000	$93,465	Yes
	12	Yes		8	$56,000	$448,000	$112,158	Yes
	14	Yes		8	$56,000	$448,000	$130,851	Yes
	16	Yes		8	$56,000	$448,000	$149,544	Yes
West of Peabody Road— Beelard Drive to single-family/ multi-family residential boundary	6	Yes	48	23	$52,000	$1,196,000	$572,103	Yes
	8	Yes		25	$52,000	$1,300,000	$762,804	Yes
	10	Yes		40	$54,000	$2,160,000	$953,505	Yes
	12	Yes		40	$56,000	$2,240,000	$1,144,206	Yes
	14	Yes		40	$56,000	$2,240,000	$1,334,907	Yes
	16	Yes		44	$56,000	$2,464,000	$1,525,608	Yes
East of Peabody Road—	6	Yes	37	16	$52,000	$832,000	$235,197	Yes

Table 3.14-10
Summary of Jepson Parkway Project Soundwall Feasibility and Reasonableness Allowances under Alternative E

Noise Barrier	Height (feet)	Provides 5 dB of Noise Reduction?	Impacted Residences	Benefited Residences	Reasonable Allowance per Residence[a]	Total Reasonable Allowance[a, b]	Projected Cost of Construction[c]	Reasonable and Feasible?
Marshall Road to Berryessa Drive	8	Yes		16	$54,000	$864,000	$313,596	Yes
	10	Yes		16	$56,000	$896,000	$391,995	Yes
	12	Yes		16	$56,000	$896,000	$470,394	Yes
	14	Yes		24	$56,000	$1,344,000	$548,793	Yes
	16	Yes		24	$56,000	$1,344,000	$627,192	Yes

Notes:

a. Cost in 2007 dollars.

b. Based on Caltrans guidance, no modification to the reasonable allowance is required as the barrier costs for each alternative would be less than 50 percent of the construction cost without abatement; see Appendix B in the Noise Study.

c. Cost prediction based on $45 per square foot.

- **West of Peabody Road—Beelard Drive to single-family/multi-family residential boundary:** This barrier would be a new barrier constructed at the edge of the property line adjacent to southbound Peabody Road. The barrier would extend from Beelard Drive to the area where residential land uses turn from single-family to multi-family. To achieve a 5 dBA reduction a wall of at least 6 feet would be needed. Construction of a 6-foot wall would achieve a 5 dBA reduction at 23 of the 48 impacted residences. If the total cost of the wall at this location is less than the total cost allowance, then the wall would likely be incorporated into the project. The total cost allowance for the 6-foot wall, calculated in accordance with the Department's *Protocol*, is $1,196,000. The current estimated cost of the wall is $572,103.

- **East of Peabody Road—Marshall Road to Berryessa Drive:** This barrier would be a new barrier constructed at the edge of the property line adjacent to northbound Peabody Road. The barrier would extend from Marshall Road to the Berryessa Drive, and from Berryessa Drive to the open lot north of Berryessa Drive. To achieve a 5 dBA reduction a wall of at least 16 feet would be needed. Construction of a 6-foot wall would achieve a 5 dBA reduction at 16 of the 37 impacted residences. If the total cost of the wall at this location is less than the total cost allowance, then the wall would likely be incorporated into the project. The total cost allowance for the 6-foot wall, calculated in accordance with the Department's *Protocol*, is $832,000. The current estimated cost of the wall is $235,197.

Construction Noise

The following construction noise mitigation measures would apply to all the build alternatives (Alternatives B, C, D, and E):

Mitigation Measure N-1: Employ Noise-Reduction Construction Measures. The construction contractor shall employ noise-reducing construction practices such that noise from construction does not exceed 90 dBA at noise-sensitive uses during daytime hours. Measures that can be used to limit noise may include the following:

- Locating equipment as far as practical from noise-sensitive uses
- Using sound-control devices such as mufflers on equipment
- Turning off idling equipment
- Using equipment that is quieter than standard equipment
- Selecting construction-access routes that affect the fewest number of people
- Using noise-reducing enclosures around noise-generating equipment
- Constructing barriers between noise sources and noise-sensitive land uses or taking advantage of existing barrier features (terrain, structures) to block sound transmission
- Temporarily relocating residents during periods of high construction noise that cannot be reduced effectively by other means

The construction contractor shall prepare a detailed noise control plan based on the construction methods proposed. This plan shall identify specific measures determined to be feasible by STA or the implementing agency that shall be taken to ensure compliance with the noise limits specified above. The noise control plan shall be reviewed and approved by STA before any noise-generating construction activity begins.

Mitigation Measure N-2: Prohibit Nighttime Construction Activities. Consistent with Vacaville Noise Ordinance, STA or the appropriate local agency shall ensure that construction activities are prohibited between 10:00 p.m. and 6:00 a.m. Monday through Saturday or until 8:00 a.m. on Sunday mornings. This stipulation shall be made part of the construction contract.

Mitigation Measure N-3: Disseminate Essential Information to Residences and Implement a Complaint/Response Tracking Program. The construction contractor shall notify residences within 500 feet of the construction areas of the construction schedule in writing before construction. The construction contractor shall designate a noise disturbance coordinator who will be responsible for responding to complaints regarding construction noise. The coordinator shall determine the cause of the complaint and ensure that reasonable measures are implemented to correct the problem. A contact telephone number for the noise disturbance coordinator shall be posted conspicuously on construction site fences and shall be included in the written notification of the construction schedule sent to nearby residents.