

3.2.7 Noise

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.

California Environmental Quality Act

CEQA requires a strictly baseline versus build analysis to assess whether a proposed project will have a noise impact. If a proposed project is determined to have a significant noise impact under CEQA, then CEQA dictates that 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, “California Environmental Quality Act Evaluation,” for further information on noise analysis under CEQA.

National Environmental Policy Act and 23 CFR 772

For highway transportation projects with FHWA (and the Department, as assigned) 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 3.2.7-1 lists the noise abatement criteria for use in the 23 CFR 772 analysis.

Table 3.2.7-1. 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	Not applicable	Undeveloped lands.
E	52 interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Note: dBA $L_{eq}(h)$ = one-hour A-weighted equivalent sound level.

Table 3.2.7-2 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.

Table 3.2.7-2. Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Jet Fly-over at 300m (1000 ft)	110	Rock Band
Gas Lawn Mower at 1 m (3 ft)	100	
Diesel Truck at 15 m (50 ft), at 80 km (50 mph)	90	Food Blender at 1 m (3 ft)
Noisy Urban Area, Daytime	80	Garbage Disposal at 1 m (3 ft)
Gas Lawn Mower, 30 m (100 ft) Commercial Area	70	Vacuum Cleaner at 3 m (10 ft) Normal Speech at 1 m (3 ft)
Heavy Traffic at 90 m (300 ft)	60	Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	30	Library
Quiet Rural Nighttime	20	Bedroom at Night, Concert Hall (Background)
	10	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

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

If it is determined that the project would 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 likely would be incorporated into the project.

The Department's *Traffic Noise Analysis Protocol* sets forth the criteria for determining when an abatement measure is reasonable and feasible. The feasibility of noise abatement is basically an engineering concern. A minimum 5 dB reduction in the future noise level must be achieved for an abatement measure to be considered feasible from an acoustical perspective. Other considerations affecting feasibility of noise abatement include topography, access requirements, other noise sources and safety considerations. The reasonableness determination is basically a cost-benefit analysis. 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.

Addition of Decibels

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

Human Response to Changes in Noise Levels

As discussed above, doubling sound energy results in a 3-dB increase in sound level. However, subjective perception of a doubling of loudness may be different than what is measured. In noisy environments, changes in noise of 1 to 2 dB are generally not detectable. However, it is widely accepted that the normal human ear begins to perceive a sound level increase of 3 dB in typical noisy environments. A 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness. A 3-dB increase is considered a perceptible increase in noise level.

Affected Environment

The *Noise Study Technical Report for the Interstate 80/Interstate 680/State Route 12 Interchange Project* (Noise Study) was prepared in 2010. The technical report discusses potential noise impacts and related noise abatement measures associated with the construction and operation of mainline and interchange improvements on I-80, I-680, and SR 12 and the construction and operation of a truck scale facility on I-80 in Solano County. The report was prepared to comply with 23 CFR 772, "Procedures for Abatement of Highway Traffic Noise," and the Department's noise analysis policies as described in the Traffic Noise Analysis Protocol.

The project area consists of a mix of residential, commercial, and industrial land uses (Activity Categories B and C). For the purposes of this analysis, land uses in the project area are grouped into a series of lettered regions as described below. Figures 3.2.7-1 through 3.2.7-16 in Volume 2 of this document identify the locations of these lettered regions. Figures 3.2.7-1 through 3.2.7-8 show the project area under Alternative B (and the fundable first phase). Figures 3.2.7-9 through 3.2.7-16 show the project area under Alternative C (and the fundable first phase).

Area A: Area A is located on the west side of I-680, north of Gold Hill Road, and is a dense single-family residential neighborhood (Activity Category B) adjacent to Lopes Road, extending north to Silver Creek Road. A sound barrier with a nominal height of six feet is located between I-680 and residences in Area A (refer to Volume 2, Figures 3.2.7-4 and 3.2.7-12).

Area A1: Area A1 is located on the west side of I-680, adjacent to Lopes Road and south of Gold Hill Road. This is a neighborhood densely populated with single-family residences (Activity Category B). A sound barrier with a nominal height of six feet is located between I-680 and residences in Area A1 (refer to Volume 2, Figures 3.2.7-4 and 3.2.7-12).

Area B: Area B is located on the west side of I-680, between Silver Creek Road and Rolling Hills Park. This area consists of residential townhouse units (Activity Category B) surrounded by a sound barrier with a nominal height of six feet (refer to Volume 2, Figures 3.2.7-4 and 3.2.7-12). This area also includes a walking trail that leads into Rolling Hills Park (Activity Category B).

Area C: Area C is located on the west side of I-680, north of Rolling Hills Park, extending along Lopes Road north to Red Top Road. This is a neighborhood densely populated with single-family residences (Activity Category B). Sound barriers with a nominal height of six feet are located between I-80 and residential receivers in this area (refer to Volume 2, Figures 3.2.7-4 and 3.2.7-12).

Area D: Area D is located on the west side of I-680, north of Cordelia Road. This area consists of two single-family residences on small lots adjacent to Lopes Road (Activity Category B), in the northwest quadrant of the Cordelia Road/Lopes Road intersection; and commercial land uses (Activity Category C) that do not include areas of frequent human use. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-3 and 3.2.7-11).

Area E: Area E is located on the east side of I-680 on both sides of Cordelia Road. This area consists of scattered single-family homes (Activity Category B), and commercial buildings (Activity Category C) that do not include areas of frequent human use. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-3 and 3.2.7-11).

Area F: Area F is located north of Business Center Drive, which will connect to the North Connector in the future under both Alternatives B and C. A single-family residential subdivision (Activity Category B) is located in this area. The area consists mostly of retail and commercial buildings (Activity Category C) that do not include areas of frequent human use. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-1 and 3.2.7-9).

Area G: Area G is located on the south side of SR 12E east of I-80. This area consists of the baseball diamond and park area adjacent to Busch Drive and west of Chadbourne Road (Activity Category B). The area consists mostly of retail and commercial buildings (Activity Category C) that do not include areas of frequent human use. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-7 and 3.2.7-15).

Area H: Area H is located on the north side of SR 12E east of I-80. This area is a single-family residential neighborhood (Activity Category B) that extends from east of Abernathy Road to

Beck Avenue. Two sound barriers in this area extend along SR 12; one extends along Marquette Way and has a nominal height of eight feet, and the other extends along Burgundy Way and has a nominal height of ten feet (refer to Volume 2, Figures 3.2.7-7 and 3.2.7-15).

Area I: Area I is located on the north side of SR 12E and consists of single-family residences (Activity Category B) along Diamond Way and Diamond Court. A sound barrier with a nominal height of eight feet is located between SR 12 and the residential area (refer to Volume 2, Figures 3.2.7-7 and 3.2.7-15).

Area J: Area J is located on the north side of SR 12E and consists of single-family residences (Activity Category B) along Ontario Street and Ontario Court. A sound barrier with a nominal height of eight feet is located between SR 12 and the residential area (refer to Volume 2, Figures 3.2.7-8 and 3.2.7-16).

Area K: Area K is located on the north side of SR 12E and consists of single-family residences (Activity Category B) and the Fairfield Vista apartment buildings along James Street and west of Pennsylvania Avenue. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-8 and 3.2.7-16).

Area L: Area L is located on the north side of SR 12E and consists of single-family residences and apartments (Activity Category B) along Illinois Street and Ohio Street. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-8 and 3.2.7-16).

Area M: Area M is located on the south side of SR 12E and consists of single-family residences and apartments (Activity Category B) and commercial buildings with no areas of outdoor frequent human use (Activity Category C) along Sacramento Street and Solano Street. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-8 and 3.2.7-16).

Area N: Area N is located along Chadbourne Road on the north side of I-80 and consists of scattered single-family residences (Activity Category B) and commercial buildings with no areas of outdoor frequent human use (Activity Category C). There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-7 and 3.2.7-15).

Area O: Area O is located on the south side of I-80 and consists of scattered single-family residences (Activity Category B) and commercial buildings with no areas of outdoor frequent human use (Activity Category C) near Hale Ranch Road. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-6 and 3.2.7-14).

Area P: Area P is located on the south side of I-80 and consists of scattered single-family residences (Activity Category B) and commercial buildings with no areas of outdoor frequent human use (Activity Category C) near Cordelia Road. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-6 and 3.2.7-14).

Area Q: Area Q is located in an area on the north side of I-80 bound by Dan Wilson Creek and Suisun Creek. This area is planned for mixed commercial and residential development (Activity Categories B and C) under the Fairfield Corporate Commons project (City of Fairfield 2005). Locations of residential use within the development are based on the configuration studied in the

Fairfield Corporate Commons Draft EIR. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-5, 3.2.7-6, 3.2.7-13, and 3.2.7-14).

Area R: Area R is located in the southeastern quadrant of the I-80/Pittman Road interchange. This area consists of hotels with outdoor swimming pools (Activity Category B), a family outdoor recreation area, and commercial use (Activity Category C). There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-5 and 3.2.7-13).

Environmental Consequences

Noise Monitoring

The existing noise environment in the project area was characterized by short- and long-term noise monitoring. Short-term noise monitoring was conducted on Tuesday, October 9, and Wednesday, October 10, 2007. Short-term noise monitoring was conducted over 15-minute intervals at or near Activity Category B land uses within the project area. The short-term measurement positions are identified in Figures 3.2.7-1 through 3.2.7-16 in Volume 2. Table 3.2.7-3 summarizes the results of the short-term noise monitoring conducted in the project area.

Table 3.2.7-3. Summary of Short-Term Noise Monitoring

Measurement Location	Description	Area	Start Time	Duration (min.)	Existing Wall Height	Measured L_{eq}
ST-1	Ramsey Road, End of Smith Lane	E	4:20 p.m.	15	N/A	70.9
ST-2	First-row residence on Bridgeport Avenue	E	4:20 p.m.	15	N/A	62.8
ST-3	Second-row residence on Bridgeport Avenue	E	4:20 p.m.	15	N/A	63.1
ST-4	First-row residence on Silverado Drive	C	3:29 p.m.	15	6 feet	58.9
ST-5	Rolling Hills Park	B	3:29 p.m.	15	N/A	59.1
ST-6A	Trail, Rolling Hills Park	B	11:57 a.m.	15	N/A	63.9
ST-6B	Trail, Rolling Hills Park	B	3:29 p.m.	15	N/A	64.8
ST-7	First-row residence on Ridgecrest Court	A	11:57 a.m.	15	6 feet	56.2
ST-8	Second-row residence on Ridgecrest Court	A	11:57 a.m.	15	6 feet	47.2
ST-9	First-row residence on Northwood Drive	A	1:02 p.m.	15	6 feet	50.7
ST-10	Second-row residence on Northwood Drive	A	1:02 p.m.	15	6 feet	48.0
ST-11	Trail, Northwood Drive	A	1:02 p.m.	15	6 feet	68.3
ST-12	Fairfield Vista Apartments, Pennsylvania Avenue	K	12:32 p.m.	15	N/A	52.5
ST-13	First-row residence, James Street	K	12:32 p.m.	15	N/A	48.2
ST-14	First-row residence, James Street	K	12:32 p.m.	15	N/A	48.9
ST-15	First-row residence, Ontario Court	J	3:56 p.m.	15	8 feet	59.5
ST-16	First-row residence, Burgundy Way	H	2:52 p.m.	15	8 feet	54.2
ST-17	First-row residence, Burgundy Way	H	2:52 p.m.	15	8 feet	54.6
ST-18	First-row residence, Marquette Way	H	3:56 p.m.	15	8 feet	59.6
ST-19	First-row residence, Marquette Way	H	3:56 p.m.	15	8 feet	59.0
I-80-ST-1	Cordelia Road	I-80	1:00 p.m.	15	N/A	60.4
I-80-ST-6	Hamilton Avenue	I-80	3:00 p.m.	15	N/A	54.2
I-80-ST-13	Lozano Lane	I-80	11:00 a.m.	15	N/A	71.1

Note: N/A = not applicable.

Short-term monitoring was conducted at 23 positions within the project area. The maximum level measured was 71.1 dBA L_{eq} . The median level was 47.2 dBA L_{eq} .

Long-term monitoring position LT-1 was conducted at one position, next to Suisun Creek on the south side of I-80, approximately 200 feet from the edge of pavement (shown in Figures 3.2.7-5 and 3.2.7-13). The long-term sound level data was collected over five consecutive 24-hour periods, beginning on Thursday, January 19, 2006, and ending on Wednesday, January 25, 2006. The average loudest-hour sound level measured was 68.4 dBA L_{eq1h} , during the 7 a.m. hour.

Traffic Noise Modeling

A noise impact analysis was conducted for the proposed project. Three-dimensional modeling objects were developed using CAD drawings, aerials, and topographic contours provided by the STA. These objects were digitized into the FHWA Traffic Noise Model Version 2.5 (TNM 2.5). Loudest-hour traffic volumes, classification percentages, and speeds used to model traffic noise under existing and design-year (2035) conditions were provided in the FTOR for the proposed project. Table 3.2.7-4 summarizes the traffic noise modeling results under existing and design-year conditions.

Exposure of Noise Sensitive Land Uses to Increased Traffic Noise

Modeling results in Table 3.2.7-4 indicate that predicted traffic noise levels for the design-year with-project conditions would approach or exceed the NAC of 67 dBA, $L_{eq}(h)$, for Activity Category B land uses within the project area.

Noise impacts resulting from a substantial increase over existing noise levels (12 dB) are not predicted to occur under the proposed project. As such, the increase in noise levels as a result of project operations would not be considered a significant adverse effect. However, because noise levels in the project area would approach or exceed the NAC thresholds, noise abatement must be considered.

Modeling results also indicate that predicted traffic noise levels for the design-year with-project conditions approach or exceed the NAC of 72 dBA, $L_{eq}(h)$, for Activity Category C land uses within the project area. However, none of these Category C areas have exterior frequent human use that would benefit from lowered noise levels. Accordingly, no noise abatement is considered for any Category C uses in the project area.

Under Alternative B, Phase 1, noise impacts are predicted to occur in areas D, E (just south of the I-80/680 interchange), and R (just east of Suisun Valley Road). The affected units include 13 residences, an outdoor swimming pool (at the Days Inn) and an outdoor recreation area (Scandia Family Center). Under Alternative B, 28 residences along SR 12 and I-80 would be affected in addition to the noise impacts under Alternative B, Phase 1, resulting in a total of 49 affected units (Table 3.2.7-5).

Under Alternative C, Phase 1, one residence adjacent to I-680 would be exposed to high noise levels, resulting in a total of one unit affected (refer to Table 3.2.7-6). Under Alternative C, residences along I-80 and SR 12 are included in the project area, resulting in a total of 37 affected units, as shown in Table 3.2.7-6. The units affected include 29 residences, an outdoor swimming pool (at the Days Inn) and an outdoor recreation area (Scandia Family Center).

As indicated in Table 3.2.7-4, design year with-project traffic noise levels are predicted to be more than 3 dB greater than design year no-project traffic noise levels. This increase is more than the threshold of a perceptible change (3 dB).

Under Alternative B, noise levels would increase at Venus Drive (Area F), Busch Drive (Area G), Marquette Way (Area H) and Burgundy Way (Area H). Noise levels would exceed the NAC at the Marquette Way. Under Alternative B, Phase 1, noise levels would increase at Burgundy Way (Area H) only, and would not approach or exceed the NAC. Under Alternative C, noise levels would increase at James Street (Area K), Sacramento Street (Area M), and Marquette Way (Area H), but would only approach or exceed the NAC at Marquette Way. No exposure of sensitive land uses to traffic noise is expected to occur under Alternative C, Phase 1. Under the No-Build Alternative, noise levels associated with traffic would increase in the future as traffic congestion associated with growth increases (Table 2.3.7-4).

None of the receptors within the project boundaries would be exposed to a substantial increase over existing noise levels under any of the project alternatives. Therefore, no adverse effects related to increased traffic noise are expected.

Table 3.2.7-4. Traffic Noise Impact Evaluation, I-80, I-680 and SR 12

Position	Location	Area	Existing Traffic Noise Level, dBA, L _{eq} (h)	Design-Year No-Project Traffic Noise Level, dBA, L _{eq} (h)	Design-Year With Project, Alternative B Phase 1			Design-Year With Project, Alternative B Buildout			Design-Year With Project, Alternative C Phase 1			Design-Year With Project, Alternative C Buildout			Traffic Noise Impact ^a
					Noise Level, dBA, L _{eq} (h)	Increase re Existing, dB	Increase re No-Project, dB	Noise Level, dBA, L _{eq} (h)	Increase re Existing, dB	Increase re No-Project, dB	Noise Level, dBA, L _{eq} (h)	Increase re Existing, dB	Increase re No-Project, dB	Noise Level, dBA, L _{eq} (h)	Increase re Existing, dB	Increase re No-Project, dB	
A06	Birkdale Circle	A	61	63	64	+3	+1	64	+3	+1	64	+3	+1	64	+3	+1	-
A11	Stoneridge Circle	A	62	64	65	+3	+1	65	+3	+1	65	+3	+1	65	+3	+1	-
A13	Stoneridge Circle	A	62	64	65	+3	+1	65	+3	+1	65	+3	+1	65	+3	+1	-
B01	Smith Lane	B	61	63	64	+3	+1	64	+3	+1	64	+3	+1	64	+3	+1	-
B04	Rolling Hills Park	B	67	68	69	+2	+1	69	+2	+1	69	+2	+1	69	+2	+1	A/E All alts
C01	Silverado Drive	C	61	63	63	+2	0	64	+3	+1	63	+2	0	64	+3	+1	-
C04	Silverado Drive	C	60	62	63	+3	+1	63	+3	+1	63	+3	+1	63	+3	+1	-
C05	Silverado Drive	C	60	62	62	+2	0	63	+3	+1	62	+2	0	63	+3	+1	-
D01	Lopes Road	D	70	71	70	0	-1	71	+1	0	n/a	n/a	n/a	n/a	n/a	n/a	A/E, Alt. B(ph1) B
E01	Bridgeport Avenue	E	68	70	70	+2	0	70	+2	0	n/a	n/a	n/a	n/a	n/a	n/a	A/E, Alt. B(ph1) B
E05	Cordelia Road	E	67	69	68	+1	-1	69	+2	0	n/a	n/a	n/a	n/a	n/a	n/a	A/E, Alt. B(ph1) B
E10	Ritchie Road	E	63	63	63	0	0	63	0	0	n/a	n/a	n/a	n/a	n/a	n/a	-
E11	Ramsey Road	E	66	68	69	+3	+1	69	+3	+1	n/a	n/a	n/a	n/a	n/a	n/a	A/E, Alt. B(ph1) B
E12	Ramsey Road	E	73	75	74	+1	-1	74	+1	-1	74	+1	-1	74	+1	-1	A/E All alts
F01	Venus Drive	F	53	55	57	+4	+2	59	+6	+4	56	+3	+1	57	+4	+2	-
G01	Busch Drive Baseball Diamond	G	60	62	n/a	n/a	n/a	65	+5	+3	n/a	n/a	n/a	64	+4	+2	-
H01	Marquette Way	H	64	66	n/a	n/a	n/a	68	+4	+2	n/a	n/a	n/a	68	+4	+2	A/E, Alt. B C
H06	Marquette Way	H	64	66	n/a	n/a	n/a	69	+5	+3	n/a	n/a	n/a	69	+5	+3	A/E, Alt. B C
H09	Marquette Way	H	62	64	n/a	n/a	n/a	68	+6	+4	n/a	n/a	n/a	68	+6	+4	A/E, Alt. B C
H11	Marquette Way	H	61	63	n/a	n/a	n/a	66	+5	+3	n/a	n/a	n/a	66	+5	+3	A/E, Alt. B C
H12	Marquette Way	H	59	61	n/a	n/a	n/a	62	+3	+1	n/a	n/a	n/a	62	+3	+1	-
H21	Burgundy Way	H	59	61	64	+5	+3	64	+5	+3	n/a	n/a	n/a	63	+4	+2	-
I01	Diamond Way	I	59	61	59	0	-2	59	0	-2	n/a	n/a	n/a	60	+1	-1	-
I11	Diamond Way	I	59	61	62	+3	+1	62	+3	+1	n/a	n/a	n/a	62	+3	+1	-
J01	Ontario Street	J	59	61	61	+2	0	61	+2	0	n/a	n/a	n/a	63	+4	+2	-
K01	James Street	K	58	61	n/a	n/a	n/a	58	0	-3	n/a	n/a	n/a	62	+4	+1	-
K04	James Street	K	62	62	n/a	n/a	n/a	64	+2	+2	n/a	n/a	n/a	65	+3	+3	-
L04	Illinois Street	L	59	61	n/a	n/a	n/a	62	+3	+1	n/a	n/a	n/a	63	+4	+2	-
L06	Ohio Street	L	61	63	n/a	n/a	n/a	65	+4	+2	n/a	n/a	n/a	64	+3	+1	-
M01	Sacramento Street	M	51	53	n/a	n/a	n/a	54	+3	+1	n/a	n/a	n/a	59	+8	+6	-
N01	Chadbourne Road	N	63	64	n/a	n/a	n/a	65	+2	+1	n/a	n/a	n/a	65	+2	+1	-
O01	Hale Ranch Road	O	70	72	n/a	n/a	n/a	73	+3	+1	n/a	n/a	n/a	73	+3	+1	A/E All alts
P01	Cordelia Road	P	65	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	- ^b
Q01	Fairfield Commons (future)	Q	54	55	n/a	n/a	n/a	56	+2	+1	n/a	n/a	n/a	56	+2	+1	-
Q03	Fairfield Commons (future)	Q	55	56	n/a	n/a	n/a	57	+2	+1	n/a	n/a	n/a	57	+2	+1	-
Q04	end of Russell Road	Q	71	72	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	n/a ^b	- ^b
R01	Days Inn Pool (R1)	R	74	75	76	+2	+1	76	+2	+1	n/a	n/a	n/a	76	+2	+1	A/E All alts
R02	Scandia Rec Center (R2)	R	78	79	80	+2	+1	80	+2	+1	n/a	n/a	n/a	80	+2	+1	A/E All alts

^a A/E indicates that traffic noise levels approach or exceed the NAC for the corresponding Activity Categories in the area.

^b This property is taken under future project alternatives

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Table 3.2.7-5. Counts of Affected Residences, Alternative B, and Alternative B, Phase 1

Area	Primary Source of Traffic Noise	Alternative B, Phase 1		Alternative B	
		Approach or Exceed NAC	Substantial Increase over Existing Noise Levels	Approach or Exceed NAC	Substantial Increase over Existing Noise Levels
A	I-680	0	0	0	0
B	I-680	0	0	0	0
C	I-680	0	0	0	0
D	I-680	2	0	2	0
E	I-680	11	0	11	0
F	North Connector	0	0	0	0
G	SR 12	N/A	N/A	0	0
H	SR 12	0	0	25	0
I	SR 12	0	0	0	0
J	SR 12	0	0	0	0
K	SR 12	N/A	N/A	0	0
L	SR 12	N/A	N/A	0	0
M	SR 12	N/A	N/A	0	0
N	I-80	N/A	N/A	0	0
O	I-80	N/A	N/A	3	0
P	I-80	N/A	N/A	0	0
Q	I-80	0	0	0	0
R	I-80	8 ^a	0	8 ^a	0
Total Units Affected		21	0	49	0

Note: N/A = not applicable.

^a Impact count for non-residential outdoor use is based on one unit per 100 linear feet of highway frontage.

Table 3.2.7-6. Counts of Affected Residences, Alternative C and Alternative C, Phase 1

Area	Primary Source of Traffic Noise	Alternative C, Phase 1		Alternative C	
		Approach or Exceed NAC	Substantial Increase over Existing Noise Levels	Approach or Exceed NAC	Substantial Increase over Existing Noise Levels
A	I-680	0	0	0	0
B	I-680	0	0	0	0
C	I-680	0	0	0	0
D	I-680	N/A	N/A	N/A	N/A
E	I-680	1	0	1	0
F	North Connector	0	0	0	0
G	SR 12	N/A	N/A	0	0
H	SR 12	N/A	N/A	25	0
I	SR 12	N/A	N/A	0	0
J	SR 12	N/A	N/A	0	0
K	SR 12	N/A	N/A	0	0
L	SR 12	N/A	N/A	0	0
M	SR 12	N/A	N/A	0	0
N	I-80	N/A	N/A	0	0
O	I-80	N/A	N/A	3	0
P	I-80	N/A	N/A	0	0
Q	I-80	N/A	N/A	0	0
R	I-80	N/A	N/A	8 ^a	0
Total Units Affected		1	0	37	0

Note: N/A = not applicable.

^a Impact count for nonresidential outdoor use is based on one unit per 100 linear foot of highway frontage.

Exposure of Noise-Sensitive Land Uses to Construction Noise

Construction noise is regulated by the Department’s Standard Specifications Section 14-8, “Sound Control Requirements,” which states that noise levels generated during construction will comply with applicable local, state, and federal regulations and that all equipment will be fitted with adequate mufflers according to the manufacturers’ specifications.

Table 3.2.7-7 summarizes noise levels produced by construction equipment that is commonly used on roadway construction projects. Construction equipment is expected to generate noise levels ranging from 70 to 90 dB at a distance of 50 feet, and noise produced by construction equipment would be reduced over distance at a rate of about 6 dB per doubling of distance.

Table 3.2.7-7. Construction Equipment Noise

Equipment	Maximum Noise Level (dBA at 50 feet)
Scrapers	89
Bulldozers	85
Heavy trucks	88
Backhoe	80
Pneumatic tools	85
Concrete pump	82

Source: Federal Transit Administration 2006.

No adverse noise effects from construction are anticipated, because construction would be conducted in accordance with the Department’s Standard Specifications Section 14-8 and applicable local noise standards. Construction noise would be short-term, intermittent, and masked by local traffic noise. Under the No-Build Alternative, no new noise effects associated with project construction would occur.

Avoidance, Minimization, and/or Mitigation

Noise Abatement Evaluation under 23 CFR 772

None of the receptors within the project boundaries would be exposed to a substantial increase (greater than 12 dB) in future predicted noise levels under any of the project alternatives. Consequently, no adverse effects under NEPA were identified. However, several receptors within the project area would experience high noise levels that approach or exceed the NAC thresholds. Under the requirements of 23 CFR 772 noise abatement in the form of noise barriers was considered for the following areas that are predicted to experience high noise levels:

- Area E (All Project Alternatives).
- Area H (Project Alternatives B and C).
- Area O (Project Alternatives B and C).
- Area R (Project Alternatives B and C, Alternative B, Phase 1).

Potential noise abatement measures include the following:

- Avoiding the impact by using design alternatives, such as altering the horizontal and vertical alignment of the project.
- Constructing noise barriers.
- Acquiring property to serve as a buffer zone.
- Using traffic management measures to regulate types of vehicles and speeds.
- Acoustically insulating public-use or nonprofit institutional structures.

Because of the configuration and location of the proposed project, noise barriers are the only form of noise abatement evaluated in this report. Each noise barrier has been evaluated for feasibility based on achievable noise reduction. For each noise barrier found to be acoustically feasible, reasonable cost allowances were calculated. The Department's 2009 base cost-per-residence allowance is \$31,000. Additional allowance dollars are added to the base allowance based on absolute noise levels, the increase in noise levels resulting from the proposed project, achievable noise reduction, and the date of building construction in the area. Worksheets in Appendix B of the Noise Study summarize the reasonable cost allowance calculations, based on the procedure outlined in the Protocol.

For any noise barrier to be considered reasonable from a cost perspective the estimated cost of the noise barrier should be equal to or less than the total cost allowance calculated for the barrier. The cost calculations of the noise barrier should include all items appropriate and necessary for construction of the barrier, such as traffic control, drainage modification, and retaining walls. The design of noise barriers presented in this report is preliminary only and has been conducted at a level appropriate for environmental review but not for final design of the proposed project.

Preliminary information on the physical location, length, and height of noise barriers is provided in this report. If pertinent parameters change substantially during the final project design, preliminary noise barrier designs may be modified or eliminated from the final project. A final decision on the construction of the noise abatement will be made upon completion of the project design.

Area D (Alternatives B and Alternative B, Phase 1)

The traffic noise modeling results in Table 3.2.7-4 indicate that traffic noise levels at residences in Area D will be in the range of 70–71 dBA- $L_{eq}[h]$. Traffic noise impacts are predicted to occur at two residences in this area under Alternative B. Receivers in Area D lie outside of the project area under Alternative C, so they are not considered for noise abatement under Alternative C.

Noise Barrier D was designed for the edge of southbound I-680, and was analyzed for feasibility to benefit receivers in Area D. Detailed modeling analysis of Barrier D indicates that a barrier with a height of up to 16 feet would provide a maximum noise reduction of less than 5 dB at noise-sensitive receiver locations. Barrier D is therefore not considered to be feasible.

A noise barrier along the western edge of Lopes Road would not be feasible because the affected residences require access to Lopes Road, and an acoustically effective barrier would block driveway access. Therefore, noise barriers are not considered a feasible noise abatement option for Area D.

Area E

Table 3.2.7-4 indicates that traffic noise levels at residences in Area E will be in the range of 63–74 dBA- $L_{eq}[h]$. Traffic noise impacts are predicted to occur at 11 residences in this area.

Noise Barrier E-1 was designed for the northbound edge of I-680, and was analyzed for feasibility to benefit receivers adjacent to Cordelia Road and Bridgeport Avenue. Traffic noise from local roadways such as Cordelia Road contributes significantly to sound levels, decreasing the potential for a noise barrier along I-680 to benefit receivers adjacent to Cordelia Road. Detailed modeling analysis of Barrier E-1 indicates that a barrier with a height of 16 feet would provide a maximum noise reduction of less than 5 dB at noise-sensitive first-row receiver locations. Barrier E-1 is therefore not considered to be feasible.

Construction of noise barriers along local roads such as Cordelia Road would not be feasible because the affected residences require access to the local roads, and an acoustically effective barrier would block those access points.

Noise Barrier E-2 was designed to benefit a single ranch property south of Bridgeport Avenue, and was evaluated for wall heights in the range of 6–16 feet. Barrier E-2 would extend approximately 1,160 linear feet within Caltrans right-of-way between I-680 northbound and Ramsey Road. Detailed modeling analysis of Barrier E-2 indicates that construction of this barrier at a height of ten to 16 feet would provide noise reduction of 5 dB or more at noise-sensitive receiver locations. Barrier E-2 is therefore considered feasible from an acoustical perspective. Barrier E-2 would meet the Department’s line-of-sight requirement at a barrier height of 12 feet. Table 3.2.7-8 summarizes the calculated reasonable allowances for Noise Barrier E-2. Reasonable allowance calculation sheets are provided in Appendix B of the Noise Study. Barrier E-2 is shown in Figure 3.2.7-17.

Table 3.2.7-8. Summary of Reasonableness Determination Data—Barrier E-2, Ramsey Road

Barrier I.D.: E-2, Ramsey Road						
Predicted Sound Level without Barrier						
Design-year noise level, dBA- $L_{eq}[h]$	69					
Design-year noise level minus existing noise level, dB	3					
Design Year with Barrier	Height: 6 feet	Height: 8 feet	Height: 10 feet	Height: 12 feet	Height: 14 feet	Height: 16 feet
Barrier noise reduction, dB	3	4	5	6	6	7
Number of benefited residences	0	0	1	1	1	1
New highway or more than 50% of residences predate 1978	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable allowance per benefited residence	\$45,000	\$45,000	\$45,000	\$47,000	\$47,000	\$47,000
Total reasonable allowance	N/A	N/A	\$45,000	\$47,000	\$47,000	\$47,000

Note: N/A = not applicable.

Noise Barrier E-3 was analyzed for feasibility to benefit a single ranch property east of Red Top Road. Barrier E-3 would extend approximately 750 linear feet within Caltrans right-of-way between I-680 northbound and Ramsey Road. Barrier E-3 was evaluated for wall heights in the range of 6–16 feet, and would meet the Caltrans line-of-sight requirement at a barrier height of 12 feet. Detailed modeling analysis of Barrier E-3 indicates that a barrier with a height of up to 16 feet would provide noise reduction of 5 dB or more at noise-sensitive receiver locations. Barrier E-3 is therefore considered feasible from an acoustical perspective. Table 3.2.7-9 summarizes the calculated reasonable allowances for Barrier E-3. Reasonable allowance calculation sheets are provided in Appendix B of the Noise Study. Barrier E-3 is shown in Figure 3.2.7-17.

Table 3.2.7-9. Summary of Reasonableness Determination Data—Barrier E-3, Ramsey Road

Barrier I.D.: E-3, Ramsey Road						
Predicted Sound Level without Barrier						
Design-year noise level, dBA- $L_{eq}[h]$	74					
Design-year noise level minus existing noise level, dB	1					
Design Year with Barrier	Height: 6 feet	Height: 8 feet	Height: 10 feet	Height: 12 feet	Height: 14 feet	Height: 16 feet
Barrier noise reduction, dB	5	5	6	7	7	7
Number of benefited residences	1	1	1	1	1	1
New highway or more than 50% of residences predate 1978	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable allowance per benefited residence	\$45,000	\$45,000	\$47,000	\$47,000	\$47,000	\$47,000
Total reasonable allowance	\$45,000	\$45,000	\$47,000	\$47,000	\$47,000	\$47,000

Note: N/A = not applicable.

Area H (Project Alternatives B and C)

The traffic noise modeling results in Table 3.2.7-4 indicate traffic noise levels residences in Area H will be in the range of 62–69 dBA- $L_{eq}[h]$. Traffic noise impacts are predicted to occur at 25 residences in this area. There are two existing noise barriers within Area H. The first noise barrier (Barrier H-1) has a nominal height of eight feet and extends along the SR 12E right-of-way parallel to Columbus Drive to the Chadbourne Road exit ramp. All 25 affected receivers are first-row residences located behind Barrier H-1. The second barrier (Barrier H-2) has a nominal height of ten feet and extends along the SR 12E right-of-way from Beck Avenue to the end of Burgundy Way.

Barrier H-1 would extend approximately 2,250 linear feet within SR 12 right-of-way and perpendicular to SR 12 along the existing noise barrier footings on both sides of the neighborhood enclosing Marquette Way (see Figure 3.2.7-18). Detailed modeling analysis of Barrier H-1 indicates that increasing the height of the existing barrier to at least 14 feet would provide a noise reduction of 5 dB or more at first-row residences. Increasing the height of existing Barrier H-1 is therefore considered feasible from an acoustical perspective.

Increasing the height of Barrier H-1 to 14 feet would meet the Department’s line-of-sight requirement. Table 3.2.7-10 summarizes the calculated reasonable allowances for wall heights from ten to 16 feet. Reasonable allowance calculation sheets are provided in Appendix B of the Noise Study. Barrier H-1 is shown in Figure 3.2.7-18 in Volume 2.

Segments of Noise Barrier H-1 lie outside of Caltrans right-of-way, so would need to meet additional requirements before approval for construction. First, all affected property owners would need to approve construction of the segments of the Barrier H-1 which lie outside Caltrans right-of-way. Second, each affected property owner must enter into a contract agreement with Caltrans to specify responsibilities related to construction and maintenance of noise barriers.

Table 3.2.7-10. Summary of Reasonableness Determination Data—Barrier H-1, Marquette Way

Barrier I.D.: H-1, Marquette Way						
Predicted Sound Level without Barrier						
Design-year noise level, dBA- $L_{eq}[h]$	69					
Design-year noise level minus existing noise level, dB	6					
Design Year with Barrier	Height: 6 feet	Height: 8 feet	Height: 10 feet	Height: 12 feet	Height: 14 feet	Height: 16 feet
Barrier noise reduction, dB	0	0	2	4	6	7
Number of benefited residences	0	0	0	0	25	25
New highway or more than 50% of residences predate 1978	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable allowance per benefited residence	\$45,000	\$45,000	\$45,000	\$45,000	\$47,000	\$47,000
Total reasonable allowance	N/A	N/A	N/A	N/A	\$1,175,000	\$1,175,000

Note: N/A = not applicable.

Detailed modeling analysis of Noise Barrier H-2 indicates that increasing the height of the barrier to 16 feet would result in a maximum noise reduction of less than 5 dB at noise-sensitive first-row receiver locations. No receivers would benefit from increasing the height of Barrier H-2. Increasing the height of Barrier H-2 is therefore not considered to be feasible.

Area O (Project Alternatives B and C)

The traffic noise modeling results in Table 3.2.7-4 indicate that traffic noise levels at single-family residences will be up to 73 dBA- $L_{eq}[h]$. Traffic noise impacts are predicted to occur at three residences in this area. No noise barriers are currently located in this area. Barrier O (also Barrier SB4 in the I-80 Eastbound Cordelia Truck Scales Relocation Project) consists of two barriers that would provide shielding for traffic noise from both I-80 and the SR 12E flyover transition ramp. Barrier O would have a total length of approximately 4,800 linear feet within Caltrans right-of-way adjacent to I-80 eastbound to SR 12 transition ramps. Barrier O was evaluated for wall heights in the range of 6–16 feet, and would meet the Caltrans line-of-sight requirement at a barrier height of 12 feet. Detailed modeling analysis of Barrier O indicates that a barrier with a height of up to 16 feet would provide noise reduction of 5 dB or more at noise-sensitive receiver locations. Barrier O is therefore considered feasible from an acoustical perspective.

Table 3.2.7-11 summarizes the calculated reasonable allowances for the two barriers at equal heights. Reasonable allowance calculation sheets are provided in Appendix B of the Noise Study. Barrier O is shown in Figure 3.2.7-19 in Volume 2.

Table 3.2.7-11. Summary of Reasonableness Determination Data—Barrier O, Hale Ranch Road

Barrier I.D.: O (SB4), Hale Ranch Road						
Predicted Sound Level without Barrier						
Design-year noise level, dBA- $L_{eq}[h]$	73					
Design-year noise level minus existing noise level, dB	4					
Design Year with Barrier	Height: 6 feet	Height: 8 feet	Height: 10 feet	Height: 12 feet	Height: 14 feet	Height: 16 feet
Barrier noise reduction, dB	3	4	7	8	9	9
Number of benefited residences	0	0	1	3	3	3
New highway or more than 50% of residences predate 1978	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable allowance per benefited residence	\$47,000	\$47,000	\$49,000	\$49,000	\$51,000	\$51,000
Total reasonable allowance	N/A	N/A	\$49,000	\$147,000	\$153,000	\$153,000

Note: N/A = not applicable.

Area Q—Fairfield Corporate Commons

The Fairfield Corporate Commons project is currently under construction. The project is a mixed-use development that includes office buildings, single- and multi-family residential units, and a hotel. The Fairfield Corporate Commons Draft EIR included a noise study, which assessed noise impacts predicted to result from construction activities and operations from the long-term buildout of the project. The noise analysis was done to determine the project's conformity to local land use compatibility standards. The study determined that potentially significant impacts would occur at exterior areas of frequent human use associated with the planned residential use.

Based on the preliminary configuration of land use studied in the report, mitigation in the form of noise barriers was required to reduce impacts at exterior locations. However, David Feinstein of the City of Fairfield Planning Department confirmed in a September 25, 2009, telephone conversation with ICF Jones & Stokes personnel that residential outdoor use areas would be located behind continuous building structures, which would function as shielding elements from traffic noise on the North Connector and I-80.

The traffic noise modeling results in Table 3.2.7-4 indicate traffic noise levels at planned residential use areas associated with the future Fairfield Corporate Commons project would be up to 57 dBA- $L_{eq}[h]$. No traffic noise impacts are predicted to occur within the Fairfield Corporate Commons project.

In addition, an existing residence in Area Q is expected to be removed due to construction of a truck scales facility on westbound I-80 as part of the project. Therefore, no noise abatement was considered for Area Q.

Area R (Project Alternatives B and C, Alternative B, Phase 1)

The traffic noise modeling results in Table 3.2.7-4 indicate that traffic noise levels at Scandia Family Center and the outdoor pool area of the Days Inn will be up to 80 dBA- $L_{eq}[h]$. Traffic noise impacts are therefore predicted to occur in this area. No noise barriers are currently located in this area. The two-barrier system identified as Barrier R in Figure 3.2.7-20 in Volume 2 (Barrier NR for the I-80 HOV Lanes Project) was evaluated for wall heights in the range of 6–16

feet, and would meet the Caltrans line-of-sight requirement at a barrier height of 12 feet. The Barrier R two-barrier system would have a total length of approximately 1,400 linear feet within eastbound I-80 right-of-way. Detailed modeling analysis of Barrier R indicates that a barrier with a height of up to 16 feet would provide noise reduction of 5 dB or more at noise-sensitive receiver locations. Barrier R is therefore considered feasible from an acoustical perspective.

Table 3.2.7-12 summarizes the calculated reasonable allowances for this wall. Reasonable allowance calculation sheets are provided in Appendix B of the Noise Study.

Table 3.2.7-12. Summary of Reasonableness Determination Data—Barrier R, Pittman Road

Barrier I.D.: R (NR), Pittman Road						
Predicted Sound Level without Barrier						
Design-year noise level, dBA- $L_{eq}[h]$	80					
Design-year noise level minus existing noise level, dB	2					
Design Year with Barrier	Height: 6 feet	Height: 8 feet	Height: 10 feet	Height: 12 feet	Height: 14 feet	Height: 16 feet
Barrier noise reduction, dB	5	6	7	9	10	10
Number of benefited residences	7	7	8	8	8	8
New highway or more than 50% of residences predate 1978	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable allowance per benefited residence	\$49,000	\$51,000	\$51,000	\$53,000	\$53,000	\$53,000
Total reasonable allowance	\$343,000	\$357,000	\$408,000	\$424,000	\$424,000	\$424,000

Note: N/A = not applicable.

Under with-project design-year conditions, receiver R02 (Volume 2, Figure 3.2.7-20) is predicted to be exposed to a noise level of 80 dBA L_{eq} . This location is therefore predicted to be exposed to a severe traffic noise impact as defined in the Protocol. Noise abatement that is not reasonable and feasible as defined in the Protocol may be considered for severe traffic noise impacts on a case-by-case basis. This type of abatement is called extraordinary abatement. Barrier R would provide at least 5 dB of noise reduction and would reduce noise to less than 74 dBA L_{eq} at this location at a height of eight feet (as shown in Appendix C of the Noise Study). In the event that this barrier is not determined to be reasonable and feasible, it may be considered for extraordinary abatement.

Noise Abatement Decision Report

A Noise Abatement Decision Report (NADR) was prepared to include noise abatement construction cost estimates that have been prepared by the project engineer based on site-specific conditions. These cost estimates are then compared to the total reasonableness allowances as shown in Table 3.2.7-13.

Table 3.2.7-13. Summary of Reasonableness Allowances and Cost Estimates for Evaluated Noise Barrier Designs

Height (ft)	Receivers Benefited	Barrier Length (linear feet)	Barrier Area (square feet)	Department Cost Allowance per Residence (\$)	Department Reasonableness Allowance (\$)	Estimated Construction Cost (\$)	Cost-Reasonable?
Barrier H-1							
14	25	2,250	31,500	\$47,000	\$1,175,000	\$1,560,000	No
16	25	2,250	36,000	\$47,000	\$1,175,000	\$1,700,000	No
Barrier E-2							
10	1	1,160	11,600	\$45,000	\$45,000	\$440,000	No
12	1	1,160	13,920	\$47,000	\$47,000	\$500,000	No
14	1	1,160	16,240	\$47,000	\$47,000	\$560,000	No
16	1	1,160	18,560	\$47,000	\$47,000	\$600,000	No
Barrier E-3							
6	1	750	4,500	\$45,000	\$45,000	\$200,000	No
8	1	750	6,000	\$45,000	\$45,000	\$260,000	No
10	1	750	7,500	\$47,000	\$47,000	\$280,000	No
12	1	750	9,000	\$47,000	\$47,000	\$330,000	No
14	1	750	10,500	\$47,000	\$47,000	\$370,000	No
16	1	750	12,000	\$47,000	\$47,000	\$390,000	No
Barrier O							
10	1	4,800	48,000	\$49,000	\$49,000	\$2,530,000	No
12	3	4,800	57,600	\$49,000	\$147,000	\$2,800,000	No
14	3	4,800	67,200	\$51,000	\$153,000	\$3,030,000	No
16	3	4,800	76,800	\$51,000	\$153,000	\$3,250,000	No
Barrier R							
6	7	1,400	8,400	\$49,000	\$343,000	\$500,000	No
8	7	1,400	11,200	\$51,000	\$357,000	\$570,000	No
10	8	1,400	14,000	\$51,000	\$408,000	\$650,000	No
12	8	1,400	16,800	\$53,000	\$424,000	\$730,000	No
14	8	1,400	19,600	\$53,000	\$424,000	\$790,000	No
16	8	1,400	22,400	\$53,000	\$424,000	\$850,000	No

As shown in Table 3.2.7-13, the estimated construction costs exceed the reasonableness allowance in all cases. Accordingly, the barrier designs studied in this analysis are not considered reasonable from a cost perspective. The determination of final reasonableness will be made upon completion of the public input process.

Minimize Construction Noise

The Department's Standard Specification Section 14-8.02 will be implemented to minimize noise effects from construction. In addition, the following measures may be implemented to further minimize noise effects from construction:

- Use of equipment with sound-control devices that are no less effective than those provided on the original equipment.
- Prohibition of the use of any equipment with an unmuffled exhaust.

- Changing the location of stationary construction equipment to maximize the distance to noise sensitive uses.
- Turning off idling equipment.
- Rescheduling construction activity to non-sensitive hours of the day.
- Notifying adjacent residents in advance of construction work.
- Installing acoustic barriers around stationary construction noise sources.