

*United States 101  
Managed Lanes Project*

*NADR*



## **Second Revised Noise Abatement Decision Report**

Based on the United States 101 Managed Lanes Project Noise Study Report  
(Illingworth & Rodkin, Inc., October 2017)

San Mateo County and Santa Clara County, CA

4-SCL-101-50.6/52.55

4-SM-101-0.0/21.85

EA 04-1J560, Project ID #0413000206

**October 2018**



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**October 2018**

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## **List of Abbreviated Terms**

Benefited receptor	A dwelling unit or other equivalent land use expected to receive a noise reduction of at least 5 dBA from the proposed abatement measure
CEQA	California Environmental Quality Act
Date of public knowledge	The date of approval of the project CE, FONSI, or ROD.
CFR	Code of Federal Regulations
CIDH	Cast-in-drilled-hole
dBA	A-weighted sound pressure level
ED	Environmental Document
FHWA	Federal Highway Administration
HOV/express lane	High Occupancy Vehicle/express lane
Leq	Equivalent sound level (energy averaged sound level)
Leq[h]	A-weighted, energy average sound level during a 1-hour period
NSR	Noise study report
NADR	Noise Abatement Decision Report
NAC	Noise abatement criteria
Noise reduction design goal	7 dB of noise reduction at one or more benefited receptors.
PM	Post mile
project	United States 101 Managed Lanes Project
Reasonable allowance	A single dollar value—a reasonable allowance per benefited receptor
US 101	United States 101



# 1. Introduction

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The Noise Abatement Decision Report (NADR) presents the preliminary noise abatement decision as defined in the Caltrans Traffic Noise Analysis Protocol (Protocol). This report has been approved by a California licensed professional civil engineer. The project level noise study report (NSR) (Illingworth & Rodkin, Inc. 2017) prepared for this project is hereby incorporated by reference.

## 1.1. Noise Abatement Assessment Requirements

Title 23, Code of Federal Regulations (CFR), Part 772 of the Federal Highway Administration (FHWA) standards (23 CFR 772) and the Caltrans Traffic Noise Analysis Protocol (Protocol) require that noise abatement be considered for projects that are predicted to result in traffic noise impacts. A traffic noise impact is considered to occur when future predicted design-year noise levels with the project “approach or exceed” Noise Abatement Criteria (NAC) defined in 23 CFR 772 or when the predicted design-year noise levels with the project substantially exceed existing noise levels. A predicted design-year noise level is considered to “approach” the NAC when it is within 1 dB of the NAC. A substantial increase is defined as being a 12-dB increase above existing conditions.

23 CFR 772 requires that noise abatement measures that are reasonable and feasible and are likely to be incorporated into the project be identified before adoption of the final environmental document (ED).

The Protocol establishes a process for assessing the reasonableness and feasibility of noise abatement. Before publication of the draft ED, a *preliminary noise abatement decision* is made. The preliminary noise abatement decision is based on the *feasibility* of evaluated abatement and the *preliminary reasonableness determination*. Noise abatement is considered to be acoustically feasible if it is predicted to provide noise reduction of at least 5 dBA at all impacted receptors. Other nonacoustical factors relating to geometric standards (e.g., sight distances), safety, maintenance, and security can also affect feasibility.

The overall reasonableness of noise abatement is determined by the following three factors:

- the viewpoints of benefited receptors,
- the cost of noise abatement, and
- the noise reduction design goal.

The preliminary reasonableness determination reported in this document is based on the noise reduction design goal and the cost of abatement. The viewpoints of benefited receptors are determined by a survey that is normally conducted during the public review period for the project ED.

Caltrans' noise reduction design goal is that a barrier must be predicted to provide at least 7 dB of noise reduction at one or more benefited receptors. The cost reasonableness of abatement is determined by calculating a cost allowance that is considered to be a reasonable amount of money to spend on abatement. This *reasonable allowance* is then compared to the engineer's cost estimate for the abatement. If the engineer's cost estimate is less than the allowance and the abatement will provide at least 7 dB of noise reduction at one or more benefited receptors, then the preliminary determination is that the abatement is reasonable. If the cost estimate is higher than the allowance or if the design goal cannot be achieved, the preliminary determination is that abatement is not reasonable.

The NADR presents the preliminary noise abatement decision based on acoustical and nonacoustical feasibility factors, the design goal, and the relationship between noise abatement allowances and the engineer's cost estimate. The NADR does not present the final decision regarding noise abatement; rather, it presents key information on abatement to be considered throughout the environmental review process, based on the best available information at the time the draft ED is published. The final overall reasonableness decision will take this information into account, along with the results of the survey of benefited receptors conducted during the environmental review process.

At the end of the public review process for the ED, the final noise abatement decision is made and is indicated in the final ED. The preliminary noise abatement decision will become the final noise abatement decision unless compelling information received during the environmental review process indicates that it should be changed.

## **1.2. Purpose of the Noise Abatement Decision Report**

The purpose of the NADR is to:

- summarize the conclusions of the NSR relating to acoustical feasibility, the design goal, and the reasonable allowances for abatement evaluated,
- present the engineer's cost estimate for evaluated abatement,
- present the engineer's evaluation of nonacoustical feasibility issues,
- present the preliminary noise abatement decision, and

- present preliminary information on secondary effects of abatement (impacts on cultural resources, scenic views, hazardous materials, biology, etc.).

The NADR does not address noise barriers or other noise-reducing treatments required as mitigation for significant adverse environmental effects identified under the California Environmental Quality Act (CEQA).

### **1.3. Project Description**

The California Department of Transportation (Caltrans) in cooperation with the San Mateo County Transportation Authority (SMCTA) and the City/County Association of Governments of San Mateo County (C/CAG) propose to provide continuous managed lanes in the northbound and southbound directions of US 101 in Santa Clara and San Mateo counties from the terminus of the Santa Clara County Express Lane at San Antonio Road (PM SCL 50.6) to north of Interstate 380 (PM SM 21.85), a total of approximately twenty two (22) miles of managed lanes. The project limits include allowance for the installation of new overhead tolling system signage beginning approximately one mile in advance of the start of the managed lanes in each direction of US 101. Figure 1 shows the location of the project improvements.

A high-occupancy vehicle (HOV) lane, also known as the carpool or diamond lane, is a traffic management strategy to promote and encourage ridesharing, thereby alleviating congestion and maximizing the people-carrying capacity of highways. Express lanes are designated lanes that allow single-occupancy vehicles (SOV) the use of available capacity in the HOV lane for a toll. The toll would change dynamically in response to existing congestion levels and available capacity in the HOV lane. HOV lanes and express lanes are both types of managed lanes. A managed lane is an operational practice used to address congestion by controlling traffic movement on the highway (Caltrans 2017).

Four alternatives are being considered for the proposed project:

- Alternative 1 (No-Build) - Under this alternative, the existing express lanes from San Antonio Road in Santa Clara County to Whipple Avenue in San Mateo County would continue with no other lane additions along U.S. 101 from the Whipple Avenue interchange to the I-380 interchange.
- Alternative 2 (HOV Lane Alternative) - This alternative maintains the existing HOV lanes in the southern segment (PM SCL 50.6 to PM SM 6.3) and adds a new HOV lane in each direction from PM SM 6.3 to PM 21.8.

- Alternative 3 (Express Lane Alternative) - This alternative converts the existing HOV lanes (PM SCL 50.6 to PM SM 6.3) and a general purpose lane (PM SM 6.3 to PM SM 21.8) in each direction to express lanes, creating a continuous express lane in each direction from PM SCL 50.6 to PM SM 21.8.
- Alternative 4 (Express Lane Alternative) - This alternative converts the existing HOV lanes (PM SCL 50.6 to PM SM 6.3) to express lanes and adds an additional through lane (PM SM 6.3 to PM SM 21.8) to be used as an express lane.

The No Build Alternative, which offers a basis for comparison with the Build Alternative, assumes no major improvements within the project area other than routine rehabilitation and repair.

The alternatives are described further in depth in the NSR (Illingworth & Rodkin, Inc. 2017).

#### **1.4. Affected Land Uses**

The noise study area encompasses all developed and undeveloped land uses surrounding the project limits, with a focus on noise-sensitive land uses. Noise-sensitive land uses in the vicinity of the project limits consist of the following: residential (Activity Category B), Active sport areas, day care centers, hospitals, medical facilities, parks, playgrounds, recreation areas, schools, trails (Activity Category C), day care centers, hospitals, medical facilities, schools (Activity Category D [Interior]), and hotels, motels, offices, restaurants/bars (Activity Category E).

The NSR considered future land use development projects within approximately 500 feet of U.S. 101 within the project limits, where traffic noise levels from the highway or other improved project roadways could dominate the noise environment. The following projects were considered:

##### South San Francisco

- Costco Business Center
- five-story residential development located at 150 Airport Boulevard
- South San Francisco Caltrain Station Improvement Project
- The Cadence Phase I Ford Property Development Project
- a five-story residential development located at 211 Airport Boulevard

##### Burlingame

- SFO Technology Center Development Project
- The Carolan/Rollins residential project



San Mateo

- 220 N. Bayshore Townhomes Project
- 477 E. Hillsdale Boulevard Residential Development Project
- 2940 Hampton Inn and Suites Hotel Project

Belmont

- Autobahn Motors Dealership Reconstruction Project
- Hilton Homewood Suites Hotel
- Marriott Springhill Suites Hotel

San Carlos

- Landmark Hotel Development
- Meridian 25 - Windy Hill Project

Redwood City

- a multi-family and commercial development at 557 E. Bayshore Road
- One Marina Hotel
- a townhome development at 1548 Maple Street
- Harbor View Place Office Complex
- A Stanford Office Complex

## 2. Results of the Noise Study Report

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The NSR for this project was prepared by Dana M. Lodico, Illingworth & Rodkin, Inc. in September of 2017 and approved by Allen Baradar, District Office Chief, Office of Environmental Engineering, California Department of Transportation, District 4 on October 12, 2017.

Long-term (LT) reference noise measurements were made at 22 locations in the project area and vicinity to quantify the noise levels and to establish the peak traffic noise hour. The noise measurements were made over an approximate 24-hour period, over the course of September to November, 2016. Ninety-eight (98) short-term (ST) noise measurements were made in the project area and vicinity in concurrent time intervals with the data collected at the long-term reference measurement sites.

For Alternatives 2 and 4, some segments of existing soundwalls would require removal to allow for realignment of the highway, and in some locations minor widening of pavement and/or shoulders. The majority of realignment and widening can be achieved within the existing State right-of-way. No existing land uses would be displaced or relocated. Where soundwalls require realignment, the noise study modeled levels with the walls removed, and with the walls replaced along the realigned highway. Worst-case noise levels therefore represent conditions with the walls temporarily removed, prior to replacement.

Activity Category B, C, D and E land uses border the project limits. Noise levels were predicted in two segments along the US 101 project corridor: north of the Whipple Avenue exit, and south of the Whipple Avenue exit. Noise impacts were identified for outdoor use areas as well by affected receptors.

### *North of Whipple Avenue*

Sixty-nine short- and long-term measurement positions were used as modeling receptors in the vicinity of the project alignment north of Whipple Avenue. In addition, there are thirty-six modeled receptor locations. Existing barriers and/or structures shield the majority of the noise-sensitive residential uses. Nine segments of existing barrier would be removed and replaced with construction of the project.

The loudest-hour noise levels at measured and modeled receptors within the project area are calculated to range from 48 to 79 dBA Leq[h] under Existing and Year 2040 No Project/Alternative 3 conditions, and from 50 to 80 dBA Leq[h] under Year 2040 with Alternatives 2 and 4. Noise level increases range from no change (0 dBA over Existing conditions under

2040 No Project/Alternative 3 conditions) to up to 16 dBA under 2040 with Alternatives 2 and 4, primarily due to the proposed removal of existing sound walls at some locations. Noise level increases would be considered substantial (i.e., 12 dBA or more increase over existing conditions) at residential receptors west of U.S. 101 near Anza Boulevard, east of U.S. 101 near Kehoe Avenue, and west of U.S. 101 near College Avenue, during the period when existing barriers are planned to be removed to allow realignment of the freeway, following which the barriers are replaced.

Year 2040 with Alternatives 2 and 4 traffic noise levels are predicted to approach or exceed the NAC at first and some second-row residences located west of U.S. 101, first and some second-row residences located east of U.S. 101, recreational areas, and a hotel. Most of the impacted residential uses are located behind existing 8- to 16-foot high sound walls. Portions of some of these walls are proposed to be removed and replaced with construction of Alternatives 2 and 4, and the modeled levels represent conditions with the existing walls removed, prior to replacement.

The recreational areas are not shielded by existing sound walls. Noise abatement in the form of new and replacement sound walls and barrier height increases were considered for these impacted receptors. Barrier height increases were not assessed for receptors where existing barriers to remain were observed to be at a height of 14 feet or more.

#### *South of Whipple Avenue*

Forty-five short- and long-term measurement positions were used as modeling receptors in the vicinity of the project alignment south of Whipple Avenue. In addition, there are thirty-six modeled receptor locations. Existing barriers and/or structures shield the majority of the noise-sensitive residential uses.

The loudest-hour noise levels at measured and modeled receptors within the project area are calculated to range from 49 to 77 dBA Leq[h] under Existing conditions and from 48 to 77 dBA Leq[h] under Year 2040 No Project/Alternative 3 and with Alternatives 2 and 4. Noise levels increase by up to 1 dBA over Existing conditions under 2040 No Project/Alternative 3 conditions and by up to 2 dBA under 2040 with Alternatives 2 and 4. This noise level increase is not considered substantial.

Year 2040 with Alternatives 2 and 4 noise levels are predicted to approach or exceed the NAC at first and some second-row residences located west of U.S. 101, at first and some second-row residences located east of U.S. 101, recreational facilities, and health care facilities. Most of the impacted residential uses are located behind existing 12- to 14-foot high sound walls. All of the existing barriers along the project alignment south of Whipple

Avenue would remain with the project. The recreational areas are not shielded by existing sound walls. Noise abatement in the form of new sound walls and barrier height increases were considered for these impacted receptors.

### *Proposed Noise Abatement Options*

Noise abatement in the form of new and replacement barriers was considered for impacted receptors. A total of eighteen barriers were assessed for areas north of Whipple Avenue where 2040 with Project noise levels would approach or exceed the NAC and/or experience substantial noise increases with the project and the area would not be shielded by an existing noise barrier that is of a height of 14 feet or greater. For Alternatives 2 and 4 this includes five new barriers and ten replacement barriers that would replace existing barriers planned to be removed with the project, and barrier height increases for three barriers that are of existing heights below 14 feet. For Alternative 3, this includes four new barriers and barrier height increases for two barriers that are of existing heights below 14 feet. In addition, a total of eight barriers were assessed for areas south of Whipple Avenue where 2040 with Project noise levels would exceed the NAC and the area would not be shielded by an existing noise barrier that is of a height of 14 feet or greater. This includes five new barriers and barrier height increases for three barriers that are of existing heights below 14 feet. To be considered feasible, a noise barrier must achieve a minimum of a 5 dB reduction at a given receptor. Additionally, the Protocol acoustical design goal states that the noise barrier must provide at least 7 dB of noise reduction at one or more benefited receptors. Reasonableness is determined based on whether a proposed noise abatement measure is acceptable to the benefited receptors and within the cost allowance per benefited receptor. The cost is based on the 2017 allowance per benefited receptor of \$92,000, which is set by the Protocol.

Once a noise barrier achieved the minimum of a 5 dB reduction at given receptors, and achieved the 7 dB noise reduction design goal for at least one receptor, the reasonableness allowance was determined. Table 1 summarizes the reasonable allowance for each feasible noise barrier that met the noise reduction design goal (as shown by the column titled, “Meets the design goal of 7dBA at one or more receptors? (Yes/No),” select heights met the noise reduction design goal, whereas other heights did not). For wall heights that do not meet the reasonableness design goal of 7 dB of noise reduction, the Reasonableness Allowance for construction will not be applicable. Therefore, the total reasonable allowance for construction would be \$0.

**Table 1. Summary of Barrier Evaluation from Noise Study Report**

Barrier ID	Approximate Stationing/ Location <sup>a</sup>	Type of Barrier Analysis	Noise Level w/o Barrier at Benefited Receptors (L <sub>eq(h)</sub> )	Barrier Height (feet) <sup>b</sup>	Insertion Loss (dBA)	Number of Benefited Receptors	Meets the design goal of 7dBA at one or more receptors? (Yes/No)	Total Reasonable Monetary Allowance
22	SB 101 EOS, Bay Street Residences and Marina Vista Park, Millbrae	New	64-69 (Alt 2/4) 63-68 (Alt 3)	8	1-4	0	No	\$0
				10	5	8	No	\$0
				12	5-6	13	No	\$0
				14 <sup>c</sup>	5-7	24	Yes	\$2,208,000
				16 <sup>c</sup>	6-8	24	Yes	\$2,208,000
21	NB 101 ROW, Bayside Park, Burlingame	New	64-67	8	5	1	No	\$0
				10	5	1	No	\$0
				12	6	1	No	\$0
				14 <sup>c</sup>	7	1	Yes	\$92,000
				16 <sup>c</sup>	5-8	3	Yes	\$276,000
20a	SB 101 EOS, Rollins Road Residences, Burlingame	New	73-80	8	5-10	9	Yes	\$828,000
				10 <sup>c</sup>	6-11	9	Yes	\$828,000
				12 <sup>c</sup>	6-14	9	Yes	\$828,000
				14 <sup>c</sup>	7-14	9	Yes	\$828,000
				16 <sup>c</sup>	7-14	9	Yes	\$828,000
20b	SB 101 EOS, Rollins Road Residences, Burlingame	Replacement	79-80	8	7-9	38	Yes	\$3,496,000
				10 <sup>c</sup>	9-11	38	Yes	\$3,496,000
				12 <sup>c</sup>	10-12	38	Yes	\$3,496,000
				14 <sup>c</sup>	11-13	38	Yes	\$3,496,000
				16 <sup>c</sup>	12-14	38	Yes	\$3,496,000
19a	NB 101 EOS, Poplar Creek Golf Course and Best Western, San Mateo	New	69-71	8	0-4	0	No	\$0
				10	5	1	No	\$0
				12	7	1	Yes	\$92,000
				14 <sup>c</sup>	5-8	2	Yes	\$184,000
				16 <sup>c</sup>	6-9	2	Yes	\$184,000
19b	NB 101 EOS, Bayshore Blvd Residences and Best Western, San Mateo	Replacement	63-78	8	5	1	No	\$0
				10	5-6	6	No	\$0
				12	6-7	6	Yes	\$552,000
				14 <sup>c</sup>	7-8	6	Yes	\$552,000
				16 <sup>c</sup>	7-8	6	Yes	\$552,000
18	SB 101 EOS, N. Idaho Street and N. Amphlett Boulevard Residences, San Mateo	Replacement	79	8	5	14	No	\$0
				10 <sup>c</sup>	7	14	Yes	\$1,288,000
				12 <sup>c</sup>	9	14	Yes	\$1,288,000
				14 <sup>c</sup>	10	14	Yes	\$1,288,000

Barrier ID	Approximate Stationing/ Location <sup>a</sup>	Type of Barrier Analysis	Noise Level w/o Barrier at Benefited Receptors (L <sub>eq(h)</sub> )	Barrier Height (feet) <sup>b</sup>	Insertion Loss (dBA)	Number of Benefited Receptors	Meets the design goal of 7dBA at one or more receptors? (Yes/No)	Total Reasonable Monetary Allowance
				16 <sup>c</sup>	11	14	Yes	\$1,288,000
17	NB 101 EOS,S. Bayshore Blvd. Residences, San Mateo	Replacement	68	8	6	6	No	\$0
				10	8	6	Yes	\$552,000
				12 <sup>c</sup>	9	6	Yes	\$552,000
				14 <sup>c</sup>	10	6	Yes	\$552,000
				16 <sup>c</sup>	11	6	Yes	\$552,000
16	SB 101 EOS, N. Idaho Street Residences, San Mateo	Replacement	58-65	8	0-4	0	No	\$0
				10	5	23	No	\$0
				12	5	23	No	\$0
				14	5-6	37	No	\$0
				16 <sup>c</sup>	6-7	37	Yes	\$3,404,000
14	NB 101 EOS, S. Bayshore Blvd. Residences, San Mateo	Replacement	70	8	6	7	No	\$0
				10	8	7	Yes	\$644,000
				12 <sup>c</sup>	9	7	Yes	\$644,000
				14 <sup>c</sup>	10	7	Yes	\$644,000
				16 <sup>c</sup>	10	7	Yes	\$644,000
13	SB 101 EOS, S. Amphlett Blvd. Residences, San Mateo	Replacement	67	8	5	20	No	\$0
				10	6	20	No	\$0
				12 <sup>c</sup>	7	20	Yes	\$1,840,000
				14 <sup>c</sup>	8	20	Yes	\$1,840,000
				16 <sup>c</sup>	9	20	Yes	\$1,840,000
11a	NB 101 EOS, Norton St. Residences, San Mateo	Replacement	73-76	8	6-7	6	Yes	\$552,000
				10 <sup>c</sup>	7-8	6	Yes	\$552,000
				12 <sup>c</sup>	8	6	Yes	\$552,000
				14 <sup>c</sup>	9	6	Yes	\$552,000
				16 <sup>c</sup>	9	6	Yes	\$552,000
10a & 10b	Barrier 10a: NB 101 EOS, Port Royal Ave. Residences and Bay Trail, San Mateo  Barrier 10b: NB 101 EOS, San Mateo	Replacement	76	8	5	1	No	\$0
				10	6	1	No	\$0
				12 <sup>c</sup>	7	1	Yes	\$92,000
				14 <sup>c</sup>	8	1	Yes	\$92,000
				16 <sup>c</sup>	8	1	Yes	\$92,000
8	NB 101 EOS, Marina Townhomes/ Docktown Marina, Redwood City	New	64-72	8	5	15	No	\$0
				10	5-6	26	No	\$0
				12 <sup>c</sup>	6-7	26	Yes	\$2,392,000
				14 <sup>c</sup>	6-8	26	Yes	\$2,392,000
				16 <sup>c</sup>	7-9	26	Yes	\$2,392,000
7	SB 101 EOS, Stanford Health/ Hoover Street Residences, Avenue 2 Apartments,	New	62-70	8	5	3	No	\$0
				10	5	7	No	\$0
				12 <sup>c</sup>	5-7	19	Yes	\$1,748,000

Barrier ID	Approximate Stationing/ Location <sup>a</sup>	Type of Barrier Analysis	Noise Level w/o Barrier at Benefited Receptors (Leq[h])	Barrier Height (feet) <sup>b</sup>	Insertion Loss (dBA)	Number of Benefited Receptors	Meets the design goal of 7dBA at one or more receptors? (Yes/No)	Total Reasonable Monetary Allowance
	Redwood City			14 <sup>c</sup>	5-8	20	Yes	\$1,840,000
				16 <sup>c</sup>	5-9	23	Yes	\$2,116,000
6	NB 101 EOS, Kelly Park, Menlo Park	New	73	8	2	0	No	\$0
				10	4	0	No	\$0
				12	5	4	No	\$0
				14	6	4	No	\$0
				16 <sup>c</sup>	7	4	Yes	\$368,000
2	SB U.S. 101 EOS, Palo Alto	New	61-72	8	5	1	No	\$0
				10	6	1	No	\$0
				12 <sup>c</sup>	7	1	Yes	\$92,000
				14 <sup>c</sup>	5-7	2	Yes	\$184,000
1	NB 101 EOS, Adobe Creek Loop Trail, Palo Alto	New	74-77	16 <sup>c</sup>	5-7	2	Yes	\$184,000
				8	5	1	No	\$0
				10	5-6	2	No	\$0
				12	5-7	2	Yes	\$184,000
				14 <sup>c</sup>	6-7	2	Yes	\$184,000
				16 <sup>c</sup>	7-8	2	Yes	\$184,000

<sup>a</sup> Barrier lengths are based on linear approximations used for purposes of noise modeling in TNM. Actual lengths may differ slightly due to barrier curvature, etc.

<sup>b</sup> Per HDM 1102.3(2), Noise barriers should not be higher than 14 feet above the pavement when located within 15 feet of the edge of traveled way and 16 feet above ground line when located more than 15 feet from the edge of traveled way. All barriers are located within 15 feet of the edge of traveled way. Therefore, design exception is needed for barriers greater than 14 feet.

<sup>c</sup> Barrier breaks line of sight between 11.5-foot high truck stack and 5-foot high receptor.

## 3. Preliminary Noise Abatement Decision

### 3.1. Summary of Key Information

A preliminary noise abatement analysis was conducted that identified the feasibility of constructing or replacing noise barriers along US 101 to reduce traffic noise levels. Noise barriers were evaluated at the most acoustically effective location within the State right-of-way.

Table 2 lists the potential barriers that met the acoustical feasibility and Protocol acoustical design goal in areas where the NAC was approached or exceeded, and also identifies the total reasonableness allowance for each barrier along with the estimated barrier construction cost. Wall construction cost was estimated based on Masonry Block Soundwall construction, in accordance with Caltrans' 2010 standard plans and specifications. The total reasonable allowance for barriers found to be acoustically feasible and to meet the design goal ranged from \$92,000 to \$3,496,000. As shown in Table 2, none of the barriers would have estimated construction costs below the total reasonable monetary allowance for the benefited receptors. All heights from 8 feet to 16 feet are shown for the new and replacement barriers that were considered. This table replicates the column labeled "Number of Benefited Receptors" from Table 1, which shows the number of receptors that would receive an insertion loss of at least 5 dB. As mentioned for Table 1, for wall heights that do not meet the reasonableness design goal of 7 dB of noise reduction for at least 1 receptor, the Reasonableness Allowance for construction will not be applicable. Therefore, the total reasonable monetary allowance is shown as \$0 in Table 2.

**Table 2. Summary of Abatement Key Information**

Barrier ID	Type of Barrier Analysis	Barrier Height (feet)	Number of Benefited Receptors	Total Reasonable Monetary Allowance	Estimated Construction Cost	Cost Less than Allowance?
22	New	8	0	\$0	\$5,624,880	No
		10	5	\$0	\$5,797,060	No
		12	8	\$0	\$5,944,880	No
		14	24	\$2,208,000	\$6,314,420	No
		16	24	\$2,208,000	\$6,462,220	No
21	New	8	8	\$0	\$7,171,722	No
		10	10	\$0	\$7,391,252	No
		12	12	\$0	\$7,579,722	No
		14	1	\$92,000	\$8,050,886	No
		16	3	\$276,000	\$8,239,331	No
20a	New	8	9	\$828,000	\$3,520,738	No
		10	9	\$828,000	\$3,628,338	No
		12	9	\$828,000	\$3,720,725	No
		14	9	\$828,000	\$3,951,700	No
		16	9	\$828,000	\$4,044,088	No
20b	Replacement	8	38	\$3,496,000	\$7,402,961	No



Barrier ID	Type of Barrier Analysis	Barrier Height (feet)	Number of Benefited Receptors	Total Reasonable Monetary Allowance	Estimated Construction Cost	Cost Less than Allowance?
		10	38	\$3,496,000	\$7,629,520	No
		12	38	\$3,496,000	\$7,824,005	No
		14	38	\$3,496,000	\$8,310,234	No
		16	38	\$3,496,000	\$8,504,681	No
19a	New	8	0	\$0	\$5,126,194	No
		10	0	\$0	\$5,282,859	No
		12	1	\$92,000	\$5,417,376	No
		14	2	\$184,000	\$5,753,675	No
		16	2	\$184,000	\$5,888,191	No
19b	Replacement	8	1	\$0	\$2,284,790	No
		10	6	\$0	\$2,356,258	No
		12	6	\$552,000	\$2,417,600	No
		14	6	\$552,000	\$2,570,955	No
		16	6	\$552,000	\$2,632,335	No
18	Replacement	8	14	\$0	\$2,412,653	No
		10	14	\$1,288,000	\$2,486,190	No
		12	14	\$1,288,000	\$2,549,306	No
		14	14	\$1,288,000	\$2,707,095	No
		16	14	\$1,288,000	\$2,770,212	No
17	Replacement	8	6	\$0	\$6,684,363	No
		10	6	\$552,000	\$6,892,889	No
		12	6	\$552,000	\$7,071,927	No
		14	6	\$552,000	\$7,519,503	No
		16	6	\$552,000	\$7,698,504	No
16	Replacement	8	0	\$0	\$10,034,047	No
		10	23	\$0	\$10,341,460	No
		12	23	\$0	\$10,605,305	No
		14	37	\$0	\$11,264,955	No
		16	37	\$3,404,000	\$11,528,801	No
14	Replacement	8	7	\$0	\$2,682,767	No
		10	7	\$644,000	\$2,754,678	No
		12	7	\$644,000	\$2,816,426	No
		14	7	\$644,000	\$2,970,816	No
		16	7	\$644,000	\$3,032,565	No
13	Replacement	8	20	\$0	\$4,030,262	No
		10	20	\$0	\$4,153,427	No
		12	20	\$1,840,000	\$4,259,186	No
		14	20	\$1,840,000	\$4,523,586	No
		16	20	\$1,840,000	\$4,629,346	No
11a	Replacement	8	6	\$552,000	\$925,778	No
		10	6	\$552,000	\$953,788	No
		12	6	\$552,000	\$977,808	No
		14	6	\$552,000	\$1,037,857	No
		16	6	\$552,000	\$1,061,913	No
10a & 10b	Replacement	8	1	\$0	\$1,281,512 (10a) \$410,020 (10b)	No
		10	1	\$0	\$1,301,097 (10a) \$423,212 (10b)	No
		12	1	\$92,000	\$1,317,947 (10a) \$434,483 (10b)	No
		14	1	\$92,000	\$1,360,000 (10a) \$462,752 (10b)	No

Barrier ID	Type of Barrier Analysis	Barrier Height (feet)	Number of Benefited Receptors	Total Reasonable Monetary Allowance	Estimated Construction Cost	Cost Less than Allowance?
		16	1	\$92,000	\$1,376,851 (10a) \$474,060 (10b)	No
8	New	8	0	\$0	\$8,411,677	No
		10	0	\$0	\$8,669,116	No
		12	26	\$2,392,000	\$8,890,107	No
		14	26	\$2,392,000	\$9,442,599	No
		16	26	\$2,392,000	\$9,663,531	No
7	New	8	0	\$0	\$3,633,401	No
		10	0	\$0	\$3,744,444	No
		12	19	\$1,748,000	\$3,839,788	No
		14	20	\$1,840,000	\$4,078,154	No
		16	23	\$2,116,000	\$4,173,498	No
6	New	8	0	\$0	\$3,267,244	No
		10	0	\$0	\$3,367,097	No
		12	0	\$0	\$3,452,833	No
		14	0	\$0	\$3,667,178	No
		16	4	\$368,000	\$3,752,913	No
2	New	8	0	\$0	\$4,478,378	No
		10	0	\$0	\$4,615,245	No
		12	1	\$92,000	\$4,732,762	No
		14	2	\$184,000	\$5,026,562	No
		16	2	\$184,000	\$5,144,079	No
1	New	8	0	\$0	\$6,215,492	No
		10	0	\$0	\$6,405,751	No
		12	2	\$184,000	\$6,569,092	No
		14	2	\$184,000	\$6,977,434	No
		16	2	\$184,000	\$7,140,753	No

### 3.2. Nonacoustical Factors Relating to Feasibility

The following is a list of nonacoustical factors relating to the feasibility of noise abatement:

- Geometric standards, such as sight distances, are not reduced or affected by the location of the sound wall;
- Generally, the Minimum lateral clearance of 10-feet to noise barriers will be provided as required in Section 309.1, Horizontal Clearances, of the Highway Design Manual at most locations. Design will get the required exceptions approved if this standard cannot be met;
- The sound walls shall be placed on a safety shape concrete barrier as the standard horizontal clearance for clear recovery zone (CRZ) of 30 feet for a freeway cannot be met;
- Access gates would be constructed in the sound wall to satisfy the Caltrans's maintenance needs. They also provide a means to access the freeway in the event of an emergency;

- In the preparation for the design phase, the Caltrans design team gathered additional detailed utility data. A significant utility conflict was discovered. There is a major PG&E gas transmission line located where some reconstructed sound walls are proposed to be placed. Relocating this gas line is cost prohibitive. As a result of this new information, the Project Development Team determined that the project could be re-engineered to avoid the need to remove and replace sound walls 11a, 13, 16, 18 and 20b;
- Geotechnical investigations will be performed for any new sound wall within the project limits. The geotechnical investigations will need to address the geologic hazards identified within including: liquefaction, cracking, differential compaction, ground shaking, and shrink swell; and
- Build Alternatives 2 and 4 would result in the removal of existing sound walls due to widening. These sound walls are proposed to be replaced at the same heights (or higher) of the existing walls. Since the maximum noise barrier height is 14 feet when located 15 feet or less from the edge of the traveled way, a design exception may be required.

### **3.3. Preliminary Recommendation and Decision**

Based on information presented above, a preliminary noise abatement decision was made to consider the following barriers for construction as part of this project's chosen Build Alternative (Alternative 4). Because none of the barriers have an estimated construction cost below the total reasonable monetary allowance, only existing noise barriers are recommended to be replaced. These replacement walls will match the heights of the existing walls, but subject to design standards. The listed heights in Table 3 represent the heights of the existing walls. The Highway Design Manual Section 1102.3(2) requires noise barriers that are located 15 feet or less from the edge of traveled way not to exceed 14 feet in height. The need for a design exception had been identified for the existing barrier 17 and is subject to design exception approval during the Plans, Specifications, and Estimate (PS&E) phase of the project.

**Table 3. Summary of Recommended Barriers**

Barrier ID	Stationing / Location	Type of Barrier	Stationing	Existing Barrier Height (feet)
19b	NB 101 EOS, Bayshore Blvd Residences and Best Western, San Mateo	Replacement	916+75 to 918+75	12
			918+75 to 924+80	14
17	NB 101 EOS, S. Bayshore Blvd. Residences, San Mateo	Replacement	886+47 to 893+75	12
			893+80 to 902+10	16
			902+10 to 910+62	10
14	NB 101 EOS, S. Bayshore Blvd. Residences, San Mateo	Replacement	861+86 to 870+26	13.5
10a	NB 101 EOS, Port Royal Ave. Residences and Bay Trail, San Mateo	Replacement	707+00 to 709+80	11.5
10b	NB 101 EOS, San Mateo	Replacement	710+50 to 712+00	11.5

The preliminary noise abatement decision presented in this report is based on preliminary project alignments and profiles, which may be subject to change. As such, the physical characteristics of noise abatement described herein also may be subject to change. If pertinent parameters change substantially during the final project design, the preliminary noise abatement decision may be changed or eliminated from the final project design. A final decision to construct noise abatement will be made upon completion of the project design.

## 4. Secondary Effects of Abatement

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The noise abatement method considered for this project is not expected to have secondary effects on the environment.

## 5. References

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California Department of Transportation (Caltrans). 2011. Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects. May 2011.

Illingworth & Rodkin, Incorporated. 2017. Noise Study Report, US 101 Managed Lanes Project. 4-SCL-101-50.6/52.55, 4-SM-101-0.0/21.85, EA 04-1J560, EFIS 0413000206. Prepared for the California Department of Transportation under contract to AECOM. October, 2017.

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