# **Oakland Alameda Access Project**



# **Noise Abatement Decision Report**

Based on the Oakland Alameda Access Project Noise Study Report (Illingworth & Rodkin, Inc., April 2020)

Interstate 880 (PM ALA 30.47 to PM 31.61) and State Route 260 (PM ALA R0.78 to R1.90)

Oakland and Alameda, California

EA 04-0G360

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5/27/2020 Prepared By: Date: Dana M. Lodico, P.E., INCE Bd. Cert. Senior Consultant Illingworth & Rodkin, Inc. (720) 306-8322 5/27/2020 Date: Rodney Pimentel, P.E. **Program Director HNTB** (510) 587-8691 6/1/20 rewson Date: own Kevin Krewson Branch Chief Air & Noise Office of Environmental Engineering

Reviewed By:

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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									
Caltrans	California Department of Transportation									
CCD	Caltrans Cost Database									
CFR	Code of Federal Regulations									
dB	Decibel									
dBA	A-weighted sound pressure level									
EOS	Edge of Shoulder									
FED	Final Environmental Document									
FHWA	Federal Highway Administration									
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									
Reasonable allowance	A single dollar value—a reasonable allowance per benefited receptor									

# 1. Introduction

The Noise Abatement Decision Report (NADR) presents the preliminary noise abatement decision as defined in the California Department of Transportation (Caltrans) Traffic Noise Analysis Protocol (Protocol). This report has been approved by a Calfornia licensed professional civil engineer. The project level Noise Study Report (NSR) (Illingworth & Rodkin, Inc., 2020) 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 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 decibel (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 (FED).

The Protocol establishes a process for assessing the reasonableness and feasibility of noise abatement. Before publication of the draft environmental document, 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 an impacted receptor. 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
- the noise reduction design goal.

The preliminary reasonableness determination discussed in this document is based on the noise reduction design goal and the overall cost of abatement. The viewpoints of benefited receptors would be determined for any reasonable measure by conducting a survey during the public review period for the project ED.

Caltrans' noise reduction design goal that states 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 "reasonble 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;
- Present the engineer's cost estimate for evaluated abatement;
- Present the engineer's evaluation of non-acoustical feasibility issues;
- Present the preliminary noise abatement decision; and
- Present preliminary information on secondary effects of abatement (impacts on cultural resources, visual resources, hazardous materials, biological resources, 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 proposed project (project), the Oakland Alameda Access Project, is located in the cities of Oakland and Alameda in Alameda County, California. The project would improve access along (I-880), the Posey and Webster Tubes, downtown Oakland, and the City of Alameda. Within the approximately 1-mile-long project extent, I-880 (PM ALA 30.47 to PM 31.61) and State Route 260 (SR-260) (PM ALA R0.78 to R1.90) are major transportation corridors. Moreover, the I-880 freeway viaduct is a physical barrier, limiting bicycle and pedestrian connectivity between downtown Oakland and Chinatown to the north and the Jack London District and Oakland Estuary to the south. Existing local street patterns across I-880 are intertwined with freeway entrance and exit ramps and the Posey and Webster tubes (Tubes) through downtown Oakland and to and from the City of Alameda, affecting the cross-freeway circulation of motorists, bicyclists, and pedestrians. The project footprint includes all of the improvements located within the project study area boundaries.

Under the Build Alternative, also referred to as the proposed project, access to northbound (NB) and southbound (SB) I-880 from the Posey Tube would be improved via a right-turnonly lane from the Posey Tube to 5th Street and a new horseshoe connector at Jackson Street below the I-880 viaduct that would connect to the existing NB I-880/Jackson Street on-ramp. The existing WB I-980/Jackson Street off-ramp would be reconstructed and shifted to the south, as well. The Webster Tube entrance at 5th Street and Broadway would be shifted to the east to create more space for trucks to make the turn from Broadway into the Webster Tube. A bulbout would be constructed to extend the sidewalk, reducing the crossing distance and allowing improved visibility of pedestrians on the southeast corner.

The NB I-880/Broadway off-ramp would be removed and the NB I-880/Oak Street off-ramp to 6th Street would be widened. The NB I-880/Oak Street intersection would become the main NB I-880 off-ramp to downtown Oakland and to Alameda. 6th Street would become a one-way through street from Oak Street to Harrison Street and a two-way street from Harrison Street to Broadway.

The proposed project would include the addition of a Class IV two-way bicycle track on 6th Street between Oak and Washington streets and on Oak Street between 3rd and 9th streets. Bicycle and pedestrian improvements would be constructed at the Tubes' approaches in Oakland and Alameda. Figures 1A, 1B, 1C, and 1D shows all proposed elements of the Build Alternative.

# 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); daycare centers, schools, parks, picnic areas, places of worship, active sports areas, and institutional structures (Activity Category C); interiors of daycare centers, schools, and places of worship (Activity Category D); and offices, restaurants, and bars (Activity Category E).

Although all developed land uses are evaluated in this analysis, noise abatement is only considered for areas of frequent human use that would benefit from a lowered noise level. Accordingly, this impact analysis focuses on locations with defined outdoor activity areas, such as residential backyards, common exterior use areas for multi-family development, sports areas, and outdoor commercial use areas.



Figure 1A: Build Alternative Proposed Elements, Project Overview



Figure 1B: Build Alternative Proposed Elements, Oakland



Figure 1C: Build Alternative Proposed Elements, Oakland East



Figure 1D: Build Alternative Proposed Elements, Alameda

# 2. Results of the Noise Study Report

The NSR for this project was prepared by Dana M. Lodico, PE, INCE Bd. Cert., Illingworth & Rodkin, Inc. and approved by Caltrans in April 2020.

The worst-hour noise levels resulting from 2045 Build conditions would range from 36 to 73 dBA  $L_{eq[h]}$  (A-weighted, energy average sound level during a 1-hour period) at existing Category B and C land uses along the project alignment. Under Build conditions, traffic noise levels are predicted to approach (or exceed) the NAC at Category B and C receptors in the following areas: north and south of I-880 in Oakland, north and south of 7<sup>th</sup> Street in Oakland, and east of Mariner Square Drive in Alameda. Many of the receptor locations along I-880 are upper story balconies or rooftop patios, reducing the effectiveness of noise abatement that could be constructed at the I-880 edge of shoulder.

Noise abatement in the form of new noise barriers was assessed for receptors where noise levels would approach or exceed the NAC. A total of eight potential barriers were evaluated for feasibility (i.e., would achieve the Caltrans noise reduction goal of at least 5 dB) and acoustical reasonableness (i.e., would achieve the noise reduction design goal of at least 7 dB). Of these eight barriers, only three (Noise Barriers 3, 7, and 8) were found to be feasible and to achieve the Caltrans noise reduction design. As shown in Table 1, the total reasonable allowance for Barriers 3, 7, and 8 ranged from \$107,000 to \$214,000.

Noise Barrier	Approximate Stationing/ Location	Noise Level w/o Barrier at Benefited Receptors	Barrier Height (feet)	Insertion Loss (dBA)	Number of Benefited Receptors	Total Reasonable Monetary Allowance
	NB I-880 Edge of		14	7	1	\$107,000
3	Shoulder (EOS) 66 dBA L <sub>eq9t</sub> (1490 ft)		16	7	1	\$107,000
			6	7	2	\$214,000
	North side of 7 <sup>th</sup>		8	9	2	\$214,000
7	Street between		10	11	2	\$214,000
1	Harrison Street and	09 UDA Leq9h0	12	12	2	\$214,000
	Alice Street (67 ft)		14	12	2	\$214,000
			16	12	2	\$214,000
			8	8	1	\$107,000
	East side of		10	9	1	\$107,000
8	Mariner Square	69 dBA L <sub>eq9h0</sub>	12	11	1	\$107,000
	Drive (305 ft)		14	12	1	\$107,000
			16	13	1	\$107,000

Table 1. Acoustically Feasible and Resonable Noise Barriers

# 3.1. Summary of Key Information

The NSR analyzed noise barriers with heights from 6 to 16 feet to determine the feasibility of noise abatement. Table 2 summarizes the preliminary noise abatement decision for the Build Alternative for the heights of barriers that were determined to meet the feasibility criteria and to achieve the Caltrans noise reduction design goal. The following were evaluated: acoustical feasibility (5 dB), number of benefited outdoor use areas (receptors), total reasonableness allowance (\$107,000 per benefitted receiver/residence), engineer's construction cost estimate for the abatement, comparison of the estimated construction cost versus allowance, and if the Caltrans noise reduction design goal (minimum 7 dB reduction for at least one receptor) is met. As shown in Table 2, none of the evaluated barriers were determined to meet the cost reasonableness criteria.

Noise barrier feasibility could also be restricted by the following factors: underground utilities, property access, topography, and safety considerations. In addition, the property owner(s) must support the noise barrier in order for it to be constructed. As part of the public review period for this project, both the property owner(s) and non-owner occupant(s) of areas that would benefit from a barrier determined to be otherwise feasible and reasonable would be sent a noise barrier wall survey letter requesting their feedback on whether or not they would prefer a noise barrier based on the heights listed in Table 2.

Noise barrier construction cost estimates are based on masonry walls in accordance with Caltrans' standard plans and specifications. Cost estimates are based on the Caltrans Cost Database (CCD) (Caltrans, 2020), which tabulates average unit costs of construction-related items from recent state transportation projects. Cost calculations for noise barriers include the cost of the noise barrier, earthwork, and traffic control. Figures in Appendix A show the identified locations for noise barriers in both Oakland and Alameda. Appendix B summarizes the engineer's cost estimate for constructing each noise barrier.

Costs of related activities, such as clearing and grubbing, vine landscaping, and typical aesthetic treatments, have not been estimated because these items are variable and could change substantially depending on several factors.

	Table 2. Summary of Abatement Key Information													
Noise Barrier	Length (feet)	Height (feet)	Acoustically Feasible (5-dB)?	Number of Benefited Receptors	Design Goal Achieved (7-dB)?	Total Reasonable Allowance	Estimated Construction Cost	Cost Less than Allowance?						
2	1400	14	Yes	1	Yes	\$107,000	\$7,464,900	No						
3	1490	16	Yes	1	Yes	\$107,000	\$8,537,700	No						
		6	Yes	2	Yes	\$214,000	\$237,810	No						
7		8	Yes	2	Yes	\$214,000	\$254,560	No						
	67	10	Yes	2	Yes	\$214,000	\$271,310	No						
	07	12	Yes	2	Yes	\$214,000	\$285,380	No						
		14	Yes	2	Yes	\$214,000	\$299,450	No						
		16	Yes	2	Yes	\$214,000	\$316,200	No						
		8	Yes	1	Yes	\$107,000	\$675,270	No						
		10	Yes	1	Yes	\$107,000	\$789,645	No						
8	305	12	Yes	1	Yes	\$107,000	\$884,348	No						
		14	Yes	1	Yes	\$107,000	\$979,050	No						
		16	Yes	1	Yes	\$107,000	\$1,093,425	No						

# 3.2 Non-acoustical Factors Relating to Feasibility

Based on the preliminary project and abatement design, no non-acoustical factors related to feasibility have been identified that would be considered out of the ordinary for noise barrier construction. The non-acoustical factors considered are geometric standards (e.g., sight distances), safety, maintenance, security, geotechnical issues, and utility relocations. Some of these non-acoustical factors, including geotechnical issues, would have to be investigated at the design phase.

# 3.3 Preliminary Recommendation and Decision

Several factors were considered in making noise barrier recommendations if the noise barriers are determined to be reasonable from a cost perspective:

- Line-of-sight break between a receptor and an 11.5-foot-high truck stack (per Chapter 1100 of the Highway Design Manual)
- Number of benefited receptors
- Cost per benefited receptor
- Degree of noise reduction (a barrier that provides only 1 dB of improved noise reduction and costs substantially more than a lower barrier may be less favored than the lower barrier)
- 50-year minimum life cycle

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.

The preliminary noise abatement decision presented here will be included in the draft ED, which will be circulated for public review.

Based on the information summarized in Table 2 and noise reductions specified in the NSR, the following discussion presents the engineer's recommendation on the proposed height and reasonableness of the feasible and proposed noise barriers for the Build Alternative:

Noise Barrier 3 (Oakland): Noise Barrier 3 would be a masonry block noise barrier mounted on the existing 5<sup>th</sup> Avenue overhead structure along the right shoulder of northbound I-880. This noise barrier would be approximately 1,490 feet long (Post Mile [PM] 30.60 to PM 30.90). The sound reduction design goal would be met at a height of 14

feet or greater. Figure C-1 in Appendix A shows the location, minimum length, and height of Noise Barrier 3 to provide feasible abatement and meet the design goal. The estimated total construction cost of the recommended 14-foot-high noise barrier would be \$7,464,900. This exceeds the reasonable allowance of \$107,000. Therefore, construction of this noise barrier would not be reasonable.

- Noise Barrier 7 (Oakland): Noise Barrier 7 would be a masonry block noise barrier with a spread footing in front of residential properties. The barrier would be constructed along the north side of 7<sup>th</sup> Street between Harrison and Alice Streets, across from Chinese Garden Park (Appendix C). Noise Barrier 7 would be approximately 67 feet long. As a result, this barrier could potentially block the entrances to two residential structures, depending on final design. The design goal for sound reduction would be met at a height of 6 feet or greater. Figure C-1 in Appendix A shows the location, minimum length, and height of Noise Barrier 7 to provide feasible abatement and meet the design goal. The estimated total construction cost of the recommended 6-foot-high noise barrier would be \$237,810. This exceeds the reasonable allowance of \$214,000. Therefore, Noise Barrier 7 would not be reasonable.
- Noise Barrier 8 (Alameda): Noise Barrier 8 would be a masonry block noise barrier with a spread footing along the east side of Constitution Way. It would be located between the roadway and a daycare center. Noise Barrier 8 would be approximately 305 feet long. The design goal for sound reduction would be met at a height of 8 feet or greater. Figure C-2 in Appendix A shows the location, minimum length, and height of Noise Barrier 8 that would provide feasible abatement and meet the design goal. The estimated total construction cost of the recommended 8-foot-high noise barrier would be \$675,270. This would exceed the reasonable allowance of \$107,000. Therefore, Noise Barrier 8 would not be reasonable.

With consideration of the acoustic benefit and the incremental cost, none of the three noise barriers are reasonable; therefore, none are recommended.

Additional noise abatement measures will be considered by the proposed project. Concrete safety barriers will be incorporated along I-880 to the extent possible, which may provide some noise reduction. Bridge deck tining (longitudinal instead of transverse tining) is a Caltrans standard measure to attenuate noise. Tining will be evaluated during the design phase and incorporated, if feasible.

The type of bridge joints incorporated into the project's bridge design (plate bridge joints instead of accordion joints) to potentially reduce noise levels will also be evaluated during the design phase due to the additional maintenance needs associated with plate bridge joints.

# 4. Secondary Effects of Abatement

Noise Barriers 3, 7, and 8 could potentially result in secondary effects to visual resources, hazardous materials, cultural resources, biological resources, and water quality. These effects are itemized within this section. Secondary effects associated from noise barriers are not anticipated to parks/recreational facilities, environmental justice communities, geologic resources, paleontological resources, or air quality.

### 4.1 Visual Resources

A Visual Impact Assessment was prepared for the proposed project. The Oakland portion of the project area is characterized by flat terrain, man-made structures, pavement, and minimal vegetation. The visual environment within the City of Alameda is similar, but with a higher prevalence of vegetation. Within the project area, neither I-880 or SR 260 are officially designated as State Scenic Highways. However, vantage points along I-880 allow scenic views of the East Bay Hills, the San Francisco Bay, the San Bruno Mountain.

The minor local roadway improvements in Oakland would be consistent with the general character of the existing conditions. Removal of portions of the I-880 viaduct would enhance views and reduce shadowing. Viewer response from these changes would vary from moderate to low. Noise Barrier 3 along I-880 would partially obstruct views of the horizon, the Oakland cityscape, and the East Bay Hills. Views of the San Francisco Bay would not be affected. Based on this, the addition of this noise barrier would likely be classified a moderate-high impact to the visual environment. Noise Barrier 7 would impact residential views of Chinese Garden Park and disrupt views within a historic district to contributing buildings (Appendix C). In addition, this barrier would shade adjacent properties for a portion of the day. Therefore, Noise Barrier 3 and 7 would block views and add shadowing, which would negate the visual improvements associated with the proposed project.

In Alameda, the existing character of the environment would be minimally changed by the project (low impact). However, Noise Barrier 8 would remove existing trees from this landscape and add a vertical, man-made element to the existing environment. This noise barrier would partially block views of the horizon and increase shadowing. These impacts would likely elevate the change in the visual environment to moderate-high.

Each of the three evaluated noise barriers would have secondary effects on visual resources. These noise barriers would disrupt the existing visual character of the project area due to their length and height. While they would not dominate the visual environment, the barriers would block views and increase the existing urban visual character of the project area. Depending on the location, the overall visual impact of the noise barriers would be moderate to moderatehigh.

### 4.2 Hazardous Materials

An Initial Site Assessment was prepared for the proposed project. It identified five facilities with potentially hazardous waste or materials concerns. Noise Barrier 3 would be attached to the elevated I-880 viaduct and would not encounter contamination. Noise Barrier 7 would be constructed near a facility with a documented release of gasoline from a leaking underground storage tank. Barrier 8 would be constructed on artificial fill, where the contaminants of concern would include metals, pesticide, petroleum hydrocarbons, and polychlorobiphenyls (PCBs).

Secondary effects during construction of Noise Barriers 7 and 8 could occur if hazardous contamination is encountered during excavation. Note that additional data collection would be needed during the Plans, Specifications, and Estimates (PS&E) phase to determine if hazardous contamination is present. If present, the construction of noise barriers could expose construction crews and residents to hazardous contamination through physical contact or inhalation. This exposure could cause short-term detrimental effects to the environmental justice communities in the project area. If not handled or disposed of properly, hazardous contamination could also cause negative, long-term impacts to the environment. While these secondary effects could be prevented by the incorporation of project features or avoidance/minimization measures, there would be added cost associated with the off-site disposal of contaminated soil and/or groundwater at an approved disposal facility.

### 4.3 Cultural Resources

A Historic Property Survey Report, Archaeological Study Report, Historic Resources Evaluation Report, and an Extended Phase 1 Study Report were prepared to evaluate potential cultural resources within the project area.

No secondary effects to sub-surface archaeological resources would be anticipated from any of the evaluated noise barriers. Two archaeological resources were previously identified within the project area. However, none of the evaluated barriers are located near these previously recorded resources. In addition, the studies documented that the areas surrounding the potential noise barriers have a low sensitivity for archaeological resources.

The project area has numerous properties that are eligible for listing in the National Register of Historic Places and or the California Register of Historical Resources. The majority of these properties are located within two historic districts. Barriers 3 and 8 are not located near a

historic built resource or within a historic district. Barrier 7, however, is located within a historic district (7<sup>th</sup> Street Residential District) and its placement is directly in front of two buildings that are contributors to the historic district and directly adjacent to a third contributor. Construction of a noise barrier within this district, in front of two contributing buildings, and adjacent to a third contributor would cause an adverse effect to those contributing buildings by altering directly or indirectly, the characteristic that qualify the buildings for inclusion in the National Register and would likely impact the overall district's eligibility as well. Additional documentation would need to be prepared including a Finding of Effect and a Memorandum of Agreement to resolve adverse effects, additional cumulative impacts analysis and consultation would need to be initiated with the Caltrans Cultural Studies Office and the State Historic Preservation Officer. Mitigation measures would be required to off-set any significant impacts to this historic district and the contributing buildings.

### 4.4 Biological Resources

A Natural Environment Study – Minimal Impact and an Aquatic Resources Delineation Report were prepared for the proposed project. The Biological Study Area used in both reports was comprised of the project footprint and adjacent areas with biological resources that could be affected indirectly by the project. This study area consists primarily of urban and developed areas. Urban habitat is composed of hardscape and impervious surfaces interspersed with landscape, ornamental, non-native, and ruderal vegetation. Landscaped environments are unlikely to provide suitable habitat for special-status species

No vegetation would be cleared for the installation of Noise Barriers 3 or 7. As a result, no secondary biological resource effects would be anticipated from their construction.

Two wetlands were documented within (or adjacent to) the study area. Both wetlands are located in Alameda, and neither would be impacted by construction of Noise Barrier 8. However, several trees would need to be cleared to install this noise barrier. Landscape vegetation provides nesting habitat for protected birds and bats. Potential impact to protected birds and bats could be prevented through implementation of project features and avoidance/minimization measures. Additional tree replacements would be required for tree removals to replace native tree species.

### 4.4 Utilities

Construction of noise barrier wall footings has the potential to interfere with utilities. The need for utility relocations would not be known until the PS&E project phase. If required, utility relocations would add cost to the construction contract.

### 4.5 Water Quality

A Water Quality Assessment Report was prepared for the proposed project. None of the proposed noise barriers are anticipated to have permanent impacts to water quality. However, construction related impacts may occur from Noise Barriers 7 and 8. Groundwater ranges from 4 to 26 feet below the existing ground surface. Excavation for these two noise barriers could encounter groundwater which would require dewatering. Potential impacts to water quality would be prevented through implementation of project features and avoidance/minimization measures, such as implementation of best management practices (BMPs).

# 5. References

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

Illingworth & Rodkin, Incorporated. 2020. Noise Study Report, Oakland Alameda Access Project, EA 04-0G360, Prepared for the California Department of Transportation under contract to HNTB. March, 2020.





#### **Cost Estimate for Soundwall No. 3**

Length of wall (ft): 1490 Type of Soundwall: Masonry Block Soundwall on Structure Permanent Easement & TCE required? No

	Design Height, ft											
Unit Cost <sup>1</sup>	6			8		10		12		14		16
Width of spread footing		3		4		5		5.75		6.5		7.5
Sound wall area (SQFT)		8,940		11,920		14,900		17,880		20,860		23,840
Masonry cost <sup>2</sup> [\$45/SQFT]	\$	402,300	\$	536,400	\$	670,500	\$	804,600	\$	938,700	\$	1,072,800
Wall Footing (CF)		4,470		5,960		7,450		8,568		9,685		11,175
Wall Footing (Minor Conc) [\$90/CF]	\$	402,300	\$	536,400	\$	670,500	\$	771,075	\$	871,650	\$	1,005,750
Struct Reinforcement	\$	2,413,800	\$	3,218,400	\$	4,023,000	\$	4,727,025	\$	5,431,050	\$	6,235,650
Traffic Control	\$	223,500	\$	223,500	\$	223,500	\$	223,500	\$	223,500	\$	223,500
Actual Construction Cost	\$	3,441,900	\$	4,514,700	\$	5,587,500	\$	6,526,200	\$	7,464,900	\$	8,537,700
Total Wall Cost (\$ Rounded)	\$	3,442,000	\$	4,515,000	\$	5,588,000	\$	6,527,000	\$	7,465,000	\$	8,538,000

Notes:

1. Estimates are based on Caltrans database cost for 2018-2020

2. Includes cost for masonry and steel

### Cost Estimate for Soundwall No. 7

#### Length of wall (ft): 67 Type of Soundwall: Masonry Block Soundwall on Spread Footing Permanent Easement & TCE required? Yes

	Design Height, ft											
Unit Cost <sup>1</sup>		6		8		10		12		14		16
Width of spread footing		3		4		5		5.75		6.5		7.5
Sound wall area (SQFT)		402		536		670		804		938		1,072
Masonry cost <sup>2</sup> [\$45/SQFT]	\$	18,090	\$	24,120	\$	30,150	\$	36,180	\$	42,210	\$	48,240
Wall Footing (CF)		201		268		335		385		436		503
Wall Footing (Minor Conc) [\$90/CF]	\$	18,090	\$	24,120	\$	30,150	\$	34,673	\$	39,195	\$	45,225
Structure Excavation (CF)		1,642		1,876		2,111		2,286		2,462		2,697
Structure Exc & Bkf [\$20/CF]	\$	32,830	\$	37,520	\$	42,210	\$	45,728	\$	49,245	\$	53,935
Utilities	\$	48,350	\$	48,350	\$	48,350	\$	48,350	\$	48,350	\$	48,350
Temporary Pedestrian Detours	\$	10,050	\$	10,050	\$	10,050	\$	10,050	\$	10,050	\$	10,050
Actual Construction Cost	\$	127,410	\$	144,160	\$	160,910	\$	174,980	\$	189,050	\$	205,800
Temporary Construction Easement (SQFT)		600		600		600		600		600		600
Temporary Construction Easement [\$50/SQFT]	\$	30,000	\$	30,000	\$	30,000	\$	30,000	\$	30,000	\$	30,000
Permanent Easement (SQFT)		268		268		268		268		268		268
Permanent Easement [\$300/SQFT]	\$	80,400	\$	80,400	\$	80,400	\$	80,400	\$	80,400	\$	80,400
TCE and Permanent Easement	\$	110,400	\$	110,400	\$	110,400	\$	110,400	\$	110,400	\$	110,400
Total Wall Cost with R/W	\$	237,810	\$	254,560	\$	271,310	\$	285,380	\$	299,450	\$	316,200
Total Wall Cost with R/W (\$ Rounded)	\$	238,000	\$	255,000	\$	272,000	\$	286,000	\$	300,000	\$	317,000

#### Notes:

1. Estimates are based on Caltrans database cost for 2018-2020

2. Includes cost for masonry and steel

### **Cost Estimate for Soundwall No. 8**

#### Length of wall (ft): 305 Type of Soundwall: Masonry Block Soundwall on Spread Footing Permanent Easement & TCE required? Yes

	Design Height, ft											
Unit Cost <sup>1</sup>		6		8		10		12		14		16
Width of spread footing		3		4		5		5.75		6.5		7.5
Sound wall area (SQFT)		1,830		2,440		3,050		3,660		4,270		4,880
Masonry cost <sup>2</sup> [\$45/SQFT]	\$	82,350	\$	109,800	\$	137,250	\$	164,700	\$	192,150	\$	219,600
Wall Footing (CF)		915		1,220		1,525		1,754		1,983		2,288
Wall Footing (Minor Conc) [\$90/CF]	\$	82,350	\$	109,800	\$	137,250	\$	157,838	\$	178,425	\$	205,875
Structure Excavation (CF)		7,473		8,540		9,608		10,408		11,209		12,276
Structure Exc & Bkf [\$20/CF]	\$	149,450	\$	170,800	\$	192,150	\$	208,163	\$	224,175	\$	245,525
Utilities	\$	94,245	\$	117,120	\$	139,995	\$	159,210	\$	178,425	\$	201,300
Temporary Pedestrian Detours	\$	45,750	\$	45,750	\$	45,750	\$	45,750	\$	45,750	\$	45,750
Actual Construction Cost	\$	454,145	\$	553,270	\$	652,395	\$	735,660	\$	818,925	\$	918,050
Temporary Construction Easement (SQFT)		2,135		2,440		2,745		2,974		3,203		3,508
Temporary Construction Easement [\$50/SQFT]	\$	106,750	\$	122,000	\$	137,250	\$	148,688	\$	160,125	\$	175,375
TCE and Easements	\$	106,750	\$	122,000	\$	137,250	\$	148,688	\$	160,125	\$	175,375
Total Wall Cost with R/W	\$	560,895	\$	675,270	\$	789,645	\$	884,348	\$	979,050	\$	1,093,425
Total Wall Cost with R/W (\$ Rounded)	\$	561,000	\$	676,000	\$	790,000	\$	885,000	\$	980,000	\$	1,094,000

#### Notes:

1. Estimates are based on Caltrans database cost for 2018-2020

2. Includes cost for masonry and steel

# Appendix C Noise Barrier 7 Location and Rendering (DRAFT)



Figure D-1: Street view of Noise Barrier 7 along the north side of 7<sup>th</sup> Street facing northeast

Note: This rendering of Noise Barrier 7 is conceptual and not to scale. Following Caltrans review, an updated "to scale" version will be inserted into the document.



Figure D-2: Aerial view of Noise Barrier 7 along the north side of 7<sup>th</sup> Street facing northeast from Chinese Garden Park.

Note: This rendering of Noise Barrier 7 is conceptual and not to scale. Following Caltrans review, an updated "to scale" version will be inserted into the document.