

## APPENDIX B NOISE BARRIER ANALYSIS

WSDOT evaluates many factors to determine whether barriers will be feasible and/or reasonable. To be feasible, a barrier must be constructible in a location that achieves a noise reduction of at least 7 dBA at one or more receptors, and a reduction of at least 5 dBA at most first-row receptors. Once a noise barrier is found to be feasible, WSDOT evaluates whether the noise barrier is reasonable.

To be reasonable, the noise barrier’s surface area may not exceed the sum of the allowed barrier surface area per household. Exhibit B-1 summarizes the allowed area for each receptor that will benefit from a reduction of at least 3 dBA. For noise levels above 74 dBA, the allowed barrier surface area per household increases by 70 square feet per-dBA increase.

*Exhibit B-1: Noise Mitigation Allowance*

Design-Year Traffic Noise Decibel Level	Allowed Barrier Surface Area per Household in Square Meters (square feet)*
66 dBA	65.0 (700)
67 dBA	71.5 (770)
68 dBA	77.7 (837)
69 dBA	84.0 (905)
70 dBA	90.5 (973)
71 dBA	96.7 (1,041)
72 dBA	103.0 (1,109)
73 dBA	109.2 (1,176)
74 dBA	115.5 (1,244)

Source: WAC, 1999

\*For receptors that experience a reduction of at least 3 dBA

Per WSDOT guidelines, the cost applied to all noise barriers is \$53.40 per square foot. This cost represents a planning-level estimate. Once preliminary engineering of a noise barrier is completed, WSDOT’s opinion of cost may differ considerably from the planning-level estimate depending on soil conditions, wall height, and integration into other structures.

### *1. Residential Equivalency*

WSDOT calculates reasonableness based on the number of residences that benefit from a noise barrier. For noise-sensitive uses other than residences, a residential equivalency (RE) is calculated based on the usage factor and number of users (WSDOT, 1987).

Residences may be in use at all times, but many other facilities (e.g., schools) have specific hours of operation. The usage factor accounts for times of operation. Exhibit B-2 shows typical usage factors.

*Exhibit B-2: WSDOT Established Usage Factors*

Site	Hours/Day	Days/Week	Months/Year	Usage Factor
Homes	24	7	12	1
Apartments	24	7	12	1
Hospitals	24	7	12	1
Churches	6	3	12	0.11
Schools	10	5	9	0.22
Parks	10	5	5	0.17

In Washington an average household has three members, so for sites with other than residential uses, the number of users is divided by three to convert to households. Exhibit B-3 presents the RE for receptors in the proposed study area, which includes sensitive uses (other than single-family residences) that approach, meet, or exceed the NAC.

*Exhibit B-3: Residential Equivalency*

Noise Receptor	Activity Description	Number of Users	Usage Factor	Users to Households Factor	Residential Equivalency (RE)
1	Ikawa Park	10 <sup>1</sup>	0.17	0.33	1
2	Tukwila Park	50 <sup>1</sup>	0.17	0.33	3
3	Duwamish-Green River Trail	10 <sup>1</sup>	0.17	0.33	1
4	Family Fun Center	180 <sup>2</sup>	0.17	0.33	10
5	Interurban Trail	50 <sup>1</sup>	0.17	0.33	3
6	Springbrook Trail	10 <sup>1</sup>	0.17	0.33	1
48	Veteran's Park	10 <sup>1</sup>	0.17	0.33	1
49	Freeway Park	10 <sup>1</sup>	0.17	0.33	1
52	Cedar River Park – trail, picnic, recreational open space, beach area	50 <sup>1</sup>	0.17	0.33	3
53	Liberty Park – skateboard facility	20 <sup>1</sup>	0.17	0.33	1
54	Renton Public Library	210 <sup>2</sup>	0.22	0.33	15
55*	Liberty Park – furthest baseball field in outfield and tennis court	10 <sup>1</sup>	0.17	0.33	1
56*	Liberty Park – baseball field, stands, and basketball court	108 <sup>1</sup>	0.17	0.33	6
57*	Cedar River Park – soccer field and baseball field	108 <sup>1</sup>	0.17	0.33	6
58	Aquatic Center	180 <sup>2</sup>	0.17	0.33	10

<sup>1</sup> The number of users was estimated because user data were not available from the Renton Parks Department.

<sup>2</sup> The estimated average number of users at any one time while the facility is open.

\*Measurements were taken as part of the I-405 Renton to Bellevue Project, but were analyzed as part of the I-405 Tukwila to Renton Project

The remainder of this section describes noise barriers where multiple barrier heights were evaluated. The proposed barriers' feasibility, reasonableness, and size are discussed.

**Noise Barriers 1 and 2**

Noise Barrier 1 was not considered feasible because it will not be possible to provide a 7-dBA reduction in I-405 traffic noise levels for any of the residences represented by Modeled Site 7 with a wall of 28 feet in height and 1,190 feet in length, as shown in Exhibit B-4.

Noise Barrier 2 was not considered feasible because it will not be possible to provide a 7-dBA reduction in I-405 traffic noise levels for any of the residences represented by Modeled Site 7 with a wall of 28 feet in height and 731 feet in length, as shown in Exhibit B-5.

The predicted effects of Noise Barrier 1 were combined with those of Noise Barrier 2 to enhance the possibility of a feasible noise wall in the area. The barrier analysis of Noise Barrier 1 and Noise Barrier 2 was not considered feasible, because it will not be possible to provide a 7-dBA reduction for the residences represented by Modeled Site 7, as shown in Exhibit B-6.

*Exhibit B-4: Noise Barrier 1 – 28 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
7	3	67	0	65	2
Total Barrier Area (ft <sup>2</sup> )			0	33,320	
Planning-Level Cost (\$)			\$0	\$1,779,288	

\*Planning-level cost based on typical construction techniques and engineering for noise barriers with a maximum height of 24 feet.

*Exhibit B-5: Noise Barrier 2 – 28 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
7	3	67	2,310	64	3
Total Barrier Area (ft <sup>2</sup> )			2,310	20,468	
Planning-Level Cost (\$)			\$123,354	\$1,092,991	

\*Planning-level cost based on typical construction techniques and engineering for noise barriers with a maximum height of 24 feet.

*Exhibit B-6: Noise Barrier 1 – 28 feet tall and Noise Barrier 2 – 28 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
7	3	67	2,310	61	6
Total Barrier Area (ft <sup>2</sup> )			2,310	53,788	
Planning-Level Cost (\$)			\$123,354	\$2,872,279	

\*Planning-level cost based on typical construction techniques and engineering for noise barriers with a maximum height of 24 feet.

### Noise Barrier 3

Noise Barrier 3 was not considered feasible because it will not be possible to provide a 7-dBA reduction in I-405 and SR 167 traffic noise levels for any of the residences represented by Modeled Sites 10, 11, 12 and 13 with a wall of 28 feet in height and 975 feet in length, as shown in Exhibit B-7.

*Exhibit B-7: Noise Barrier 3 – 28 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
10	5	68	0	66	2
11	4	65	0	65	0
12	6	67	0	66	1
13	6	65	0	64	1
Total Barrier Area (ft <sup>2</sup> )			0	27,300	
Planning-Level Cost (\$)			\$0	\$1,457,820	

\*Planning-level cost based on typical construction techniques and engineering for noise barriers with a maximum height of 24 feet.

### Noise Barrier 4

Noise Barrier 4 was not considered feasible because it will not be possible to provide a 7-dBA reduction in SR 167 traffic noise levels for any of the residences represented by Modeled Sites 14 and 15 with a wall of 28 feet in height and 800 feet in length, as shown in Exhibit B-8.

*Exhibit B-8: Noise Barrier 4 – 28 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
14	8	67	0	67	0
15	6	61	0	61	0
Total Barrier Area (ft <sup>2</sup> )			0	22,400	
Planning-Level Cost (\$)			\$0	\$1,196,160	

\*Planning-level cost based on typical construction techniques and engineering for noise barriers with a maximum height of 24 feet.

### Noise Barrier 5

Noise Barrier 5 was not considered feasible because it will not be possible to provide a 7-dBA reduction in SR 167 traffic noise levels for any of the residences represented by Modeled Sites 18 and 19 with a wall of 28 feet in height and 1,760 feet in length, as shown in Exhibit B-9.

*Exhibit B-9: Noise Barrier 5 – 28 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
18	5	64	3,500	59	5
19	3	66	2,100	61	5
Total Barrier Area (ft <sup>2</sup> )			5,600	49,280	
Planning-Level Cost (\$)			\$299,040	\$2,631,552	

\*Planning-level cost based on typical construction techniques and engineering for noise barriers with a maximum height of 24 feet.

**Noise Barrier 6**

Noise Barrier 6 was not considered feasible because it will not be possible to provide a 7-dBA reduction in SR 167 traffic noise levels for any of the residences represented by Modeled Sites 20 and 21 with a wall of 28 feet in height and 1,585 feet in length, as shown in Exhibit B-10.

*Exhibit B-10: Noise Barrier 6 – 28 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
20	10	66	7,000	60	6
21	9	61	6,300	57	4
Total Barrier Area (ft <sup>2</sup> )			13,300	44,380	
Planning-Level Cost (\$)			\$710,220	\$2,369,892	

\*Planning-level cost based on typical construction techniques and engineering for noise barriers with a maximum height of 24 feet.

**Renton Nickel Noise Barrier East 5 Modification**

The modification of Renton Nickel Noise Barrier East 5 was not considered feasible because increasing its height from 18 feet to 24 feet will not provide a 7-dBA reduction in I-405 traffic noise levels for any of the residences represented by Modeled Sites 23, 24, 27, 28, and 29, as shown in Exhibit B-11.

*Exhibit B-11: Noise Barrier East 5 – 24 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier Modification	Reduction (dBA)
23	5	63	0	62	1
24	6	63	0	61	2
27	6	63	0	63	0
28	8	64	0	62	2
29	7	63	0	61	2
Total Barrier Area (ft <sup>2</sup> )			0	33,930	
Planning-Level Cost (\$)			\$0	\$1,811,862	

### **Noise Barrier 8**

The evaluation of Noise Barrier 8 is discussed in the SR 515/I-405 Interchange Technical Memorandum included in Appendix C.

### **Noise Barrier 9**

The evaluation of Noise Barrier 9 is discussed in the SR 515/I-405 Interchange Technical Memorandum included in Appendix C.

### **Noise Barrier 10**

The area from Renton Avenue S to the edge of Mill Avenue S was evaluated for placement of a noise barrier. Due to changing topography near the intersection of S 4th Avenue and Mill Avenue S, Noise Barrier 10 was divided into two barriers, 10A and 10B; the two barriers are evaluated together as they work as a system to collectively reduce noise levels at receptors located behind them. Noise Barrier 10 separates at Cedar Avenue S and becomes Noise Barrier 10A to the north and Noise Barrier 10B to the south. Noise Barrier 10A sits at the top of the stacked structure and overlaps with Noise Barrier 10B where the upper and lower roadway structure begins (see Exhibit 2-12 for a visual of the proposed stacked road structure). Noise Barrier 10B follows Mill Avenue to the bottom of the new stacked road structure. This area is shown in Exhibit 6-6. Noise levels in the area range from 63 dBA to 78 dBA (see Chapter 6 in the main body of this report).

As discussed in the main body of this report and presented in Exhibit 6-7, Noise Barriers 10A and 10B are recommended at heights of 14 to 20 feet and 20 feet respectively. At these heights, the two barriers collectively meet WSDOT feasibility criteria, because a 7-dBA reduction is achieved and a reduction of 5 dBA or greater is provided at most first-row residences. A total area of approximately 48,115 square feet and a total length of 2,453 feet are required for Noise Barriers 10A and 10B at the specified heights. Based on the WSDOT mitigation allowance, the allowable area that the residences in the vicinity of Noise Barrier 10 can receive is 77,688 square feet, as shown in Exhibit 6-7 (Chapter 6).

Portions of both Noise Barriers 10A and 10B will have to be located atop existing and planned retaining walls that separate I-405 from Renton Hill. This will require additional construction techniques and engineering to support the barrier. The additional cost of construction is estimated to be \$600,000.

As shown in Exhibit 6-7, Noise Barriers 10A and 10B meet WSDOT criteria for reasonableness after adding non-typical construction costs of building portions of both noise barriers on retaining walls. Exhibit 6-7 provides information on the total barrier area allowed, based on the noise reduction provided to receptors and the total barrier area for the design of both noise barriers. The planning-level cost presented is calculated by multiplying the total barrier area by \$53.40, which is the cost per square foot for noise barrier construction.

At a height of 12 feet, Noise Barriers 10A and 10B provide a maximum noise reduction of 10 dBA for two second-floor residences represented by Modeled Site 43B. Modeled Sites 38A, 38B, 42A, 42B, 42E, 43A, 43D, 46B, and 46C represent 20 of the 31 first-row residences that experience

a reduction of 5 dBA or more. Modeled Sites 38A, 46A, 50A, and 50B, which represent the 11 remaining first-row residences in the vicinity of Noise Barriers 10A and 10B, experience 0 dBA to 4-dBA reductions respectively. Receptors 38C, 38E, 39B, 39C, 42C, 42D, 42F, 42G, 42H, 43B, 43C, 44A, 44B, 44C, and 45A—representing 33 ground-floor, second-floor, third-floor, and fourth-floor residences—are predicted to achieve reductions that range from 3 dBA to 10 dBA.

Noise Barriers 10A and 10B collectively meet WSDOT feasibility criteria at heights of 12 feet each, because a 7-dBA reduction is achieved and a reduction of 5 dBA or greater is provided at most first-row residences. A total area of approximately 29,439 square feet and a total length of 2,453 feet are required for Noise Barriers 10A and 10B at this height. Based on the WSDOT mitigation allowance, the allowable area that the residences in the vicinity of Noise Barriers 10A and 10B can receive is 68,736 square feet, as shown in Exhibit B-12. The large amount of allowable wall area that remains available at the height of 12 feet indicates that additional noise reduction may be available by increasing each barrier’s height.

*Exhibit B-12: Noise Barrier 10 – 12 feet tall*

Modeled Site	Residences Represented	L <sub>eq</sub> (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier (dBA)	Reduction (dBA)
37A	4	62	0	61	1
37B	4	64	2,800	61	3
38A	3	75	3,936	69	6
38B	2	73	2,352	66	7
38C	2	75	2,624	71	4
38D	3	74	3,732	70	4
38E	3	76	4,140	73	3
38F	3	77	0	75	2
39A	2	68	0	68	0
39B	3	67	2,304	64	3
39C	5	65	3,500	61	4
42A	1	74	1,244	66	8
42B	4	72	4,432	64	8
42C	2	75	2,624	66	9
42D	2	77	2,896	73	4
42E	2	72	2,216	64	8
42F	2	75	2,624	68	7
42G	2	77	2,896	73	4
42H	2	78	3,032	74	4
43A	3	71	3,120	65	6
43B	2	76	2,760	66	10
43C	2	77	2,896	73	4
43D	2	71	2,080	64	7
44A	3	68	2,508	64	4
44B	2	69	1,808	62	7
44C	2	67	1,536	62	5

*Exhibit B-12: Noise Barrier 10 – 12 feet tall*

Modeled Site	Residences Represented	$L_{eq}$ (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier (dBA)	Reduction (dBA)
45A	3	65	2,100	62	3
45B	4	61	0	60	1
46A	3	67	0	67	0
46B	1	69	904	63	6
46C	2	68	1,672	62	6
47A	3	62	0	61	1
47B	4	61	0	61	0
50A	2	71	0	71	0
50B	3	67	0	67	0
51A	2	69	0	69	0
51B	2	66	0	66	0
Barrier 10A Area (ft <sup>2</sup> )			--	21,406	
Barrier 10B Area (ft <sup>2</sup> )			--	8,033	
TOTAL Barrier Area (ft <sup>2</sup> )			68,736	29,439	
Planning-Level Cost (\$)			\$3,670,502	\$1,572,043 + \$600,000 = \$2,172,043	

At heights of 28 feet respectively, Noise Barriers 10A and 10B provide a maximum noise reduction of 15 dBA for six second-floor and third-floor residences represented by Modeled Sites 42C, 42D, and 43C. Modeled Sites 38A, 38B, 38D, 42A, 42B, 42E, 43A, 43D, 46B, and 46C represent 23 of the 31 first-row residences that experience a reduction of 5 dBA or more. Modeled Sites 46A, 50A, and 50B—representing the eight remaining first-row residences in the vicinity of Noise Barriers 10A and 10B—experience reductions of 0 to 1 dBA. Receptors 37A, 37B, 38C, 38E, 38F, 39A, 39B, 39C, 42C, 42D, 42F, 42G, 42H, 43B, 43C, 44A, 44B, 44C, 45A, and 45B—representing 54 ground-floor, second-floor, third-floor, and fourth-floor residences—are predicted to achieve reductions that range from 3 dBA to 15 dBA.

Noise Barriers 10A and 10B meet WSDOT feasibility criteria at a height of 28 feet, because a 7-dBA reduction is achieved and a reduction of 5 dBA or greater is provided at most first-row residences. A total area of approximately 68,690 square feet and a total length of 2,453 feet are required for Noise Barriers 10A and 10B at this height. Based on the WSDOT mitigation allowance, the allowable area that the residences in the vicinity of Noise Barriers 10A and 10B can receive is 80,468 square feet, as shown in Exhibit B-13. A 2-dBA average reduction is predicted per benefited receiver with the 28-foot barrier design, compared to the 20-foot barrier design. Only eight additional residences experience noise levels below the NAC when comparing the 28-foot height to the 20-foot height. The 28-foot height design also adds only four additional benefited receivers compared to the 20-foot height design for Noise Barriers 10A and 10B.

I-405, TUKWILA TO RENTON IMPROVEMENT PROJECT (I-5 TO SR 169 – PHASE 2)  
NOISE DISCIPLINE REPORT

*Exhibit B-13: Noise Barrier 10 – 28 feet tall*

Modeled Site	Residences Represented	L <sub>eq</sub> (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier (dBA)	Reduction (dBA)
37A	4	62	2,800	59	3
37B	4	64	2,800	56	8
38A	3	75	3,936	62	13
38B	2	73	2,352	60	13
38C	2	75	2,624	62	13
38D	3	74	3,732	61	13
38E	3	76	4,140	64	12
38F	3	77	4,344	69	8
39A	2	68	1,808	60	8
39B	3	67	2,304	57	10
39C	5	65	3,500	59	6
42A	1	74	1,244	61	13
42B	4	72	4,432	61	11
42C	2	75	2,624	60	15
42D	2	77	2,896	62	15
42E	2	72	2,216	60	12
42F	2	75	2,624	61	14
42G	2	77	2,896	62	15
42H	2	78	3,032	66	12
43A	3	71	3,120	62	9
43B	2	76	2,760	62	14
43C	2	77	2,896	62	15
43D	2	71	2,080	61	10
44A	3	68	2,508	58	10
44B	2	69	1,808	58	11
44C	2	67	1,536	56	11
45A	3	65	2,100	60	5
45B	4	61	2,800	56	5
46A	3	67	0	65	2
46B	1	69	904	60	9
46C	2	68	1,672	59	9
47A	3	62	0	60	2
47B	4	61	0	59	2
50A	2	71	0	71	0
50B	3	67	0	66	1
51A	2	69	0	68	1
51B	2	66	0	66	0
<b>Barrier 10A Area (ft<sup>2</sup>)</b>			--	49,947	
<b>Barrier 10B Area (ft<sup>2</sup>)</b>			--	18,743	
<b>TOTAL Barrier Area (ft<sup>2</sup>)</b>			80,488	68,690	
<b>Planning-Level Cost (\$)</b>			\$4,298,059	\$3,668,046 + \$600,000 = \$4,268,046	

### Noise Barrier 11

Noise Barrier 11 was not considered feasible because it is not possible to provide a 7-dBA reduction in I-405 traffic noise levels for any of the residences represented by Modeled Sites 40 and 41 with a wall of 28 feet in height and 846 feet in length (as shown in Exhibit B-14).

*Exhibit B-14: Noise Barrier 11 – 28 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
40	3	74	0	74	0
41	7	65	0	65	0
Total Barrier Area (ft <sup>2</sup> )			0	23,688	
Planning-Level Cost (\$)			\$0	\$1,264,939	

\*Planning-level cost based on typical construction techniques and engineering for noise barriers with a maximum height of 24 feet.

### Noise Barrier 12

Noise Barrier 12 is approximately 1,250 feet in length. A minimum height of 10 feet is necessary to meet WSDOT feasibility criteria and providing a 7-dBA reduction (and a reduction of 5 dBA or greater) for all first-row residential equivalents in the area, which are represented by Modeled Site 57.

As discussed in the main body of this report and presented in Exhibit 6-8 (and in Exhibit B-15 for comparison purposes), Noise Barrier 12 is unreasonable at a height of 10 feet because it requires an area of approximately 12,500 square feet. This far exceeds the 7,056 square feet of allowable area that residences in the vicinity of Noise Barrier 12 can receive.

Noise Barrier 12 was evaluated for two additional configurations (see Exhibits B-16 and B-17). At heights of 14 feet and 18 feet, Noise Barrier 12 meets WSDOT feasibility criteria by providing a 7-dBA reduction (and a reduction of 5 dBA or greater) for all first-row residential equivalents in the area, which are represented by Modeled Site 57.

The allowable wall area for Noise Barrier 12 at heights of 14 feet and 18 feet is the same: 7,056 square feet. The required area for a 14-foot-tall wall and an 18-foot-tall wall respectively increase to 17,500 and 22,500 square feet (which is over the 12,500 square feet required for a height of 10 feet). This indicates that these wall heights will be even more unreasonable than a 10-foot wall for Noise Barrier 12.

*Exhibit B-15: Noise Barrier 12 – 10 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
52	3	67	0	65	2
57	6	73	7,056	66	7
58	10	63	0	62	1
Total Barrier Area (ft <sup>2</sup> )			7,056	12,500	
Planning-Level Cost (\$)			\$376,790	\$667,500	

*Exhibit B-16: Noise Barrier 12 – 14 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
52	3	67	0	65	2
57	6	73	7,056	64	9
58	10	63	0	62	1
Total Barrier Area (ft <sup>2</sup> )			7,056	17,500	
Planning-Level Cost (\$)			\$376,790	\$934,500	

*Exhibit B-17: Noise Barrier 12 – 18 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
52	3	67	0	65	2
57	6	73	7,056	64	9
58	10	63	0	62	1
Total Barrier Area (ft <sup>2</sup> )			7,056	22,500	
Planning-Level Cost (\$)			\$376,790	\$1,201,500	

### Noise Barrier 13

Noise Barrier 13 was not considered feasible because it is not possible to provide a 7-dBA reduction in I-405 traffic noise levels for any of the residences represented by Modeled Sites 53, 54, 55 and 56 with a wall of 24 feet in height and 1,260 feet in length. This is discussed in the main body of the report (see Exhibit 6-9) and shown in Exhibit B-18.

Noise Barrier 13 was evaluated for one additional configuration (see Exhibit B-19). At a height of 28 feet, Noise Barrier 13 is considered feasible because it provides a 7-dBA reduction in I-405 traffic noise levels for residences represented by Modeled Site 56; however, at this height Noise Barrier 13 is 35,280 square feet, which is nearly twice the allowable barrier area of 18,585 square feet.

*Exhibit B-18: Noise Barrier 13 – 24 feet tall*

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
53	1	69	905	66	3
54	15	67	0	65	2
55	1	65	700	62	3
56	6	69	5,430	63	6
Total Barrier Area (ft <sup>2</sup> )			7,035	30,240	
Planning-Level Cost (\$)			\$375,669	\$1,614,816	

***Exhibit B-19: Noise Barrier 13 – 28 feet tall***

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
53	1	69	905	66	3
54	15	67	11,550	64	3
55	1	65	700	62	3
56	6	69	5,430	62	7
Total Barrier Area (ft <sup>2</sup> )			18,585	35,280	
Planning-Level Cost (\$)			\$992,439	\$1,883,952	

**Noise Barrier 14**

Noise Barrier 14 was not considered feasible because it is not possible to provide a 7-dBA reduction in I-405 traffic noise levels for any of the residences represented by Modeled Sites 59, 60, and 61 with a wall of 28 feet in height and 750 feet in length (as shown in Exhibit B-20).

***Exhibit B-20: Noise Barrier 14 – 28 feet tall***

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft <sup>2</sup> )	Noise Level with Barrier	Reduction (dBA)
59	1	65	0	64	1
60	1	71	0	70	1
61	1	74	1,244	71	3
Total Barrier Area (ft <sup>2</sup> )			1,244	21,000	
Planning-Level Cost (\$)			\$66,430	\$1,121,400	

\*Planning-level cost based on typical construction techniques and engineering for noise barriers with a maximum height of 24 feet.