SECTION 6 MEASURES TO AVOID OR MINIMIZE EFFECTS

WSDOT can control noise at three locations: at noise sources, with mufflers and quieter engines; along noise paths, with barriers; and at receptors, with insulation. Noise abatement is only necessary where frequent human use occurs and where a lower noise level will provide benefits (USDOT, 1982).

How will effects from construction noise be minimized?

Where practicable, WSDOT will reduce construction noise by using enclosures or walls to surround noisy equipment, installing mufflers on engines, using quiet equipment or construction methods, minimizing operation time, and locating stationary equipment far from sensitive receptors. To reduce construction noise at nearby receptors, WSDOT will incorporate the following activities where practicable:

- As construction takes place in the area where the noise barrier is to be built, if possible, construct the proposed noise barrier before other construction activities begin;
- Limit the noisiest construction activities (e.g., pile driving) to between 7 a.m. and 10 p.m., to reduce construction noise levels during sensitive nighttime hours;
- Equip construction equipment engines with adequate mufflers, intake silencers, and engine enclosures to reduce their noise;
- Turn off construction equipment during prolonged periods of nonuse to eliminate noise;
- Locate stationary equipment away from residences to decrease noise;
- Construct temporary noise barriers or curtains around stationary equipment that must be located near residences, to decrease noise levels at nearby sensitive receptors; and
- Require use of Occupational Safety and Health Administration (OSHA)-approved ambient sound-sensing backup alarms, to reduce disturbances from backup alarms during quiet periods.

How can effects from traffic noise be minimized?

FHWA regulations (23 CFR 772) specify that when the project team identifies noise effects, they must evaluate abatement (mitigation) measures to reduce these effects. For FHWA approval, the project team must incorporate all noise abatement measures that they determine to be feasible and reasonable into the project design, including the opinions of local residences regarding the mitigation measures.

A variety of mitigation methods can effectively reduce traffic noise levels. For example, methods to reduce noise generated from the project's long-term operation can include implementing traffic management measures, acquiring land as buffer zones, realigning the roadway, noise-insulating public use or non-profit institutional structures, and constructing noise barriers or berms.

The I-405 Team's noise specialists evaluated these measures for their potential to reduce noise caused by the proposed project. This section summarizes the results of this evaluation. A final determination of the size and placement of noise barriers or berms and the implementation of other noise-attenuating methods will take place during detailed project design. This determination will occur after an opportunity for public involvement and after approval of noise mitigation strategy at the local, state, and/or federal levels.

Traffic Management Measures

Traffic management measures include time restrictions or traffic control devices and signing. These measures help prohibit certain vehicle types (e.g., motorcycles and heavy trucks), modify speed limits, and implement exclusive lane designations.

Restricting vehicle types or lowering speed limits on I-405 could worsen congestion and is contrary to the facility's purpose. Limiting the introduction of new sensitive noise receptors near the study area could help reduce noise effects, although the area is largely built out. A Transportation System Management Plan, combined with increased transit facilities that encourage carpool and public transit use, will reduce vehicle trips and subsequently reduce traffic noise. However, a 3-dBA decrease in traffic noise will require an approximately 50 percent reduction in traffic, which is highly unlikely.

Land Acquisition for Noise Buffers or Barriers

Residential properties border I-405 in the study area. Acquiring land in this area would require relocating residents, and often presents an unreasonably expensive option for noise mitigation purposes.

Roadway Realignment

The project's horizontal alignment is defined to minimize impacts to property owners and environmental sensitive areas. The vertical alignment is constrained by the need to provide clearance above and below roadway, railroad, and utility crossings. Lowering the I-405 mainline to provide noise reduction to some receptors will be prohibitively expensive and will provide only marginal improvement. Realigning the roadway could also increase noise levels at other receptors.

Noise Insulation of Buildings

Noise insulation of buildings could be feasible, but this remedy does not apply for commercial and residential structures, which constitute most uses within the study area. Noise insulation is provided primarily for public facilities.

Noise Barriers

Noise barriers include noise walls, berms, and buildings with uses that are not noise sensitive. A noise barrier's effectiveness is determined by its height and length and by site topography.

WSDOT evaluates many factors to determine whether barriers are feasible and reasonable. To be feasible, a barrier must be constructible in a location within WSDOT right-of-way that achieves a noise reduction of at least 7 dBA at one or more receptors, and must provide a reduction of at least 5 dBA at most first-row receptors. Determination of reasonableness depends on: the number of sensitive receptors benefited by a reduction in noise of at least 3 dBA; the cost effectiveness of the barriers to provide noise reduction within the allowable area determined by the number of benefited receivers; and concerns such as aesthetics, safety, and the desires of nearby residents.

Noise barriers were evaluated in areas where noise levels were predicted to approach, meet, or exceed the NAC if the project is built. These areas included a large number of noise-

sensitive receptors, closely grouped together to allow for a reasonable evaluation.

Noise-sensitive areas that approach, meet, or exceed the NAC were evaluated for noise barriers, except for Ikawa Park, Tukwila Park, Duwamish-Green River Trail, Interurban Trail, Springbrook Trail, Freeway Park, and Veteran's Park. Based on their physical location in relation to I-405, noise mitigation from I-405 is not feasible in these noise-sensitive areas. The absence of a large number of noise-sensitive receptors in these areas will also prevent them from meeting WSDOT's reasonableness criteria. Receptor locations and noise levels are shown in Exhibits 4-2 through 4-15.

Due to ramp reconfigurations and subsequent elevation changes in the study area, noise modeling results for the Build Alternative predict decreased noise levels for the 10 residences represented by a family fun center, as well as for the Interurban and Springbrook trails. Baseline noise levels are 71 dBA for the family fun center and 74 dBA for each of the trails, and are predicted to be 69 dBA, 68 dBA, and 70 dBA respectively for the Build Alternative. Therefore, a reduction in noise levels occurs in these locations even without a noise barrier. While these areas are eligible for mitigation, they are not areas where noise mitigation efforts can noticeably lower noise levels at a cost per benefited user that satisfies WSDOT criteria for reasonableness.

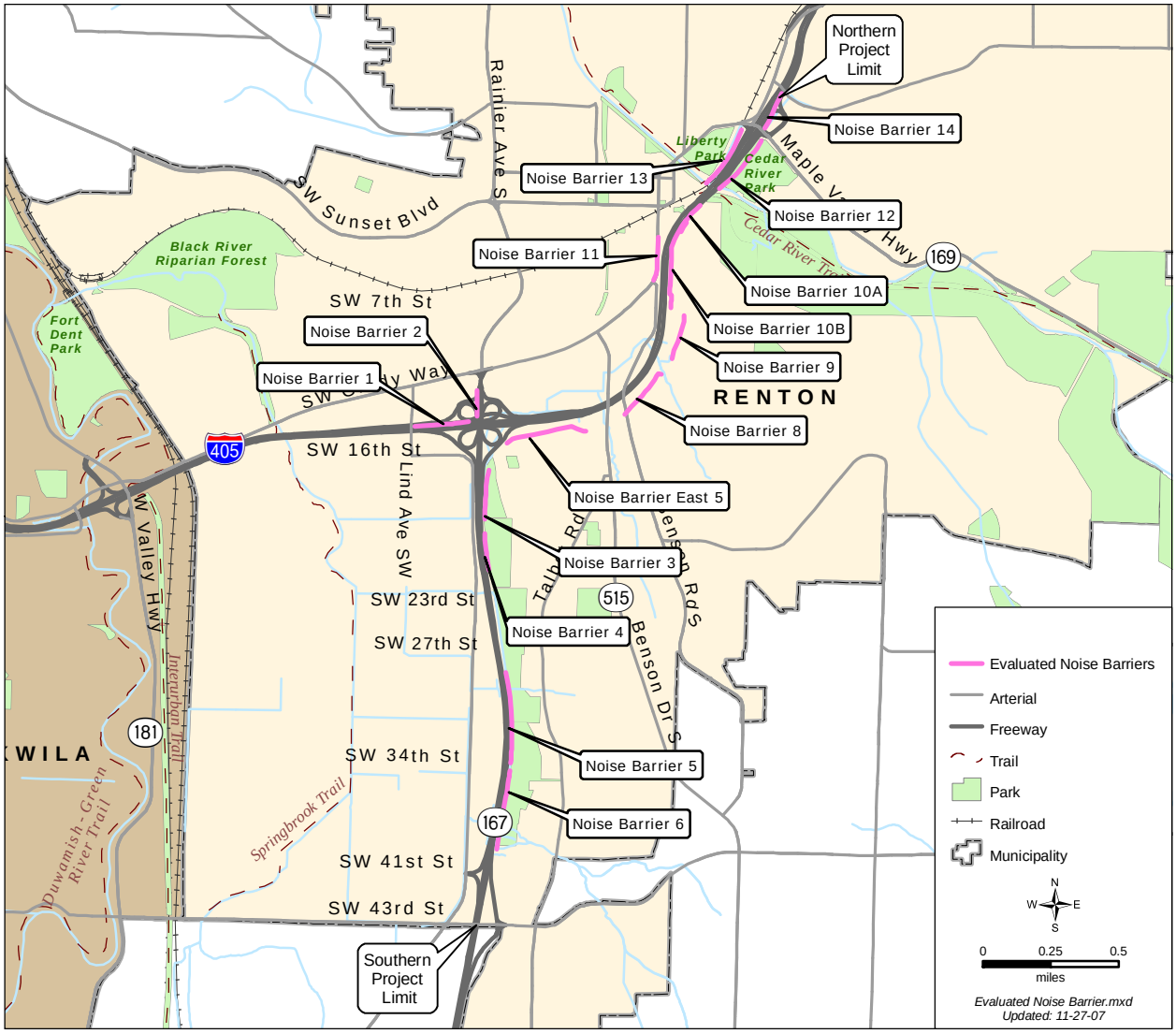
Ikawa Park, Tukwila Park, and Duwamish-Green River Trail all exceed the NAC under baseline conditions at 70 dBA, 66 dBA and 72 dBA, respectively. These locations each experience a 1-dBA increase due to increased traffic volume under the Build Alternative, putting them at 71 dBA, 67 dBA, and 73 dBA, respectively. These areas are not areas where noise mitigation efforts can noticeably lower noise levels at a cost per benefited user that satisfies WSDOT criteria for reasonableness.

Veteran's Park is predicted to experience a 1-dBA increase in noise levels, from 69 dBA under baseline conditions to 70 dBA for the Build Alternative. Further noise analysis of Freeway Park is not relevant, because Build Alternative improvements will require its acquisition. These are also areas where noise mitigation efforts cannot noticeably lower noise levels at a cost per benefited user that satisfies WSDOT criteria for reasonableness.

Fourteen noise barriers were evaluated for the Tukwila to Renton Project. Evaluated noise barrier locations are shown in Exhibit 6-1. Noise Barrier East 5 already exists under baseline conditions, from construction of the Renton Nickel Improvement Project. This barrier is included in the baseline conditions and No Build Alternative, and will be moved to a new location under the Build Alternative due to reconfiguration of the I-405 mainline and the I-405/SR 167 interchange.

Two new noise barriers are planned for construction as a part of the Tukwila to Renton Project. Noise Barrier 8 is planned for construction along the WSDOT right-of-way line east of

Exhibit 6-1: Evaluated Noise Barriers



Benson Road S and southeast of I-405, near the Berkshire Apartments. Noise Barriers 10A and 10B, which work together as a single system, will be constructed atop a retaining wall from Renton Avenue S to the edge of Mill Avenue S to reduce residential noise levels on Renton Hill.

This section summarizes the evaluation of each noise barrier. Refer to Appendix B for more detailed information on the noise barrier evaluation. Noise Barrier East 5, Noise Barrier 8, and Noise Barrier 9 were evaluated further as part of the redesigned SR 515/I-405 half-diamond interchange. This analysis is presented in Appendix C.

Noise Barrier 1 (Not Feasible)

Single-family residences in the area northwest of the I-405/SR 167 interchange were evaluated for a noise barrier. This noise barrier was evaluated along the southern edge of the new southbound frontage road between the eastern edge of Lind Avenue and the western edge of SR 167. The noise level predicted at the sensitive receptor site in this area is 67 dBA without a barrier.

The maximum reduction achieved was 2 dBA for the three residences represented by Modeled Site 7. Noise Barrier 1 will not provide a 7-dBA reduction in I-405 and SR 167 traffic noise levels with a 28-foot-high wall. For this reason, Noise Barrier 1 is not feasible.

The predicted effects of Noise Barrier 1 were combined with the effects of Noise Barrier 2, as shown in Appendix B. However, even when combined these noise barriers could not achieve a 7-dBA reduction with a 28-foot-high wall in order to meet WSDOT's feasibility criteria.

Noise Barrier 2 (Not Feasible)

Single-family residences in the area northwest of the I-405/SR 167 interchange were evaluated for a second noise barrier, in addition to Noise Barrier 1. This noise barrier was evaluated along the western edge of SR 167, just north of the new southbound frontage road. The noise level predicted at the sensitive receptor site in this area is 67 dBA without a barrier.

The maximum reduction was 3 dBA for the three residences represented by Modeled Site 7. Noise Barrier 2 will not provide a 7-dBA reduction in I-405 and SR 167 traffic noise

levels with a 28-foot-high wall. For this reason, Noise Barrier 2 is not feasible.

The predicted effects of Noise Barrier 2 were combined with the effects of Noise Barrier 1, as shown in Appendix B. However, even when combined these noise barriers could not achieve a 7-dBA reduction with a 28-foot-high wall in order to meet WSDOT's feasibility criteria.

Noise Barrier 3 (Not Feasible)

The area southeast of the I-405/SR 167 interchange, along the eastern edge of the SR 167 northbound general-purpose off-ramp to northbound I-405, was evaluated for a noise barrier. Noise levels in the area of Noise Barrier 3 range from 65 dBA to 67 dBA without a noise barrier.

The maximum reduction provided by Noise Barrier 3 is 2 dBA for the five residences represented by Modeled Site 10. With a 28-foot-high-wall, Noise Barrier 3 will not 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 (see Appendix B). For this reason, Noise Barrier 3 is not feasible.

Noise Barrier 4 (Not Feasible)

The area southeast of the SR 167 northbound general-purpose off-ramp to northbound I-405 was evaluated for a noise barrier. The noise barrier was evaluated along the eastern edge of SR 167. Noise levels in the area of Noise Barrier 4 range from 61 dBA to 67 dBA without a noise barrier.

Noise Barrier 4 did not provide a measurable reduction in noise levels for this area. With a 28-foot-high wall, Noise Barrier 4 will not provide a 7-dBA reduction in I-405 and SR 167 traffic noise levels for any of the residences represented by Modeled Sites 14 and 15 (see Appendix B). For this reason, Noise Barrier 4 is not feasible.

Noise Barrier 5 (Not Feasible)

A pocket of single-family residences on Talbot Road S, south of the I-405/SR 167 interchange and east of SR 167, were evaluated for a noise barrier. This noise barrier was evaluated along the eastern edge of SR 167. Noise levels in the area of Noise Barrier 5 range from 64 dBA to 66 dBA without a noise barrier.

The maximum reduction provided by Noise Barrier 5 is 5 dBA for the five residences represented by Modeled Site 18 and for the three residences represented by Modeled Site 19. With a 28-foot-high wall, Noise Barrier 5 will not provide a 7-dBA reduction in SR 167 traffic noise levels for any of the residences represented by Modeled Sites 18 and 19 (see Appendix B). For this reason, Noise Barrier 5 is not feasible.

Noise Barrier 6 (Not Feasible)

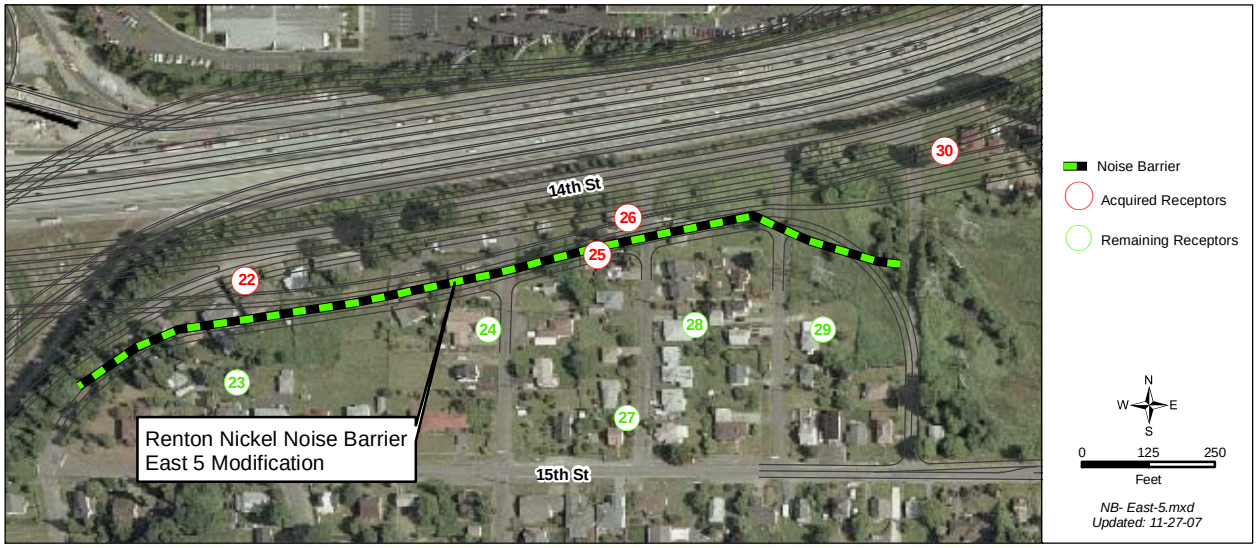
A pocket of single-family residences on Shattuck Avenue S and S 36th Street, south of the I-405/SR 167 interchange and east of SR 167, were evaluated for a noise barrier. This noise barrier was evaluated along the eastern edge of SR 167. Noise levels in the area of Noise Barrier 6 range from 61 dBA to 66 dBA.

The maximum reduction provided by Noise Barrier 6 was 6 dBA for the 15 residences represented by Modeled Site 20. With a 28-foot-high wall, Noise Barrier 6 will not provide a 7-dBA reduction in SR 167 traffic noise levels for any of the residences represented by Modeled Sites 20 and 21 (see Appendix B). For this reason, Noise Barrier 6 is not feasible.

Renton Nickel Noise Barrier East 5 Modification

Noise Barrier East 5 was built under the Renton Nickel Improvement Project and will be relocated as a part of the Tukwila to Renton Project. Noise Barrier East 5 will be relocated south of the existing S 14th Street, directly southeast of the I-405/ SR 167 interchange (see Exhibit 6-2 below). The noise barrier will run along the eastern edge of the SR 167

Exhibit 6-2: Renton Nickel Noise Barrier East 5 Modification



northbound general-purpose off-ramp to I-405 northbound and the southern edge of the proposed northbound frontage road, beginning west of the S 15th Street/Lake Avenue intersection atop Talbot Hill and ending just west of the old Smithers Avenue S.

In accordance with WSDOT perpetuity standards, Noise Barrier East 5 must be relocated to a position that provides residences in the Talbot Hill area with shielding effects that are comparable to those of Noise Barrier East 5 in its original position. Noise Barrier East 5 will have the same approximate dimensions as it does under the Renton Nickel Improvement Project. However, it will be approximately 100 feet shorter in length because the two potentially noise-sensitive residences in the area to the east of the old Smithers Avenue S will be acquired for an interim construction stage which is addressed in Appendix C. The length of Noise Barrier East 5 will be approximately 1,608 feet and it will remain at a height of 18 feet.

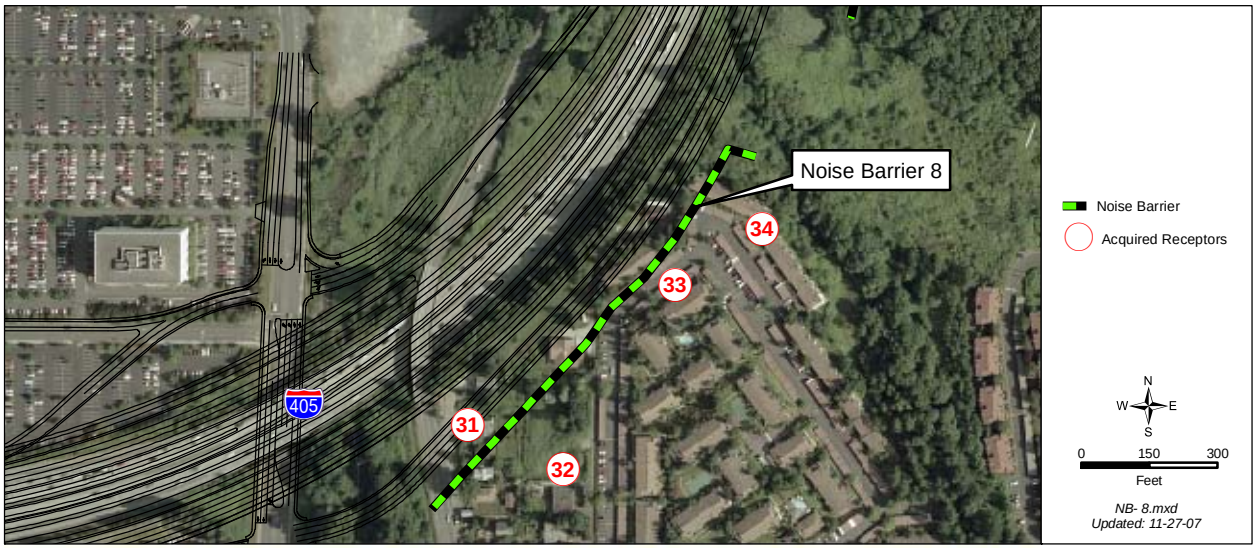
Modifications to Noise Barrier East 5 were evaluated. Noise levels in this area range from 67 dBA to 72 dBA under the Build Alternative.

Increasing the height from 18 feet to 24 feet provided a maximum reduction of 2 dBA for the 21 residences represented by Modeled Sites 24, 28, and 29. This modification to Noise Barrier East 5 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 (see Appendix B). For this reason, an upgrade to Noise Barrier East 5 is not feasible.

Noise Barrier 8 (Feasible, Reasonable)

The area just east of Benson Road S and continuing atop the hillside adjacent to the Berkshire Apartments was evaluated for a noise barrier (see Exhibit 6-3). This noise barrier was evaluated along the new WSDOT right-of-way line from Benson Road S, continuing north to approximately 200 feet beyond the Berkshire Apartment property. Noise levels in the area of Noise Barrier 8 range from 54 dBA to 71 dBA.

Exhibit 6-3: Location of Noise Barrier 8



Planned acquisitions for the SR 515/I-405 half-diamond interchange include two apartment buildings within the Berkshire Apartment complex and full or partial acquisitions of several single-family residential parcels, including some residential structures along I-405 and Benson Road S.

At a height of 20 feet, Noise Barrier 8 provides a maximum noise reduction of 12 dBA for four second-floor residences represented by Modeled Site 33A(2). Modeled Sites 32A, 33A, and 33D represent all nine first-row residences, which experience a reduction of 5 dBA or more. Receptors 33A(2), 33D(2), 33F, 33F(2), 33G, and 33G(2)—representing 21 ground-floor and second-floor residences—are predicted to achieve reductions that range from 3 dBA to 12 dBA.

Noise Barrier 8 meets WSDOT feasibility criteria at a height of 20 feet, because a 7-dBA reduction is achieved and a reduction of 5 dBA or greater is provided at most first-row residences. An area of approximately 21,911 square feet and a length of 1,096 feet are required for Noise Barrier 8 at this height. Noise Barrier 8 would force utility line relocation in the area north of the Berkshire Apartments. Utility relocations costs of $40,000 are including in the evaluation of reasonableness shown in Exhibit 6-4. Based on the WSDOT mitigation allowance, the allowable area that the residences in the vicinity of Noise Barrier 8 can receive is 24,406 square feet, as shown in Exhibit 6-4. The optimal barrier height for Noise Barrier 8 is 20 feet.

Exhibit 6-4: Allowed Barrier Area for Noise Barrier 8 – 20 feet tall

Modeled Site	Residences Represented	L_{eq} (dBA)	Allowed Barrier Area (ft^2)	Noise Level with Barrier (dBA)	Reduction (dBA)
32A	2	71	2,080	66	5
32B	3	69	0	67	2
33A	4	66	2,800	57	9
33A(2)	4	71	4,160	59	12
33B	4	54	0	52	2
33B(2)	4	54	0	53	1
33C	3	56	0	55	1
33C(2)	3	58	0	56	2
33D	3	65	2,100	56	9
33D(2)	3	69	2,712	61	8
33E	3	55	0	54	1
33E(2)	3	57	0	55	2
33F	3	64	2,100	59	5
33F(2)	3	67	2,304	62	5
33G	4	66	2,800	63	3
33G(2)	4	68	3,344	65	3
TOTAL Barrier Area (ft^2)			24,400	21,911	
Utility Relocation Cost ($)			--	40,000	
Planning-Level Cost ($)			$1,302,960	$1,170,047 + $40,000 = $1,210,047	

Additional barrier heights were evaluated in Appendix C.

Noise Barrier 9 (Feasible, Not Reasonable)

A pocket of single-family residences located on Renton Avenue S, southeast of the southern limit of Mill Avenue S, were evaluated for a noise barrier. This noise barrier was evaluated along the WSDOT right-of-way line east of I-405. The residences in this area are located at a much higher elevation than the I-405 lanes. Noise levels predicted at the sensitive receptor sites in this area range from 65 to 71 dBA without a barrier.

The maximum reduction provided by Noise Barrier 9 was 8 dBA for the three residences represented by Modeled Site

35D. As shown in Exhibit 6-5, at this barrier height Noise Barrier 9 meets WSDOT feasibility criteria, because a 7-dBA noise reduction is experienced at Modeled Sites 35B and 35D and 9 of the 12 first-row residences represented by Modeled Sites 35B, 35C, and 35D achieve at least a 5-dBA noise reduction. At a height of 16 feet, an area of approximately 11,584 square feet and a length of 724 feet is required for Noise Barrier 9. Based on the WSDOT mitigation allowance, the allowable area that residences in the vicinity of Noise Barrier 9 can receive is 10,236 square feet. Because the allowable area is less than the area needed for the shortest barrier in both height (16 feet) and length (724 feet), Noise Barrier 9 is not considered to be reasonable.

Exhibit 6-5: Noise Barrier 9 – 16 feet tall

Modeled Site	Residences Represented	Leq (dBA)	Allowed Barrier Area (ft^2)	Noise Level with Barrier	Reduction (dBA)
35A	3	65	2,100	62	3
35B	3	66	2,100	59	7
35C	3	71	3,120	66	5
35D	3	70	2,916	62	8
Total Barrier Area (ft^2)			10,236	11,584	
Planning-Level Cost ($)			$546,602	$618,586	

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

Additional barrier heights were evaluated in Appendix C.

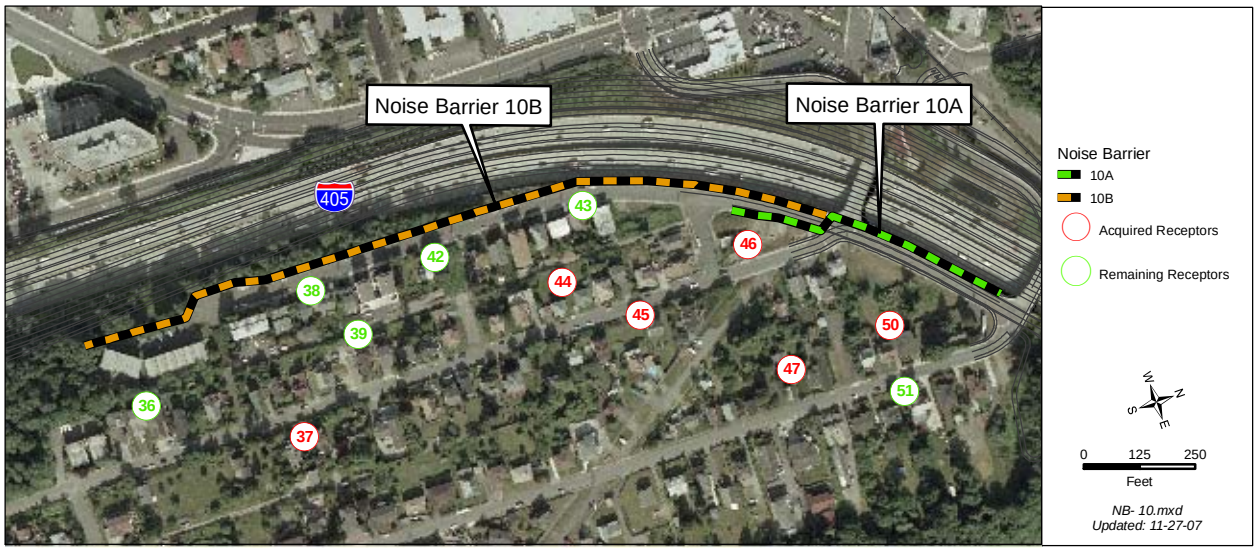
Noise Barriers 10A and 10B (Feasible, Reasonable)

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.

At heights of 14 to 20 feet and 20 feet respectively, Noise Barriers 10A and 10B provide a maximum noise reduction of 13 dBA for two second-floor residences represented by Modeled Site 43B. Modeled Sites 38A, 38B, 38D, 42A, 42B, 42E, 43A, 43D, 46B, and 46C represent 23 of the 31 first-row residences, which experience a reduction of 5 dBA or more. Modeled Sites 46A, 50A, and 50B, which represent the 8 remaining first-row residences in the vicinity of Noise Barriers 10A and 10B, experience between 0 dBA and 1-dBA reductions. Receptors 37B, 38C, 38E, 38F, 39A, 39B, 39C, 42C, 42D, 42F, 42G, 42H, 43B, 43C, 44A, 44B, 44C, 45A, and 45B—representing 50 ground-floor, second-floor, third-floor, and fourth-floor residences—are predicted to achieve reductions that range from 4 dBA to 13 dBA.

Exhibit 6-6: Location of Noise Barriers 10A and 10B



Noise Barriers 10A and 10B meet WSDOT feasibility criteria at heights of 14 to 20 feet and 20 feet respectively, 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.

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 for 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 standard cost per square foot for noise barrier construction.

Additional barrier height evaluations are presented in Appendix B.

Exhibit 6-7: Allowed Barrier Area for Noise Barrier 10

Modeled Site	Residences Represented	L_{eq} (dBA)	Allowed Barrier Area (ft^2)	Noise Level with Barrier (dBA)	Reduction (dBA)
37A	4	62	0	60	2
37B	4	64	2,800	57	7
38A	3	75	3,936	64	11
38B	2	73	2,352	62	11
38C	2	75	2,624	65	10
38D	3	74	3,732	64	10
38E	3	76	4,140	69	7
38F	3	77	4,344	73	4
39A	2	68	1,808	63	5
39B	3	67	2,304	59	8
39C	5	65	3,500	60	5
42A	1	74	1,244	63	11
42B	4	72	4,432	62	10
42C	2	75	2,624	63	12
42D	2	77	2,896	65	12
42E	2	72	2,216	62	10
42F	2	75	2,624	63	12
42G	2	77	2,896	67	10
42H	2	78	3,032	72	6
43A	3	71	3,120	63	8
43B	2	76	2,760	63	13
43C	2	77	2,896	65	12
43D	2	71	2,080	62	9
44A	3	68	2,508	60	8
44B	2	69	1,808	59	10
44C	2	67	1,536	58	9
45A	3	65	2,100	61	4
45B	4	61	2,800	57	4
46A	3	67	0	66	1
46B	1	69	904	61	8
46C	2	68	1,672	60	8
47A	3	62	0	60	2
47B	4	61	0	60	1
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^2)			-	34,727	
Barrier 10B Area (ft^2)			-	13,388	
TOTAL Barrier Area (ft^2)			77,688	48,115	
Planning-Level Cost ($)			$4,148,539	$2,569,341 + $600,000 = $3,169,341	

Noise Barrier 11 (Not Feasible)

The area around the Main Avenue S/S Grady Way/Benson Road S intersection was evaluated for a noise barrier. This noise barrier was evaluated from the southernmost point of Main Avenue S, north along its eastern edge and ending south of the Main Avenue S/Cedar Avenue intersection. Noise levels in this area range from 65 dBA to 74 dBA without a barrier.

Noise Barrier 11 will not provide any measurable noise reduction in I-405 traffic noise levels at noise receptor sites in the area with a 28-foot-high wall (see Appendix B). For this reason, Noise Barrier 11 is not feasible.

The primary reason that Noise Barrier 11 did not reduce noise levels in this area is because most of the noise experienced by the residences represented by Modeled Sites 40 and 41 comes from Main Avenue S, S Grady Way, and Benson Road S.

Noise Barrier 12 (Feasible, Not Reasonable)

The Cedar River Park area was evaluated for a noise barrier. This noise barrier was evaluated along the eastern edge of the northbound I-405 to SR 169 off-ramp, between the I-405 Cedar River Bridge and SR 169. Noise levels in this area range from 63 dBA to 73 dBA without a barrier.

At a height of 10 feet, Noise Barrier 12 provides a maximum noise reduction of 7 dBA for Modeled Site 57, which represents the soccer and baseball fields in Cedar River Park and has a Residential Equivalency (RE) of 6 first-row residences (see Exhibits B-2 and B-3 in Appendix B for an explanation of how RE is determined.) Modeled Site 58 represents an aquatic center, has an RE of 10, and experiences a 1-dBA reduction. Modeled Site 52, which represents the trails, picnic areas, recreational open space, and beach areas in Cedar River Park, has an RE of 3 and experiences a 2-dBA noise reduction.

Noise Barrier 12 meets WSDOT feasibility criteria at a height of 10 feet, because a 7-dBA reduction is achieved and a 5-dBA reduction or greater is provided for all first-row residential equivalents. An area of approximately 12,500 square feet (length of 1,250 feet) is required for Noise Barrier 12 at this height. Based on WSDOT mitigation allowance, the allowable area that the residences in the vicinity of Noise Barrier 12 can receive is 7,056 square feet, as shown in Exhibit 6-8. Because

of this, Noise Barrier 12 is not reasonable. Additional barrier height evaluations are presented in Appendix B.

Exhibit 6-8: Allowed Barrier Area for Noise Barrier 12

Modeled Site	Residences Represented	L_{eq} (dBA)	Allowed Barrier Area (ft^2)	Noise Level with Barrier (dBA)	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^2)			7,056	12,500	
Planning-Level Cost ($)			$376,790	$667,500	

Noise Barrier 13 (Feasible, Not Reasonable)

The Liberty Park area was evaluated for a noise barrier along the eastern edge of Houser Way S, beginning north of the Cedar River and ending along the western edge of the entrance to the SR 169/Sunset Boulevard to southbound I-405 on-ramp. Noise levels in this area range from 65 dBA to 69 dBA without a barrier.

The maximum reduction provided by Noise Barrier 13 is 7 dBA at Modeled Site 56, which represents the baseball field, stands, and basketball court at Liberty Park. This park is a first-row receptor with an RE of 6. Modeled Site 53 represents the skateboard facility at Liberty Park and is also a first-row receptor. This modeled site has an RE of 1 and achieves a 3-dBA reduction. Modeled Sites 54 and 55 have REs of 15 and 1 respectively and each experience 3-dBA reductions. These sites respectively represent the Renton Public Library and the tennis courts and baseball field furthest from I-405 in Liberty Park.

Noise Barrier 13 meets WSDOT feasibility criteria at a height of 28 feet, because a 7-dBA reduction is achieved, a reduction of 5 dBA or greater is provided at 6 of the 7 first-row residential equivalents, and all receptors in the vicinity achieve reductions of 3 or more dBA. An area of approximately 35,280 square feet and a length of 1,260 feet are required for Noise Barrier 13 at this height. Based on WSDOT mitigation allowance, the allowable area that the sites in the vicinity of Noise Barrier 13 can receive is 18,585 square feet, as

shown in Exhibit 6-9. This indicates that Noise Barrier 13 is not reasonable.

At a height of 28 feet, Noise Barrier 13 will exceed the 24-foot-maximum height of a typically constructed noise barrier. Additional construction techniques and engineering will be needed to support the barrier. This will increase the costs of the barrier and enhance the unreasonableness of Noise Barrier 13. (Note: Additional costs are not included in Exhibit 6-9.)

Exhibit 6-9: Allowed Barrier Area for Noise Barrier 13

Modeled Site	Residences Represented	L_{eq} (dBA)	Allowed Barrier Area (ft^2)	Noise Level with Barrier (dBA)	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^2)			18,585	35,280	
Planning-Level Cost ($)			$992,439	$1,883,952	

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

Noise Barrier 14 (Not Feasible)

The area northeast of the I-405/SR 169 interchange and southeast of NE 3rd Avenue was evaluated for a noise barrier. Noise Barrier 14 was evaluated along the western edge of the SR 169/NE 3rd Avenue connector. Noise levels in this area range from 65 dBA to 74 dBA.

The maximum noise reduction provided by Noise Barrier 14 is 3 dBA at Modeled Site 61, which represents a hotel. With a 28-foot-high wall, Noise Barrier 14 will not provide a 7-dBA reduction in I-405 and SR 169 traffic noise levels for any of the sites represented in the area (see Appendix B). For this reason, Noise Barrier 14 is not feasible.

The primary reason that Noise Barrier 14 did not reduce traffic noise in this area is because most of the noise experienced by residences represented by Modeled Sites 59, 60, and 61 comes from NE 3rd Avenue, the SR 169/NE 3rd Avenue connector, and SR 169.