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FINAL NOISE WALL TECHNICAL MEMORANDUM

To:	Ms. Kelly Martin Oregon Department of Transportation Region 1 Senior Project Leader
From:	Scott Noel (HMMH), James Stupfel (OBEC)
Date:	8/5/2019
Subject:	Final Noise Wall Memorandum - Draft
Reference:	HMMH Project Number 310330.002

Executive Summary

This memo supports the final design for the OR217 NB Aux Lanes Project Key# K21179 (Project), summarizing and updating the sound wall analysis of three noise walls addressed in the Project's noise technical reports (NTRs) and including additional analysis of a fourth sound wall. From the NTRs, two noise walls would be located north of the northbound (NB) Oregon Highway 217 (OR217) lanes and one located south of the southbound (SB) OR217 lanes. The fourth sound wall was analyzed for sensitive areas located north of the northern Hall Boulevard overpass, located at the west end of Homestead Lane and Crestwood Drive. All four of these sound walls have or will be carried forward in the final design.

Acoustical modeling analysis of these noise walls implementing the latest horizontal and vertical design for the Project indicates that they can be constructed feasibly and reasonably per the requirements indicated in the Oregon Department of Transportation (ODOT) Noise Manual (ODOT 2011). The sound wall lengths and heights were optimized, at a minimum, to provide benefit (i.e., 5 decibel reduction) to the same sensitive land uses as those identified in the NTRs. Relative to the sound walls analyzed in the NTRs each sound wall length was reduced, while the heights of each wall may be taller, shorter, or the same height as those listed in the NTRs. The sound walls listed in Table ES-1 and their general dimensions have been developed in this final noise wall analysis.

Table ES-1. Summary of Project Sound Walls

Sound Wall	Height Range (ft)	Average Height (ft)	Length (ft)	Surface Area (sq ft)	Cost Estimate	Number of Benefitted Receptors	Estimated Cost per Benefitted Receptor ($)
NB Sound Wall 1	10-16	13	913	12,043	$240,860	60	$4,014
NB Sound Wall 2	16-18	16	879	14,326	$299,005	26	$11,500
SB Sound Wall	16-23	20	2,105	40,905	$960,295	61	$13,917
SW Crestwood Drive and SW Homestead Lane Barrier	10-14	14	1,749	23,983	$479,660	29	$16,540

Approximately 1,020 feet of the westernmost portion of NB Sound Wall 1 would be parallel to approximately 1,050 feet of the easternmost portion of the SB Sound Wall. Parallel barrier analysis was conducted to identify if traffic noise reflections off of these noise walls would reduce their effectiveness. In some areas approximately 2 decibels (dB) to 3 dB of additional noise would result from reflections off of these noise walls. In order to reduce these effects the sound walls should be constructed using sound absorptive materials on the roadway sides of each wall with a Noise Reduction Coefficient (NRC) of 0.8 or greater. There are a number of products available to achieve this NRC or better.

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Joseph J. Czech

1. Introduction

Final noise wall analysis was conducted to confirm and update the findings of earlier analysis for three walls recommended for the Project. Two ODOT noise technical reports (NTRs) were prepared for the Project that were reviewed to determine where and what mitigation measures were recommended (SLR 2018a; 2018b). One additional addendum to these reports was also prepared. From a traffic noise perspective, no significant design changes have occurred since the date of the original NTRs; however, some vertical and/or horizontal adjustments occurred that changed the alignment relative to the design in the NTRs by ±2 feet in some areas. Four noise walls were recommended for inclusion in the Project, specifically:

- NB Sound Wall 1 (St. James Barrier)
- NB Sound Wall 2 (Carriage House Barrier)
- SB Sound Wall
- SW Crestwood Drive and SW Homestead Lane Barrier

In addition, near Shady Lane and 95th Avenue, a home owner constructed a portion of their home adjacent to ODOT right-of-way (ROW) for OR217. The wall analyzed as part of the previous analysis effort placed a noise wall in a location that would require acquisition of this property. For this reason ODOT elected to analyze repositioning the noise wall closer to the OR217 travel lanes and on-ramp from Greenburg Road to determine if it can effectively reduce noise levels. This memorandum summarizes the methods used for and results of the final noise wall analysis for the Project.

The methods used to analyze noise abatement are provided in Section 2 of this memo. Section 3 provides the results of each of the optimization efforts in detail. Section 4 lists the references used in this analysis. Appendix A includes sound level results at each receptor analyzed associated with each sound wall.

2. Methodology

Acoustical modeling using the latest version of the Federal Highway Administration's (FHWA's) Traffic Noise Model (TNM version 2.5), was completed to confirm the findings of the Project's NTRs for each of the sound walls recommended. TNM files associated with the Project's NTRs were provided by ODOT as the starting point of the final noise wall analysis. The TNM files from the NTRs were updated with the latest horizontal and vertical roadway design prepared by the Project's design engineers. The locations of the noise walls identified in the NTRs were generally retained in the analysis with the following exceptions:

(1) Where the SB Sound Wall in the NTRs intersected with a home that is adjacent to the ODOT ROW near Shady Lane and 95th Avenue. To avoid this property acquisition, the 250-foot westernmost portion of the SB Sound Wall was shifted 5 feet closer to the SB OR217 travel lanes and the on-ramp from Greenburg Road.
(2) Shifts to avoid wetlands and a culvert located near the SB Sound Wall.
(3) Where the NB Sound Wall 2 is located near Oregon Highway 99W and where it crosses over OR217, in the NTRs this sound wall followed the general alignment of an access road that connects two parking lots for the Westside Christian High School. For this analysis the noise wall makes an approximately 90-degree turn between the High School and the OR99E westbound on-ramp to NB OR217. For this wall, a longer length wall alignment along OR99E and a shorter length wall alignment were analyzed. The longer alignment would benefit the school and residences whereas the shorter alignment would only benefit the residences.

To more accurately model the apartment complex located behind the SB Sound Wall, the apartment buildings were modeled using TNM barrier objects representing the outer edges and heights of the buildings. The roadway traffic and all other inputs, other than those previously discussed, are the same as used in the NTRs.

Approximately 1,020 feet of the westernmost portion of NB Sound Wall 1 would be parallel to approximately 1,050 feet of the easternmost portion of the SB Sound Wall. In this area, the amount of traffic noise reflected from the noise walls to the noise sensitive receptors (i.e., residential uses) was calculated using the parallel barrier analysis capabilities in TNM. This analysis was completed implementing the methods identified in the

National Cooperative Highway Research Program (NCHRP) Report 791 "Supplemental Guidance on the Application of FHWA's Traffic Noise Model (TNM)" (NCHRP 2014). This guidance recommends that the amount of noise being reflected be used to identify if acoustically absorptive panels should be used to reduce these effects.

Sound walls were analyzed to identify if they are feasible and reasonable. Feasible refers to the ability of a wall to reduce noise levels (i.e., insertion loss or "IL") at impacted receptors by 5 dB or greater for at least a simple majority of impacted receptors. Reasonableness means that all three of the following are true:

(1) The cost to construct the sound wall does not exceed $25,000 per benefitted receptor,
(2) At least one impacted receptor achieves a 7 dB reduction (IL), and
(3) More than 50 percent of the benefitted receptors acknowledge via voting that they want to have the sound wall constructed. This facet of the analysis will be established via voting that will take place sometime in the summer and/or fall of 2019.

3. Results

Results of the acoustic modeling confirmed that the noise walls identified in the Project's NTRs and addenda are effective mitigation measures. The following four subsections provide detail on each of four sound walls and Appendix A provides detailed calculations of sound levels for each receptor analyzed behind the walls. TNM files and spreadsheet analyses were provided electronically with this memo. Figures 1, 2 and 3 are maps of each of the optimized walls.

3.1 NB Sound Wall 1

NB Sound Wall 1 was modeled in the same location described in the project's NTRs and optimized for the current design to achieve the same benefits (locations with 5 dB IL or more) as documented in the NTRs. In the case of NB Sound Wall 1 the same benefits are predicted via a sound wall shorter in length than that of what was presented in the NTR, see Table 1. Specifically, approximately 430 feet of sound wall length from Hall Boulevard extending northwest is not required to maintain the benefits identified in the NTR. The NB Sound Wall 1 is primarily shown in Figure 1.

Table 1. NB Sound Wall 1 (St. James Wall) Dimensions by Project Station

Project Station	Height (ft)	Panel Length (ft)	Surface Area (sq ft)[1]
378.563	14	53	740
379.18	16	66	1,049
379.9	16	69	1,101
380.54	16	73	1,162
381.25	16	76	1,224
382	14	76	1,065
382.8	14	73	1,023
383.5	12	71	852
384.2	12	65	783
384.9	12	68	811
385.5	10	58	584
386.1	10	57	568
386.7	10	51	508
387.2	10	57	573
Total Length (ft)		913	
Range in Wall Heights (ft)		10-16	
Total Surface Area (sq ft)		12,043	
Estimated Cost ($)		$240,860	
Number of Benefitted Receptors (5 dB IL)		60	
Percent Feasible (%)		98%	
Achieves Design Goal?		Yes	
Estimated Cost per Benefitted Receptor ($)		$4,014	

[1] Square footage is derived directly from TNM, which includes more significant figures than shown. For this reason, the square footage may not always be exactly the product of the rounded panel height multiplied by panel length.

3.2 NB Sound Wall 2

NB Sound Wall 2 was modeled in the same location described in the project's NTRs and optimized for the current design to achieve the same benefits (locations with 5 dB IL or more) as documented in the NTRs. A 183 foot portion of the sound wall alignment identified in the NTR extending from Hall Boulevard to the southeast would cross a parking lot at a business (Dalton's Northwest Catering) that would not benefit from the wall. A small portion of the parking lot encroaches into ODOT's ROW where the sound wall was modeled in the NTR. To avoid this ROW impact this portion of the sound wall was removed from the analysis and heights optimized to see if the same benefits identified in the NTR could be achieved. Predictions demonstrate that the sound wall identified in Table 2 would achieve the same benefits while avoiding the ROW impact. The sound wall would need to be taller to achieve these reductions. However, approximately 580 feet of sound wall length of the NTR sound wall were found to not be required to achieve the same benefits in the NTR and were therefore removed.

The NTR for NB Sound Wall 2 also required that during final design that the portion of the sound wall located between OR217 and OR99W and the Westside Christian High School be re-evaluated to see if extending the sound wall to the north running parallel to OR99W could provide benefit. The High School has a number of student/faculty picnic tables situated at the exterior of the SW corner of the building. Extending the sound wall along OR99W was evaluated to determine if a benefit would occur at the picnic tables of the High School.

This analysis demonstrated that extending the wall would benefit the High School picnic tables but would also require that a gap be included in the wall to maintain an existing pedestrian access to OR99W. To allow for the pedestrian access gap an overlap of 20 feet would be needed to achieve the same reductions at the High School. In addition, the gap in the wall and the associated overlapping wall system would require ODOT to acquire ROW from the High School for placement of the sound wall. Engineering estimates have identified that the ROW acquisitions would come at a cost of approximately $100,000. Inclusive of the ROW costs, the sound wall is reasonable to construct with the extension to benefit the High School, see Table 3; however, outreach with the High School has identified that they would not be agreeable to constructing the noise wall in this location. For this reason the portion of the sound wall to provide shielding to the High School will not be included in the final design. The NB Sound Wall 2 is depicted in Figure 2.

Table 2. NB Sound Wall 2 (Carriage House Wall) Dimensions by Project Station

Project Station	Height (ft)	Panel Length (ft)	Surface Area (sq ft)[1]
395.2	16	28	447
395.48	16	28	447
395.76	16	29	461
396.04	16	29	461
396.32	16	74	1,178
397.13	16	67	1,070
397.8	16	73	1,167
398.5	16	100	1,594
399.4	16	56	891
400	16	72	1,158
400.77	16	65	1,045
401.4	16	60	959
402	16	59	951
402.7	18	78	1,397
403.4	18	61	1,100
Total Length (ft)		879	
Range in Wall Heights (ft)		16-18	
Total Surface Area (sq ft)		14,326	
Estimated Cost ($)		$299,005	
Number of Benefitted Receptors (5 dB IL)		26	
Percent Feasible (%)		79%	
Achieves Design Goal?		Yes	
Estimated Cost per Benefitted Receptor ($)		$11,500	

[1] Square footage is derived directly from TNM, which includes more significant figures than shown. For this reason, the square footage may not always be exactly the product of the rounded panel height multiplied by panel length.

Table 3. NB Sound Wall 2 (Carriage House Wall) Dimensions by Project Station Inclusive of School Portion

Project Station	Height (ft)	Panel Length (ft)	Surface Area (sq ft)[1]
395.2	16	28	448
395.48	16	28	448
395.76	16	29	464
396.04	16	29	464
396.32	16	74	1,184
397.13	16	67	1,072
397.8	16	73	1,168
398.5	16	100	1,600
399.4	16	56	896
400	16	72	1,152
400.77	16	65	1,040
401.4	16	60	960
402	16	59	944
402.7	16	78	1,248
403.4	18	61	1,098
404	18	60	1,080
404.5	16	52	832
404.7	14	64	896
405.2	14	72	1,008
405.5	14	68	952
405.5	14	68	952
405.5	14	45	630
405.5	14	47	658
405.5	12	91	1,092
405.5	12	69	828
Total Length (ft)		1,510	
Range in Wall Heights (ft)		12-18	
Total Surface Area (sq ft)		23,105	
Cost Excluding ROW ($)		*$542,520*	
ROW Acquisition/ Retaining Wall Replacement Cost Estimate ($)		*$100,000*	
Estimated Total Cost ($)		$642,520	
Number of Benefitted Receptors (5 dB IL)		27	
Percent Feasible (%)		86%	
Achieves Design Goal?		Yes	
Estimated Cost per Benefitted Receptor ($)		$23,797	

[1] Square footage is derived directly from TNM, which includes more significant figures than shown. For this reason, the square footage may not always be exactly the product of the rounded panel height multiplied by panel length.

3.3 SB Sound Wall

The SB Sound Wall was modeled in the same location as that analyzed in the NTR except for the following:

- NW end of wall shifted 5-feet towards the OR217 onramp from Greenberg Road and
- Where the wall would transect a wetland across an existing culvert roughly at the midpoint of the sound wall, the alignment crosses perpendicular to the culvert rather than continuing straight across as it did in the NTR

Optimization of the sound wall was completed via modeling to identify specific heights of individual wall panels and to identify if the wall length could be adjusted in two areas to reduce impacts to ROW, wetlands, and the existing culvert. Modeling demonstrates that approximately 150 feet of wall length could be removed where the wall alignment would cross a wetland area where an existing culvert is located, while maintaining the number of benefits identified in the NTRs. This would result in two separate noise walls that, if analyzed in isolation from one another, would be feasible, cost effective, and meet the design goal; however, if analyzed together they provide benefit to additional receptors. To maintain consistency with the NTR and because together these walls provide benefit to more receptors, ODOT decided to treat these sound walls like one continuous sound wall for voting purposes.

In addition, approximately 100 feet of the southeastern end of the sound wall was removed to avoid a ROW impact. This reduction in wall length can be accomplished while maintaining the number of benefits identified in the NTRs. Table 4 provides the results of this analysis and demonstrates that the sound wall is feasible, cost effective and meets the design goal.

The SB Sound Wall (northern and southern portions) is shown primarily in Figure 1.

3.4 SW Crestwood Dive and SW Homestead Lane Barrier

A variable height barrier ranging in heights of 10 to 14 feet and of a length of 1,841 feet was found to meet the ODOT feasible, cost, and design goal criteria in the projects NTR addenda (HMMH 2019). The optimized barrier is unchanged from what was analyzed in the technical report addenda and would cost $479,660 with a cost benefit per benefitted receptor of $16,540. Table 5 provides the results of this analysis and demonstrates that the sound wall is feasible, cost reasonable, and meets the design goal. Figure 3 is a map of the sound wall location and the receptors that would benefit from the wall.

3.5 Parallel Barrier Analysis

Where NB Sound Wall 1 and the SB Sound Wall are parallel to one another, parallel barrier analysis demonstrates that sound levels would be increased by 3 dB or greater in some locations, substantially reducing the barriers' effectiveness. In these areas the side of each wall facing OR217 should be acoustically absorptive with a noise reduction coefficient (NRC) of 0.8 or greater. Modeling demonstrates that these treatments would reduce the parallel-barrier noise reduction losses to less than 1 dB.

Table 4. SB Sound Wall Dimensions by Project Station

Project Station	Height (ft)	Panel Length (ft)	Surface Area (sq ft)[1]
365.38	22	53	1,158
365.9	22	48	1,046
366.36	22	50	1,107
366.87	22	42	914
367.27	21	48	998
367.73	21	32	673
368.08	21	78	1,631
368.84	19	73	1,382
369.58	21	73	1,531
370.31	22	82	1,807
371.12	22	89	1,951
372	22	94	2,076
372.9	22	82	1,797
373.75	22	58	1,280
374.34	23	60	1,381
374.9	23	29	666
375.15	22	29	637
374.9	Wetland and Culvert Avoidance		
375.9			
376.1			
376.1	23	67	1,552
376.87	22	63	1,378
377.5	21	76	1,590
378.18	19	99	1,884
379.08	16	78	1,243
380.7	16	79	1,260
381.5	16	82	1,316
382.2	16	66	1,057
383	16	73	1,169
383.7	16	75	1,195
384.3	16	60	963
385.1	16	80	1,274
385.9	16	84	1,349
386.9	16	103	1,640

Total Length (ft)	2,105
Range in Wall Heights (ft)	16-23
Total Surface Area (sq ft)	40,905
Estimated Cost ($)	$960,295
Number of Benefitted Receptors (5 dB IL)	69
Percent Feasible (%)	98%
Achieves Design Goal?	Yes
Estimated Cost per Benefitted Receptor ($)	$13,917

[1] Square footage is derived directly from TNM, which includes more significant figures than shown. For this reason, the square footage may not always be exactly the product of the rounded panel height multiplied by panel length.

Table 5. SW Crestwood Drive and SW Homestead Lane Barrier

Wall Segment Start X, Y Coordinate OCSR Portland Feet (ft)	Height (ft)	Panel Length (ft)	Surface Area (sq ft)
319276.2, 148826.2	12	42	504
319272.1, 148868.3	12	42	504
319267.9, 148910.4	12	38	456
319264.2, 148948	14	38	532
319260.5, 148985.7	14	38	532
319256.8, 149023.4	14	44	616
319247.5, 149066.7	14	44	616
319238.3, 149110	14	44	616
319229.2, 149153.3	14	44	616
319220, 149196.6	14	44	616
319210.8, 149239.9	14	44	616
319201.6, 149283.3	14	44	616
319192.4, 149326.6	14	44	616
319183.2, 149369.9	14	43	602
319171.4, 149411.2	14	43	602
319159.7, 149452.5	14	43	602
319147.9, 149493.7	14	43	602
319136.2, 149535	14	43	602
319124.4, 149576.3	14	43	602
319112.6, 149617.6	14	43	602
319100.9, 149658.9	14	50	700
319090.3, 149707.3	14	50	700
319079.7, 149755.7	14	50	700
319069.1, 149804.1	14	50	700
319058.5, 149852.5	14	49	686
319047.9, 149900.8	14	50	700
319037.3, 149949.2	14	50	700
319026.8, 149997.6	14	50	700
319016.2, 150046	14	50	700
319005.6, 150094.4	14	50	700
318995, 150142.8	14	50	700
318984.4, 150191.2	14	50	700
318973.8, 150239.6	14	50	700
318963.2, 150288	14	50	700
318952.6, 150336.4	14	50	700
318942, 150384.8	14	49	686
318931.4, 150433.1	14	50	700
318920.8, 150481.5	10	50	500
Total Length (ft)		1,749	
Range in Wall Heights (ft)		10-14	
Total Surface Area (sq ft)		23,983	
Estimated Cost ($)		$479,660	
Number of Benefitted Receptors (5 dB IL)		29	
Percent Feasible (%)		100%	
Achieves Design Goal?		Yes	
Estimated Cost per Benefitted Receptor ($)		$16,540	

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Figure 1
Sound Walls and Noise Sensitive Receptors

OR 217 Auxiliary Lanes Project
Beaverton/Tigard, OR

Receiver Site and Number
- Impacted and Benefited
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted

Top Floor Noise Prediction Result
Bottom Floor Noise Prediction Result

Location of Voting Receptor(s)

Benefited Units Groupings
- All Units Benefited
- Top Floor Units Benefited Only

Sound Wall Heights (feet)
10, 12, 14, 16, 18, 19, 21, 22, 23

0 100 200 400 Ft

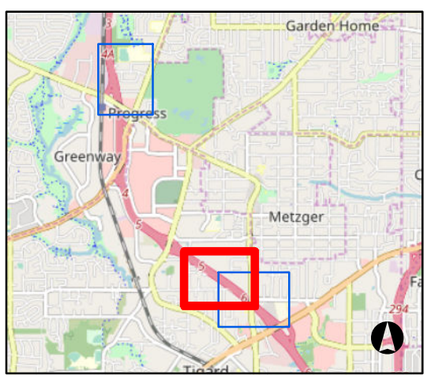

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Figure 2
Sound Walls and Noise Sensitive Receptors

OR 217 Auxiliary Lanes Project
Beaverton/Tigard, OR

Receiver Site and Number

- Impacted and Benefited
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted

Top Floor Noise Prediction Result
Bottom Floor Noise Prediction Result

× Location of Voting Receptor(s)

Benefited Units Groupings

- All Units Benefited
- Top Floor Units Benefited Only

Sound Wall Heights (feet)

10 12 14 16 18 19 21 22 23

0 100 200 400 Ft

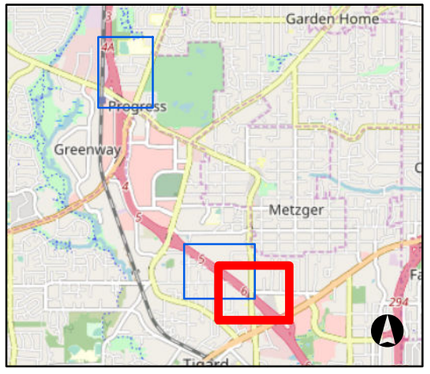

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Figure 3
Sound Walls and Noise Sensitive Receptors

OR 217 Auxiliary Lanes Project
Beaverton/Tigard, OR

Receiver Site and Number
- Impacted and Benefited
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted

Top Floor Noise Prediction Result
Bottom Floor Noise Prediction Result

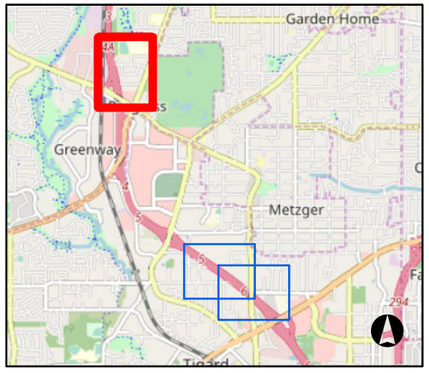
Location of Voting Receptor(s)

Benefited Units Groupings
- All Units Benefited
- Top Floor Units Benefited Only

Sound Wall Heights (feet)

10	16	21
12	18	22
14	19	23

0 100 200 400 Ft



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4. References

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SLR Corp. 2018b. *Northbound Results Addendum to the OR 217 Southbound and Northbound Auxiliary Lanes: Beaverton-Hillsdale Highway to OR 99W Noise Technical Report*. Portland, OR

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APPENDIX A. NOISE ABATEMENT SOUND LEVELS AT NOISE SENSITIVE RECEPTORS

Project Information				No Barrier Analysis		Barrier Length from NTR			Shorter Barrier on SE End		
				No Barrier		NB Sound Wall 1			NB Sound Wall 1		
						Average Wtd I.L. (benefited)	7.1	dB I.L. Avg	Average Wtd I.L.	6.2	dB I.L. Avg
						Maximum I.L.	13	dB I.L. Max	Maximum I.L.	10	dB I.L. Max
K21179 OR217 NB				Total Units Exposed to Impact	45	Benefited/Impacted ≥ AFG	44	# Prot Units	Benefited/Impacted ≥ AFG	44	# Prot Units
Contract No. 310330.002				# Impacts - NAC only	45	Benefited/Non Impact ≥ AFG	16	# Units	Benefited/Non Impact ≥ AFG	16	# Units
217 NB Barrier_1				# Impacts - SI only	0	Total Benefited	60	# Ben Units	Total Benefited	60	# Ben Units
NB Sound Wall 1				# Impacts - Both NAC & SI	0	Impacted Units ≥ NRDG	28	# Units	Impacted Units ≥ NRDG	24	# Units
HMMH						Benefited Units ≥ NRDG	28	# Units	Benefited Units ≥ NRDG	24	# Units
HJT/SRN						Percent of impacts ≥ AFG	98%	% Ben Units	Percent of impacts ≥ AFG	98%	% Ben Units
7/19/2019						Percent of benefits ≥ NRDG	47%	% NRDG Units	Percent of benefits ≥ NRDG	40%	% NRDG Units
						"Cost-Reasonable" ?	Yes		"Cost-Reasonable" ?	Yes	
						Surface Area	20018	Sq Feet	Surface Area	12043	Sq Feet
						Surface Area/Ben Rec	334	Sq Feet	Surface Area/Ben Rec	201	Sq Feet
						Barrier Length	1,336	Feet	Barrier Length	913	Feet
						Min Height	12.0	Feet	Min Height	10.0	Feet
						Max Height	16.0	Feet	Max Height	16.0	Feet
						Avg Height	14.3	Feet	Avg Height	13.0	Feet
						Total Barrier Cost	$400,360		Total Barrier Cost	$240,860	
				Enter SI Info		Cost/Ben Rec	$6,673		Cost/Ben Rec	$4,014	

Receiver ID	Row	FHWA Act Cat	No. of Dwelling Units	Type of Impact		Impact?	No. of Impacted Units	With Barrier Sound Levels, Impact and Benefit				With Barrier Sound Levels, Impact and Benefit			
				Bld Leq > NAC?	Sub. Inc.?			Leq(dBA)	IL (db)	Impacted?	No. Benefited	Leq(dBA)	IL (db)	Impacted?	No. Benefited
R4	1	B	0	71		Impact!	0	61	10	Benefited/Impact	0	62	9	Benefited/Impact	0
R50a	1	B	4	72		Impact!	4	60	12	Benefited/Impact	4	62	10	Benefited/Impact	4
R50b	1	B	4	76		Impact!	4	63	13	Benefited/Impact	4	69	7	Benefited/Impact	4
R51a	1	B	4	63				58	4			59	3		
R51b	1	B	4	68		Impact!	4	60	8	Benefited/Impact	4	63	6	Benefited/Impact	4
R52a	1	B	4	64				58	6	Benefited/Non-Imp	4	59	6	Benefited/Non-Imp	4
R52b	1	B	4	68		Impact!	4	61	8	Benefited/Impact	4	62	7	Benefited/Impact	4
R53a	1	B	4	64				59	6	Benefited/Non-Imp	4	59	5	Benefited/Non-Imp	4
R53b	1	B	4	69		Impact!	4	61	7	Benefited/Impact	4	62	7	Benefited/Impact	4
R54a	1	B	3	61				57	4			58	3		
R54b	1	B	4	64				59	5	Benefited/Non-Imp	4	60	5	Benefited/Non-Imp	4
R55a	1	B	2	59				56	3			56	3		
R55b	1	B	2	63				59	4			59	4		
R56a	1	B	4	68		Impact!	4	62	6	Benefited/Impact	4	62	6	Benefited/Impact	4
R56b	1	C	4	73		Impact!	4	66	7	Benefited/Impact	4	66	7	Benefited/Impact	4
R57a	1	B	4	64				60	4			60	4		
R57b	1	B	4	69		Impact!	4	64	6	Benefited/Impact	4	64	6	Benefited/Impact	4
R58a	1	B	4	65		Impact!	4	59	6	Benefited/Impact	4	60	5	Benefited/Impact	4
R58b	1	B	4	70		Impact!	4	62	8	Benefited/Impact	4	62	8	Benefited/Impact	4
R59a	1	B	4	61				57	4			58	3		
R59b	1	B	4	65		Impact!	4	59	6	Benefited/Impact	4	60	5	Benefited/Impact	4
R60a	1	B	4	58				56	3			56	3		
R60b	1	B	4	62				58	4			58	4		
R61	1	B	1	61				58	3			58	3		
R62a	1	B	4	59				56	3			57	3		
R62b	1	B	4	64				59	5	Benefited/Non-Imp	4	59	5	Benefited/Non-Imp	4
R86a	1	B	4	57				55	2			55	2		
R86b	1	B	4	61				57	4			58	4		
R102a	1	B	4	55				54	1			54	0		
R102b	1	B	4	59				56	2			57	2		
R103a	1	C	2	58				56	2			56	2		
R104	1	B	2	58				57	1			57	1		
R106	1	B	1	65		Impact!	1	62	3	Impact! w/ Bar		65	0	Impact! w/ Bar	
R107	1	B	2	62				60	1			61	1		
R108b	1	B	8	60				56	3			58	2		
R109	1	B	1	57				56	2			56	1		
R110b	1	B	10	59				57	3			58	2		
R111b	1	B	8	60				59	1			59	1		
R112	1	B	2	57				56	1			57	1		
R103b	1	B	3	56				54	1			54	1		

Project Information				No Barrier Analysis				Barrier Length from NTR				Barrier Length Reduced at NW and SE Ends				Barrier Length Reduced at NW End and Extended Wall near Westside Christian High School			
				No Barrier				NB Sound Wall 2				NB Sound Wall 2				NB Sound Wall 2			
								Average Wtd I.L. (benefited)	7.8	dB I.L. Avg		Average Wtd I.L.	8.0	dB I.L. Avg		Average Wtd I.L.	8.2	dB I.L. Avg	
								Maximum I.L.	12	dB I.L. Max		Maximum I.L.	14	dB I.L. Max		Maximum I.L.	14	dB I.L. Max	
K21179 OR217 NB				Total Units Exposed to Impact			14	Benefited/Impacted ≥ AFG	11	# Prot Units		Benefited/Impacted ≥ AFG	11	# Prot Units		Benefited/Impacted ≥ AFG	12	# Prot Units	
Contract No. 310330.002				# Impacts - NAC only			14	Benefited/Non Impact ≥ AFG	15	# Units		Benefited/Non Impact ≥ AFG	15	# Units		Benefited/Non Impact ≥ AFG	15	# Units	
217 NB Barrier_2				# Impacts - SI only			0	Total Benefited	26	# Ben Units		Total Benefited	26	# Ben Units		Total Benefited	27	# Ben Units	
NB Sound Wall 2				# Impacts - Both NAC & SI			0	Impacted Units ≥ NRDG	11	# Units		Impacted Units ≥ NRDG	11	# Units		Impacted Units ≥ NRDG	11	# Units	
HMMH								Benefited Units ≥ NRDG	15	# Units		Benefited Units ≥ NRDG	15	# Units		Benefited Units ≥ NRDG	15	# Units	
HJT/SRN								Percent of impacts ≥ AFG	79%	% Ben Units		Percent of impacts ≥ AFG	79%	% Ben Units		Percent of impacts ≥ AFG	86%	% Ben Units	
5/22/2019								Percent of benefits ≥ NRDG	58%	% NRDG Units		Percent of benefits ≥ NRDG	58%	% NRDG Units		Percent of benefits ≥ NRDG	56%	% NRDG Units	
								"Cost-Reasonable" ?	Yes			"Cost-Reasonable" ?	Yes			"Cost-Reasonable" ?	Yes		
								Surface Area	21282	Sq Feet		Surface Area	14326	Sq Feet		Surface Area	23105	Sq Feet	
								Surface Area/Ben Rec	819	Sq Feet		Surface Area/Ben Rec	551	Sq Feet		Surface Area/Ben Rec	856	Sq Feet	
								Barrier Length	1,449	Feet		Barrier Length	879	Feet		Barrier Length	1,515	Feet	
								Min Height	12.0	Feet		Min Height	16.0	Feet		Min Height	12.0	Feet	
								Max Height	18.0	Feet		Max Height	18.0	Feet		Max Height	18.0	Feet	
								Avg Height	14.6	Feet		Avg Height	16.3	Feet		Avg Height	15.4	Feet	
								Total Barrier Cost	$448,215			Total Barrier Cost	$299,005			Total Barrier Cost	$472,985		
				Enter SI Info				Cost/Ben Rec	$17,239			Cost/Ben Rec	$11,500			Cost/Ben Rec	$17,518		

Receiver ID	Row	FHWA Act Cat	No. of Dwelling Units	Type of Impact		Impact?	No. of Impacted Units	With Barrier Sound Levels, Impact and Benefit				With Barrier Sound Levels, Impact and Benefit				With Barrier Sound Levels, Impact and Benefit			
				Bld Leq > NAC?	Sub. Inc.?			Leq(dBA)	IL (db)	Impacted?	No. Benefited	Leq(dBA)	IL (db)	Impacted?	No. Benefited	Leq(dBA)	IL (db)	Impacted?	No. Benefited
R5	1	B	1	63				57	**5**	Benefited/Non-Imp	1	57	**6**	Benefited/Non-Imp	1	57	**6**	Benefited/Non-Imp	1
R113	1	B	3	57				57	0			57	1			57	1		
R114	1	B	5	58				58	0			58	0			58	0		
R115a	1	B	4	62				62	0			62	0			62	0		
R115b	1	B	3	64				64	0			64	0			64	0		
R116	1	B	7	54				54	0			54	0			54	0		
R117a	1	B	3	62				62	0			62	0			62	0		
R117b	1	B	3	63				63	0			63	0			63	0		
R118	1	B	2	66		Impact!	2	66	0	Impact! w/ Bar		66	0	Impact! w/ Bar		66	0	Impact! w/ Bar	
R119a	1	B	2	67		Impact!	2	56	**11**	Benefited/Impact	2	57	**10**	Benefited/Impact	2	56	**11**	Benefited/Impact	2
R119b	1	B	2	72		Impact!	2	61	**11**	Benefited/Impact	2	62	**11**	Benefited/Impact	2	62	**10**	Benefited/Impact	2
R120a	1	B	2	65		Impact!	2	56	**9**	Benefited/Impact	2	56	**9**	Benefited/Impact	2	55	**10**	Benefited/Impact	2
R120b	1	B	2	72		Impact!	2	61	**11**	Benefited/Impact	2	61	**11**	Benefited/Impact	2	62	**11**	Benefited/Impact	2
R121a	1	B	4	58				56	2			56	3			56	3		
R121b	1	B	4	63				58	**5**	Benefited/Non-Imp	4	57	**6**	Benefited/Non-Imp	4	57	**6**	Benefited/Non-Imp	4
R122a	1	B	4	53				51	2			51	2			51	2		
R122b	1	B	4	56				53	4			52	4			52	4		
R123a	1	B	4	54				51	3			51	3			51	3		
R123b	1	B	4	56				53	4			52	4			52	4		
R124a	1	B	4	58				55	2			55	3			55	3		
R124b	1	B	4	63				57	**7**	Benefited/Non-Imp	4	57	**7**	Benefited/Non-Imp	4	56	**7**	Benefited/Non-Imp	4
R125a	1	B	3	52				50	2			50	2			50	2		
R125b	1	B	3	53				52	2			51	2			51	2		
R126a	1	B	3	50				49	1			49	1			49	1		
R126b	1	B	3	52				52	1			52	1			52	1		
R127a	1	B	3	62				57	**5**	Benefited/Non-Imp	3	56	**6**	Benefited/Non-Imp	3	56	**6**	Benefited/Non-Imp	3
R127b	1	B	3	72		Impact!	3	60	**12**	Benefited/Impact	3	59	**14**	Benefited/Impact	3	59	**14**	Benefited/Impact	3
R128a	1	B	3	57				55	1			55	2			55	2		
R128b	1	B	3	63				58	**5**	Benefited/Non-Imp	3	58	**5**	Benefited/Non-Imp	3	58	**5**	Benefited/Non-Imp	3
R129a	1	B	2	51				50	1			50	1			50	1		
R129b	1	B	2	53				52	1			52	1			51	1		
R130a	1	B	2	47				47	0			47	0			47	0		
R130b	1	B	2	49				49	1			49	1			49	1		
R131a	1	B	3	51				49	1			49	2			49	2		
R131b	1	B	3	52				51	2			51	2			51	2		
R132a	1	B	3	53				53	0			53	1			53	1		
R132b	1	B	3	55				54	1			54	1			54	1		
R133	1	B	1	51				50	1			50	0			50	1		
R134	1	B	6	50				49	0			50	0			49	0		
R135	1	B	6	50				50	0			50	0			49	0		
R136	1	B	8	48				47	1			47	1			47	1		
R137	1	C	1	67		Impact!	1	65	2	Impact! w/ Bar		67	0	Impact! w/ Bar		62	**5**	Benefited/Impact	1
R138	1	E	1	54				53	1			54	0			52	2		

Project Information		No Barrier Analysis		Barrier Length from NTR			Barrier Length with SE End Removed			Barrier Length with Culvert/Wetland Area and SE End Removed		
		No Barrier		SB Sound Wall			SB Sound Wall			SB Sound Wall		
				Average Wtd I.L. (benefited)	8.9	dB I.L. Avg	Average Wtd I.L.	8.8	dB I.L. Avg	Average Wtd I.L.	9.0	dB I.L. Avg
				Maximum I.L.	14	dB I.L. Max	Maximum I.L.	14	dB I.L. Max	Maximum I.L.	15	dB I.L. Max
K21179 OR217 NB		Total Units Exposed to Impact	40	Benefited/Impacted ≥ AFG	39	# Prot Units	Benefited/Impacted ≥ AFG	39	# Prot Units	Benefited/Impacted ≥ AFG	39	# Prot Units
Contract No. 310330.002		# Impacts - NAC only	40	Benefited/Non Impact ≥ AFG	39	# Units	Benefited/Non Impact ≥ AFG	39	# Units	Benefited/Non Impact ≥ AFG	30	# Units
217 SB Barrier 1 ft Inc - V5		# Impacts - SI only	0	Total Benefited	78	# Ben Units	Total Benefited	78	# Ben Units	Total Benefited	69	# Ben Units
SB Sound Wall		# Impacts - Both NAC & SI	0	Impacted Units ≥ NRDG	37	# Units	Impacted Units ≥ NRDG	35	# Units	Impacted Units ≥ NRDG	32	# Units
HMMH				Benefited Units ≥ NRDG	62	# Units	Benefited Units ≥ NRDG	60	# Units	Benefited Units ≥ NRDG	49	# Units
HJT/SRN				Percent of impacts ≥ AFG	98%	% Ben Units	Percent of impacts ≥ AFG	98%	% Ben Units	Percent of impacts ≥ AFG	98%	% Ben Units
6/18/2019				Percent of benefits ≥ NRDG	79%	% NRDG Units	Percent of benefits ≥ NRDG	77%	% NRDG Units	Percent of benefits ≥ NRDG	71%	% NRDG Units
				"Cost-Reasonable" ?	Yes		"Cost-Reasonable" ?	Yes		"Cost-Reasonable" ?	Yes	
				Surface Area	44360	Sq Feet	Surface Area	41049	Sq Feet	Surface Area	40905	Sq Feet
				Surface Area/Ben Rec	569	Sq Feet	Surface Area/Ben Rec	526	Sq Feet	Surface Area/Ben Rec	593	Sq Feet
				Barrier Length	2,383	Feet	Barrier Length	2,176	Feet	Barrier Length	2,105	Feet
				Min Height	16.0	Feet	Min Height	16.0	Feet	Min Height	16.0	Feet
				Max Height	22.0	Feet	Max Height	22.0	Feet	Max Height	23.0	Feet
				Avg Height	19.2	Feet	Avg Height	19.4	Feet	Avg Height	19.8	Feet
				Total Barrier Cost	$1,042,630		Total Barrier Cost	$976,410		Total Barrier Cost	$960,295	
				Cost/Ben Rec	$13,367		Cost/Ben Rec	$12,518		Cost/Ben Rec	$13,917	

eceiver I	Row	FHWA Act Cat	No. of Dwelling Units	Type of Impact		Impact?	No. of Impacted Units	With Barrier Sound Levels, Impact and Benefit				With Barrier Sound Levels, Impact and Benefit				With Barrier Sound Levels, Impact and Benefit			
				Bld Leq > NAC?	Sub. Inc.?			Leq(dBA)	IL (db)	Impacted?	No. Benefited	Leq(dBA)	IL (db)	Impacted?	No. Benefited	Leq(dBA)	IL (db)	Impacted?	No. Benefited
R18	1	B	1	75		Impact!	1	62	**13**	Benefited/Impact	1	62	**13**	Benefited/Impact	1	63	**12**	Benefited/Impact	1
R19	1	B	3	74		Impact!	3	60	**14**	Benefited/Impact	3	60	**14**	Benefited/Impact	3	60	**14**	Benefited/Impact	3
R20	1	E	1	64				64	0			64	0			64	0		
R28	1	B	3	59				52	**7**	Benefited/Non-Imp	3	52	**7**	Benefited/Non-Imp	3	51	**8**	Benefited/Non-Imp	3
R29	1	B	2	69		Impact!	2	60	**9**	Benefited/Impact	2	60	**9**	Benefited/Impact	2	61	**8**	Benefited/Impact	2
R30	1	B	2	65		Impact!	2	58	**7**	Benefited/Impact	2	60	**5**	Benefited/Impact	2	60	**5**	Benefited/Impact	2
R33	1	B	3	66		Impact!	3	59	**7**	Benefited/Impact	3	59	**7**	Benefited/Impact	3	60	**6**	Benefited/Impact	3
R34	1	C	1	56				56	0			56	0			56	0		
R35	1	C	1	59				59	0			59	0			59	0		
R36	1	B	1	62				62	1			62	1			62	1		
R38	1	B	5	62				58	4			58	4			58	4		
R39	1	B	4	55				53	2			53	2			54	1		
R63	1	B	2	75		Impact!	2	63	**12**	Benefited/Impact	2	63	**12**	Benefited/Impact	2	63	**12**	Benefited/Impact	2
R64	1	B	0	73		Impact!	0	60	**13**	Benefited/Impact	0	60	**13**	Benefited/Impact	0	64	**10**	Benefited/Impact	0
R65	1	B	1	72		Impact!	1	60	**12**	Benefited/Impact	1	60	**12**	Benefited/Impact	1	62	**11**	Benefited/Impact	1
R66	1	B	2	69		Impact!	2	64	**5**	Benefited/Impact	2	64	**5**	Benefited/Impact	2	64	**5**	Benefited/Impact	2
R67	1	B	0	68		Impact!	0	62	**6**	Benefited/Impact	0	62	**6**	Benefited/Impact	0	62	**6**	Benefited/Impact	0
R68	1	B	1	55				50	**6**	Benefited/Non-Imp	1	50	**6**	Benefited/Non-Imp	1	50	**5**	Benefited/Non-Imp	1
R69	1	B	2	68		Impact!	2	57	**11**	Benefited/Impact	2	57	**11**	Benefited/Impact	2	59	**9**	Benefited/Impact	2
R70	1	B	2	64				56	**9**	Benefited/Non-Imp	2	56	**9**	Benefited/Non-Imp	2	57	**7**	Benefited/Non-Imp	2
R71	1	B	2	66		Impact!	2	58	**8**	Benefited/Impact	2	58	**8**	Benefited/Impact	2	59	**7**	Benefited/Impact	2
R72	1	B	2	57				50	**7**	Benefited/Non-Imp	2	50	**7**	Benefited/Non-Imp	2	52	**6**	Benefited/Non-Imp	2
R73	1	B	2	61				54	**7**	Benefited/Non-Imp	2	54	**7**	Benefited/Non-Imp	2	55	**6**	Benefited/Non-Imp	2
R74	1	B	1	66		Impact!	1	62	4	Impact! w/ Bar		62	4	Impact! w/ Bar		62	4	Impact! w/ Bar	
R75	1	B	4	62				59	3			59	3			59	3		
R76	1	B	2	58				56	2			56	2			56	2		
R77	1	B	4	56				54	2			54	2			54	2		
R78	1	B	3	55				52	4			51	4			52	3		
R79	1	B	4	57				52	**5**	Benefited/Non-Imp	4	52	**5**	Benefited/Non-Imp	4	53	4		
R80	1	B	3	57				52	**5**	Benefited/Non-Imp	3	52	**5**	Benefited/Non-Imp	3	53	4		
R81	1	B	4	61				56	**5**	Benefited/Non-Imp	4	56	**5**	Benefited/Non-Imp	4	57	4		
R82	1	B	4	59				55	4			55	4			56	3		
R83	1	B	3	58				55	3			55	3			55	3		
R84	1	B	2	56				54	2			54	2			54	2		
R85	1	B	2	53				53	0			53	0			53	0		
R87b	1	B	2	71		Impact!	2	64	**7**	Benefited/Impact	2	64	**7**	Benefited/Impact	2	64	**7**	Benefited/Impact	2
R88a	1	B	2	46				45	1			45	1			45	1		
R88b	1	B	2	49				49	1			49	1			48	1		
R89b	1	B	2	73		Impact!	2	63	**10**	Benefited/Impact	2	63	**10**	Benefited/Impact	2	63	**10**	Benefited/Impact	2
R90a	1	B	2	55				48	**8**	Benefited/Non-Imp	2	48	**8**	Benefited/Non-Imp	2	47	**8**	Benefited/Non-Imp	2
R90b	1	B	2	57				50	**7**	Benefited/Non-Imp	2	50	**7**	Benefited/Non-Imp	2	50	**7**	Benefited/Non-Imp	2
R91b	1	B	1	66		Impact!	1	54	**12**	Benefited/Impact	1	54	**12**	Benefited/Impact	1	54	**12**	Benefited/Impact	1
R92b	1	B	2	70		Impact!	2	58	**12**	Benefited/Impact	2	58	**12**	Benefited/Impact	2	57	**14**	Benefited/Impact	2
R93a	1	B	2	51				46	**5**	Benefited/Non-Imp	2	46	**5**	Benefited/Non-Imp	2	46	**6**	Benefited/Non-Imp	2
R93b	1	B	2	53				49	4			49	4			48	**5**	Benefited/Non-Imp	2
R94b	1	B	2	74		Impact!	2	62	**12**	Benefited/Impact	2	62	**12**	Benefited/Impact	2	61	**13**	Benefited/Impact	2
R95a	1	B	2	58				49	**9**	Benefited/Non-Imp	2	49	**9**	Benefited/Non-Imp	2	47	**11**	Benefited/Non-Imp	2
R95b	1	B	2	59				52	**7**	Benefited/Non-Imp	2	52	**7**	Benefited/Non-Imp	2	51	**8**	Benefited/Non-Imp	2
R96b	1	B	2	72		Impact!	2	59	**13**	Benefited/Impact	2	59	**13**	Benefited/Impact	2	57	**15**	Benefited/Impact	2
R97a	1	B	2	63				51	**12**	Benefited/Non-Imp	2	51	**12**	Benefited/Non-Imp	2	50	**13**	Benefited/Non-Imp	2
R97b	1	B	2	64				53	**11**	Benefited/Non-Imp	2	53	**11**	Benefited/Non-Imp	2	51	**13**	Benefited/Non-Imp	2
R98b	1	B	2	68		Impact!	2	56	**12**	Benefited/Impact	2	56	**12**	Benefited/Impact	2	55	**14**	Benefited/Impact	2
R99a	1	B	2	60				51	**9**	Benefited/Non-Imp	2	51	**9**	Benefited/Non-Imp	2	55	**5**	Benefited/Non-Imp	2
R99b	1	B	2	62				53	**9**	Benefited/Non-Imp	2	53	**9**	Benefited/Non-Imp	2	57	**5**	Benefited/Non-Imp	2
R100b	1	B	2	73		Impact!	2	61	**12**	Benefited/Impact	2	61	**12**	Benefited/Impact	2	58	**15**	Benefited/Impact	2
R101a	1	B	2	70		Impact!	2	58	**12**	Benefited/Impact	2	58	**12**	Benefited/Impact	2	62	**8**	Benefited/Impact	2
R101b	1	B	2	72		Impact!	2	60	**12**	Benefited/Impact	2	60	**12**	Benefited/Impact	2	64	**8**	Benefited/Impact	2

Project Information				No Barrier Analysis				Analysis7			
				No Barrier				SW Crestwood Dive and SW Homestead Lane Barrier			
								Average Wtd I.L. (benefited)	7.2	dB I.L. Avg	
								Maximum I.L.	12	dB I.L. Max	
OR 217 North of Hall Overpass				Total Units Exposed to Impact			12	Benefited/Impacted ≥ AFG	12	# Prot Units	
310330.002				# Impacts - NAC only			12	Benefited/Non Impact ≥ AFG	17	# Units	
Build, Barr 1				# Impacts - SI only			0	Total Benefited	29	# Ben Units	
SW Crestwood Dive and SW Homestead Lane Barrier				# Impacts - Both NAC & SI			0	Impacted Units ≥ NRDG	12	# Units	
Oregon Department of Transportation, Region 1				Front Row Summary				Benefited Units ≥ NRDG	19	# Units	
Dillon Tannler (DST) and Scott Noel (SRN)				Feasibility Uses Front Row? (Enter "Y")			Y	Percent of impacts ≥ AFG	100%	% Ben Units	
6/20/2019				Reasonableness Uses Front Row? (Enter "Y")			Y	Percent of benefits ≥ NRDG	66%	% NRDG Units	
				Front Row Impacts			0	"Cost-Reasonable" ?	Yes		
								Surface Area	23983	Sq Feet	
						SF/dB/BR?		Surface Area/Ben Rec	827	Sq Feet	
								Barrier Length	1,749	Feet	
								Min Height	10.0	Feet	
								Max Height	14.0	Feet	
								Avg Height	13.7	Feet	
								Total Barrier Cost	$479,660		
				Enter SI Info		$/dB/BR?	25000	Cost/Ben Rec	$16,540		
				Enter SI Info				Front Row Benefits			0
								Front Row NRDG			0

Receiver ID	Row	FHWA Act Cat	No. of Dwelling Units	Type of Impact		Impact?	No. of Impacted Units	With Barrier Sound Levels, Impact and Benefit			
				Bld Leq > NAC?	Sub. Inc.?			Leq(dBA)	IL (db)	Impacted?	No. Benefited
R-172	0	C	1	49				49	0		
R-171	0	C	1	52				51	1		
R-173	0	C	1	60				59	1		
R-174	0	C	1	58				56	2		
R-175	0	C	1	55				52	3		
R-176	0	D	1	30				29	1		
R-177	0	C	1	76		Impact!	1	64	12	Benefited/Impact	1
R-178	0	B	1	70		Impact!	1	60	10	Benefited/Impact	1
R-179	0	B	1	67		Impact!	1	59	8	Benefited/Impact	1
R-180	0	B	1	66		Impact!	1	58	8	Benefited/Impact	1
R-181	0	B	1	66		Impact!	1	58	8	Benefited/Impact	1
R-182	0	B	1	66		Impact!	1	58	8	Benefited/Impact	1
R-183	0	B	1	64				57	7	Benefited/Non-Imp	1
R-184	0	B	1	63				55	8	Benefited/Non-Imp	1
R-185	0	B	1	61				53	8	Benefited/Non-Imp	1
R-186	0	B	1	66		Impact!	1	58	8	Benefited/Impact	1
R-187	0	B	1	67		Impact!	1	59	8	Benefited/Impact	1
R-188	0	B	1	62				54	8	Benefited/Non-Imp	1
R-189	0	B	1	62				54	8	Benefited/Non-Imp	1
R-190	0	B	1	66		Impact!	1	59	7	Benefited/Impact	1
R-191	0	B	1	67		Impact!	1	60	7	Benefited/Impact	1
R-192	0	B	1	60				53	7	Benefited/Non-Imp	1
R-193	0	B	1	64				58	6	Benefited/Non-Imp	1
R-194	0	B	1	60				54	6	Benefited/Non-Imp	1
R-195	0	B	1	66		Impact!	1	59	7	Benefited/Impact	1
R-196	0	B	1	60				55	5	Benefited/Non-Imp	1
R-197	0	B	1	56				54	2		
R-198	0	B	1	57				52	5	Benefited/Non-Imp	1
R-199	0	B	1	58				52	6	Benefited/Non-Imp	1
R-200	0	B	1	54				53	1		
R-201	0	B	1	69		Impact!	1	60	9	Benefited/Impact	1
R-202	0	B	1	60				56	4		
R-203	0	B	1	58				55	3		
R-204	0	B	1	57				55	2		
R-213	1	B	1	57				55	2		
R-214	2	B	1	57				56	1		
R-215	3	B	1	57				56	1		
R-216	4	B	1	56				55	1		
R-217	5	B	1	55				54	1		
R-218	6	B	1	55				54	1		
R-219	7	B	1	54				53	1		
R-220	8	B	1	54				53	1		
R-221	9	B	1	53				51	2		
R-222	10	B	1	53				52	1		
R-223	11	B	1	51				50	1		
R-224	12	B	1	51				50	1		
R-225	13	B	1	55				52	3		
R-226	14	B	1	53				51	2		
R-227	15	B	1	52				51	1		
R-228	16	B	1	57				52	5	Benefited/Non-Imp	1
R-229	17	B	1	56				52	4		
R-230	18	B	1	53				51	2		
R-231	19	B	1	59				53	6	Benefited/Non-Imp	1
R-232	20	B	1	57				52	5	Benefited/Non-Imp	1
R-233	21	B	1	56				51	5	Benefited/Non-Imp	1
R-234	22	B	1	55				51	4		
R-235	23	B	1	54				51	3		
R-236	24	B	1	54				51	3		
R-237	25	B	1	59				52	7	Benefited/Non-Imp	1
R-238	26	B	1	58				52	6	Benefited/Non-Imp	1
R-239	27	B	1	54				50	4		
R-240	28	B	1	53				50	3		
R-241	29	B	1	53				51	2		
R-242	30	B	1	56				52	4		