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## Appendix A - Traffic Noise Analysis and Abatement

### Process

When are noise reports and/or recommendations final?

The noise abatement process from the preparation of a noise wall to the final noise wall design (or decision not to build) can be confusing. The following process attempts to provide some clarification to project teams and outlines a recommended “standard” process, but acknowledges that variations to this process are likely because of the differences between projects.

#### Environmental Discipline Reports

The noise analyst works with the project team to model project elements affecting noise that include traffic, topography, and the location of noise sensitive receivers. If traffic noise impacts are discovered through modeling, then abatement is evaluated.

Abatement is compared to the feasibility (constructability, effectiveness) and reasonableness (allowable barrier size/cost) for a “standard” project. If abatement is feasible and reasonable, the report recommends the optimal (cost to benefit) noise barrier.

The traffic noise discipline report can be finalized.

#### Design Phase

*Design Phase and Public Involvement steps (below) may be incorporated before report is finalized.*

The project office reviews the recommended noise wall height and horizontal alignment to determine if there are any conflicts that were not realized at the time the discipline report was prepared.

If conflicts from utilities, steep slopes, etc. are present, the details and costs of the conflicts are provided to the noise analyst by the project team. The noise analyst will then add any additional (“but for” the noise wall) costs to the reasonableness evaluation. If noise wall costs including accommodation of conflicts are still less than the allowable costs for the noise wall,

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the barrier height and/or alignment are re-evaluated and a new barrier will be recommended. If barrier costs plus the new costs exceed the allowable costs, the barrier may not be recommended by the ANE Program.

If a noise wall is recommended, ANE Program will review and confirm noise wall dimensions throughout design process.

### Public Involvement

If abatement is recommended in the Traffic Noise Discipline Report, public outreach to determine public desires for abatement must occur. The noise wall discussion may be introduced to the public before the Design Phase, but should happen after the noise wall alignment, height, and length (or other abatement description) is established so that people can understand any effects of the noise wall (or other abatement) on their community.

The final determination whether to construct a noise wall or other abatement that is recommend in the traffic noise analysis, cannot be made until public outreach has occurred.

### Final Steps

Any updates to the Traffic Noise Discipline report to clarify changes that occurred during the Design Phase or from Public Involvement can be made at the project engineering offices discretion. Addendum or supplementary memorandum to clarify changes can also be added to the discipline report or project file.

The noise wall is constructed or a letter from the ANE Program is added to the project file clarifying why a noise wall was not constructed.

## Appendix B – Peak Hour Traffic Volume

**Exhibit 23: Modeled Hourly Traffic Volumes for Existing and future No-Build and Build Conditions**

<b>Existing (2008) Traffic Volumes</b>		
<b>Northbound</b>		<b>PM Peak</b>
	8th St E. On to Ellingson Off	2,760
	Ellingson Off to Ellingson On	2,540
	Ellingson On to 15th St SW Off	2,850
	15th St SW Off to SR 18 Off	2,430
<b>Southbound</b>		
	15th St SW On to Ellingson Rd Off	3,780
	Ellingson Rd Off to Ellingson Rd On	3,460
	Ellingson Rd On to 8th St SE Off	3,940
	8th St SE Off to 8th St SE On	3,450

<b>Future No Build (2030) Traffic Volumes</b>		
<b>Northbound</b>		<b>PM Peak</b>
	8th St E. On to Ellingson Off	2,982
	Ellingson Off to Ellingson On	2,744
	Ellingson On to 15th St SW Off	3,079
	15th St SW Off to SR 18 Off	2,625
<b>Southbound</b>		
	15th St SW On to Ellingson Rd Off	4,270
	Ellingson Rd Off to Ellingson Rd On	3,909
	Ellingson Rd On to 8th St SE Off	4,451
	8th St SE Off to 8th St SE On	3,897

\* 2030 Traffic Volume is used for the future Traffic Volume since there is no change in Traffic Volumes between 2030 and 2036.

<b>Future Build (2030) Traffic Volumes</b>		
<b>Northbound</b>		<b>PM Peak</b>
	8th St E. On to Ellingson Off	3,094
	Ellingson Off to Ellingson On	2,847
	Ellingson On to 15th ST SW Off	3,195
	15th St SW Off to SR 18 Off	2,724
<b>Southbound</b>		
	15th St SW On to Ellingson Rd Off	5,141
	Ellingson Rd Off to Ellingson Rd On	4,706
	Ellingson Rd On to 8th St SE Off	5,359
	8th St SE Off to 8th St SE On	4,692

\* 2030 Traffic Volume is used for the future Traffic Volume since there is no change in Traffic Volumes between 2030 and 2036.

## Appendix C – Residential Equivalency

### Exhibit 24: Modeled Residential Equivalency Calculations

#### 1) Church

A residential equivalency calculation was conducted to determine the number of residences that could be considered for this site. The church is used 4 hours every Sunday for an average of 100 people every Sunday.

4 hours per day/24 hours in a day = 0.17 and

1 days per week/7 days in a week = 0.14 and

12 months per year/12 months in a year = 1 then:

0.17 x 0.14 x 1 = 0.024 usage factor

100 users x 0.024 (usage factor) = 2.42 and,

= 2 residences

#### 2) Community Center

Heaviest use is in the summer between May and September. Because the the community center is rented an average of 3 times per month. The rest of the year, it is rented about once a week. There are an average of 300 attendees for the events.

##### May-Sept

8 hours per day/24 hours in a day = 0.33 and

1 days per week/7 days in a week = 0.14 and

5 months per year/12 months in a year x 0.75 month = 0.31 then:

0.33 x 0.14 x 0.31 = 0.014 usage factor

300 users x 0.014 (usage factor) = 4.3 and,

= 4 residences

##### October-April

8 hours per day/24 hours in a day = 0.33 and

1 days per week/7 days in a week = 0.14 and

7 months per year/12 months in a year x 0.25 month = 0.15 then:

0.33 x 0.14 x 0.15 = 0.0069 usage factor

300 users x 0.0069 (usage factor) = 2.08 and,

= 2 residences

The total for the year = 4 residences + 2 residences = 6 residences

# Appendix D - Location of New Noise Wall



NOISE WALL NAME DESCRIPTION/LOCATION	COORDINATES NAME	X (EASTING)	Y (NORTHING)	Z(bottom) (ft)	MINIMUM TOP OF WALL ELEVATION (TOW) (ft)
Noise Wall 1 NB Ellingson Road to Boundary Road	point75	1,614,738.10	431,047.70	74.6	74.6
	point76	1,614,749.80	431,147.00	76.63	84.63
	point77	1,614,756.40	431,246.80	79.66	89.66
	point78	1,614,758.30	431,346.70	83.52	95.52
	point79	1,614,755.10	431,446.70	87.45	99.45
	point80	1,614,747.50	431,546.40	90.54	104.54
	point81	1,614,739.00	431,646.00	92.8	106.8
	point82	1,614,731.80	431,745.80	94.63	106.63
	point83	1,614,728.00	431,845.50	95.51	107.51
	point84	1,614,728.90	431,944.40	94.9	106.9
	point85	1,614,724.50	432,044.30	94.23	106.23
	point86	1,614,716.60	432,143.80	93.91	105.91
	point87	1,614,714.50	432,243.80	93.65	105.65
	point88	1,614,715.90	432,343.80	93.11	105.11
	point89	1,614,717.30	432,443.80	93.48	105.48
point90	1,614,718.60	432,543.80	93.88	105.88	

## APPENDIX D

NOISE WALL NAME DESCRIPTION/LOCATION	COORDINATES NAME	X (EASTING)	Y (NORTHING)	Z(bottom) (ft)	MINIMUM TOP OF WALL ELEVATION (TOW) (ft)
	point91	1,614,719.90	432,643.70	94.61	106.61
	point92	1,614,721.30	432,743.70	95.25	107.25
	point93	1,614,722.60	432,843.70	96.05	108.05
	point94	1,614,724.00	432,943.70	96.82	108.82
	point95	1,614,724.80	433,043.70	96.93	108.93
	point96	1,614,725.30	433,099.80	96.85	98.85
	point177	1,614,727.60	433,178.90	96.85	98.85
	point120	1,614,729.30	433,246.40	96.91	108.91
	point121	1,614,751.30	433,340.00	92.85	104.85
	point122	1,614,755.40	433,440.00	92.5	104.5
	point123	1,614,760.30	433,539.80	91.58	103.58
	point124	1,614,764.90	433,639.70	90.75	102.75
	point125	1,614,769.80	433,739.60	90.14	102.14
	point126	1,614,774.40	433,839.50	89.01	101.01
	point127	1,614,778.30	433,939.40	88.49	100.49
	point128	1,614,781.60	434,039.40	88.04	100.04

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NOISE WALL NAME DESCRIPTION/LOCATION	COORDINATES NAME	X (EASTING)	Y (NORTHING)	Z(bottom) (ft)	MINIMUM TOP OF WALL ELEVATION (TOW) (ft)
Noise Wall 1 NB Ellingson Road to Boundary Road	point129	1,614,784.90	434,139.30	87.4	99.4
	point130	1,614,788.30	434,239.30	86.76	98.76
	point131	1,614,791.60	434,339.20	85.82	97.82
	point132	1,614,794.90	434,439.10	84.99	96.99
	point133	1,614,798.40	434,539.10	84.32	96.32
	point134	1,614,803.30	434,639.00	83.2	95.2
	point135	1,614,807.90	434,738.90	82.38	94.38
	point136	1,614,812.50	434,838.70	81.81	93.81
	point137	1,614,799.30	434,935.20	84.88	96.88
	point138	1,614,804.00	435,035.10	84.21	96.21
	point139	1,614,808.80	435,135.00	83.95	95.95
	point140	1,614,813.60	435,234.90	83.53	95.53
	point141	1,614,818.30	435,334.80	83.28	95.28
	point142	1,614,824.60	435,434.60	83.15	95.15
point143	1,614,832.00	435,534.30	82.81	94.81	
point144	1,614,836.30	435,634.20	82.51	94.51	

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NOISE WALL NAME DESCRIPTION/LOCATION	COORDINATES NAME	X (EASTING)	Y (NORTHING)	Z(bottom) (ft)	MINIMUM TOP OF WALL ELEVATION (TOW) (ft)
Noise Wall 1 NB Ellingson Road to Boundary	point145	1,614,839.90	435,734.10	81.98	93.98
	point146	1,614,843.10	435,834.10	81.93	93.93
	point147	1,614,846.90	435,934.00	81.65	93.65
	point148	1,614,850.80	436,033.90	81.54	93.54
	point149	1,614,854.80	436,133.90	81.35	93.35
	point150	1,614,857.80	436,233.80	81.17	93.17
	point151	1,614,861.00	436,333.80	80.97	92.97
	point152	1,614,865.40	436,433.70	80.69	92.69
	point153	1,614,867.80	436,533.60	80.49	92.49
	point154	1,614,870.80	436,633.60	80.31	92.31
	point155	1,614,874.00	436,733.50	79.92	91.92
	point156	1,614,877.40	436,833.50	79.69	91.69
	point157	1,614,880.60	436,933.40	79.49	91.49
	point158	1,614,884.30	437,033.40	79.23	91.23
	point159	1,614,887.60	437,133.30	79.09	91.09
point160	1,614,890.80	437,233.20	78.78	90.78	

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NOISE WALL NAME DESCRIPTION/LOCATION	COORDINATES NAME	X (EASTING)	Y (NORTHING)	Z(bottom) (ft)	MINIMUM TOP OF WALL ELEVATION (TOW) (ft)
Road	point161	1,614,893.30	437,333.20	78.55	90.55
	point162	1,614,896.80	437,433.20	77.92	89.92
	point163	1,614,900.90	437,533.10	77.05	89.05
	point164	1,614,906.00	437,632.90	76.52	86.52
	point165	1,614,913.40	437,732.70	76.27	86.27
	point166	1,614,926.90	437,831.70	75.77	85.77
	point167	1,614,943.60	437,930.20	75.08	85.08
	point168	1,614,962.60	438,028.40	74.54	84.54
	point169	1,614,984.00	438,126.10	74	84
	point170	1,615,006.80	438,223.40	73.33	83.33
	point171	1,615,035.40	438,319.20	72.53	82.53

**Noise Wall 1**

<b>Receiver</b>	<b>Future Build W/O Wall</b>	<b>Noise Wall Reduction</b>	<b>Future Build with Wall</b>
R1	<b>71.7</b>	3.0	<b>68.6</b>
R2- M1	<b>73</b>	6.0	<b>66.3</b>
R3-M2	<b>67.4</b>	2.8	64.4
R4-M3	<b>72.1</b>	7.5	64.6
R5	<b>72.8</b>	9.5	63.3
R6-M4	<b>72.8</b>	6.3	59.6
R7-M5	<b>65.9</b>	8.9	63.5
R8	<b>72.4</b>	6.8	62.1
R9-M6	<b>69.1</b>	6.2	59.6
R10	<b>66</b>	7.3	63.1
R11	<b>71.3</b>	6.3	61.9
R12	<b>70.1</b>	5.7	58.5
R13	<b>65</b>	6.0	62.6
R14	<b>69.1</b>	0.1	64.8
R15	<b>65.6</b>	4.2	58.8
R16	63.2	4.4	64.2
R17-M9	<b>69.1</b>	6.2	61.7
R18	<b>69.1</b>	5.4	60.0
R19	<b>66</b>	6.3	61.1
R20	<b>68.3</b>	4.7	59.7
R21	<b>66.1</b>	5.1	58.8
R22	64.8	5.3	57.9
R23	63.4	4.5	62.2
R24	<b>66.9</b>	2.1	60.9
R56	63	4.7	59.9
R62	65.4	4.7	59.7
R64	<b>65.8</b>	4.8	60.1
R65	<b>66.7</b>	5.5	59.5
R67	<b>65.9</b>	5.5	60.6
R68	<b>71.7</b>	6.0	60.7
R69	<b>73</b>	5.9	57.8
R71	<b>68</b>	6.0	60.9
R72	<b>66.2</b>	6.1	59.4
R74	<b>66.9</b>	4.2	61.9
R75	<b>65.9</b>	4.9	60.3
R76	<b>66.6</b>	4.8	61.4
R78	<b>69.3</b>	6.1	61.8

R79	<b>66.1</b>	5.1	60.2
R80	<b>70.1</b>	6.3	62.0
R81	<b>68</b>	5.7	61.0
R82	<b>67.3</b>	5.4	61.3
R84	65.1	5.7	58.7
R86	<b>68.1</b>	5.8	60.8
R88	<b>71.3</b>	6.8	62.4
R89	<b>71.2</b>	6.7	62.6
R90	<b>69</b>	6.1	61.5
R91	<b>69.4</b>	6.2	62.5
R93	<b>69.5</b>	6.1	62.9
R94	<b>72.9</b>	9.1	63.7
R95	<b>74.4</b>	9.5	64.9
R97	<b>72.7</b>	9.2	63.5
R98	<b>67.6</b>	7.0	60.5
R99	<b>66.4</b>	6.9	59.4
R100	<b>71.6</b>	8.6	63.0
R101	<b>68.4</b>	7.5	60.9
R102	<b>69.2</b>	7.9	61.3
R103	<b>70.6</b>	8.5	62.1
R104	<b>71.6</b>	9.0	62.7
R105	<b>70.5</b>	8.5	64.6
R106	<b>71.2</b>	8.9	62.4
R107	<b>71.6</b>	9.0	62.6
R108	<b>73.2</b>	9.6	63.5
R109	<b>71.4</b>	8.4	63.0
R111	<b>73</b>	8.7	64.3
R112	<b>68.8</b>	6.7	62.1
R113	<b>67.3</b>	5.9	61.5
R114	<b>73.8</b>	7.0	<b>66.4</b>
R115	<b>70.1</b>	5.7	64.2
R116	<b>73</b>	6.4	65.4
R118	<b>72.6</b>	5.0	<b>67.3</b>
R119	<b>69.3</b>	7.6	61.7
R121	<b>67.2</b>	6.4	60.8
R122	<b>68</b>	7.6	60.4
R124	65.1	4.9	59.7
R128	63	3.8	59.2
R133	<b>67.3</b>	5.6	60.9
R135	<b>65.6</b>	5.4	59.8
<b>Noise levels in Bold typeface meet or exceed the WSDOT NAC</b>			

## Appendix E – TNM Output