

Attachment 6

Noise Technical Memorandum, September 2006



To: Paul Johnson, WSDOT Project Manager

cc: Dave Williams, WSDOT Environmental Manager
Susan Killen, Keith Nakano, and Mark Stewart, Parsons Brinckerhoff

From: Patrick Romero, Parsons Brinckerhoff

Date: September 6, 2006

Subject: Noise Discipline Report – Appendix E
SR 518/Sea-Tac Airport to I-5/I-405 Interchange – Extension of Noise Barrier 2 and Noise Barrier 4 across the SR 518 bridge over 42nd Avenue South

The *SR 518/Sea-Tac Airport to I-5/I-405 Interchange Noise Discipline Report* (May 2006) evaluated noise impacts within the project area and recommended three noise barriers to mitigate identified impacts. The original analysis for Noise Barrier 2 and Noise Barrier 4 concluded that the cost of widening the SR 518 bridge over 42nd Avenue South and the cost of constructing noise barriers over this crossing would be prohibitively expensive. The three residences located to the southeast of the SR 518 bridge over 42nd Avenue South were originally analyzed as a separate neighborhood because they were separated by 42nd Avenue South. When evaluated on their own, the allowable wall area with respect to the limited number of residences was insufficient to construct a noise barrier in this area. With guidance from the Washington State Department of Transportation (WSDOT) Air Quality, Acoustics, and Energy staff, the analysis approach was changed. Since the only barrier design that would provide any reduction in traffic noise levels would have to cross the bridge and connect to Noise Barrier 4, guidance was provided that these residences along

42nd Avenue South should be included in the evaluation of Noise Barrier 4, which is planned for the project, west of 42nd Avenue South.

This memorandum provides additional analysis to evaluate extending Noise Barriers 2 and 4 across the SR 518 bridge over 42nd Avenue South to lower noise levels at nearby residences located northwest and southeast of the SR 518 bridge over 42nd Avenue South. The background and analysis methods used for this additional analysis remain unchanged from the prior analysis.

Noise Barrier 2 Extension (Not Feasible)

Fourteen-foot tall and 30-foot tall extensions to Noise Barrier 2 were evaluated across the northern side of the SR 518 bridge over 42nd Avenue South. Sensitive noise receptors in this area include outdoor use areas for one single-family residence (Receptor N) and 13 apartment units (Receptors 12, N, Q, and R) west of 42nd Avenue South (Figure 1).

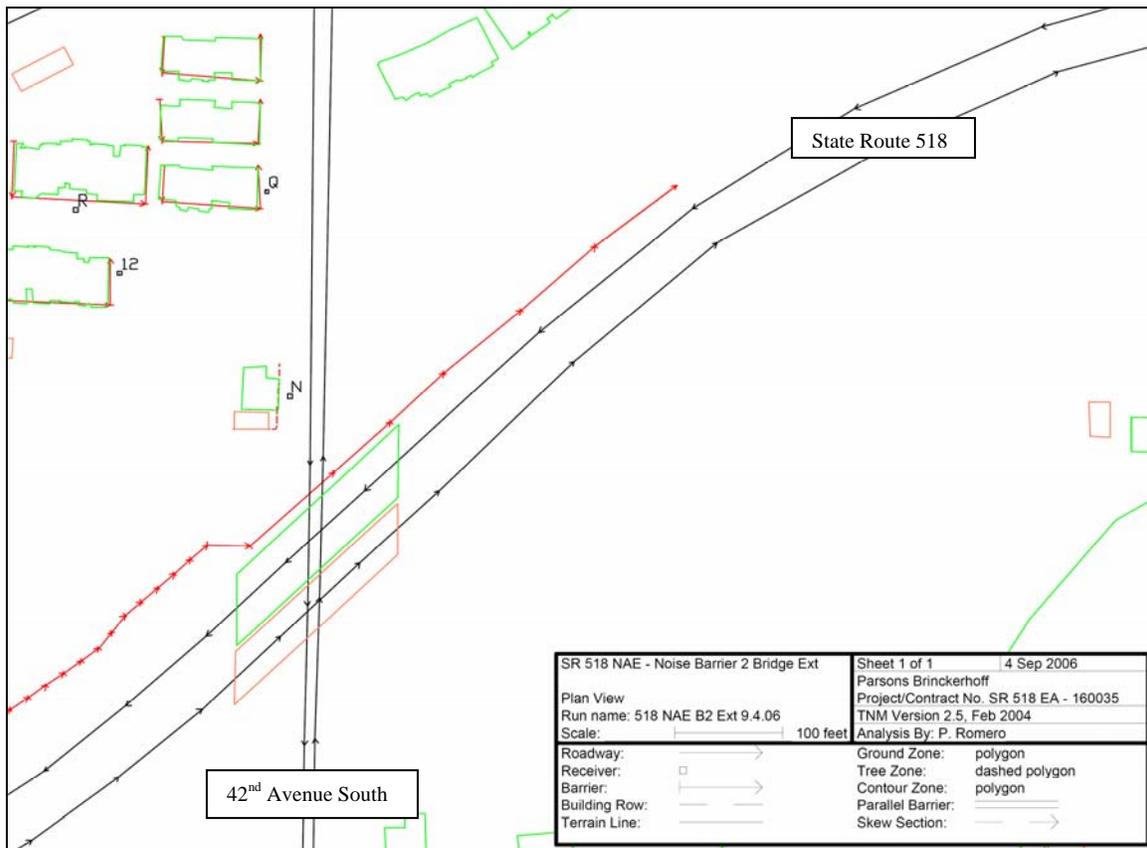


Figure 1. Noise Model Plan View of Noise Barrier 2 Extension

Project noise levels in the area of Noise Barrier 2 were predicted to range between 67 and 72 dBA without a noise barrier (Table 1). As shown in Table 1, a 30-foot tall and approximately 550-foot-long extension of Noise Barrier 2 does not achieve the necessary 3 dBA reduction to be included as benefited receivers in the evaluation of Noise Barrier 2. Each of the residences in this area receives a portion of their traffic noise from nearby 42nd Avenue South and Southcenter Boulevard. Only one residence (Receptor N) of the 14 residences located in this area is within 200 feet of the nearest SR 518 lanes.

Table 1: Noise Modeling Results, Noise Barrier 2

Receptor		RE	L _{eq} Sound Level (dBA)			
			Existing	No Action	Build	Noise Barrier 2 Extended Across SR 518 bridge over 42 nd Avenue South (30 feet tall)
12	Multifamily Apartments at 40 th Avenue South	4	67	68	68	66
N*	Single-Family Residence along 42 nd Avenue South	1	71	72	72	70
Q	Multifamily Apartments along 42 nd Avenue South	2	68	69	69	68
R	Multifamily Apartments along 40 th Avenue South	7	66	67	67	65

Bold indicates sound levels that approach or exceed the NAC.
 *First-row residences are marked with an asterisk.
 RE represents Residential Equivalency.

Noise Barrier 4 Extension (Feasible, Reasonable)

A fourteen-foot tall extension to Noise Barrier 4 along the south side of the SR 518 bridge over 42nd Avenue South meets WSDOT's criteria for Feasibility and Reasonableness. Residences behind this noise barrier are represented by Receptors D and G, as shown in Figure 2.

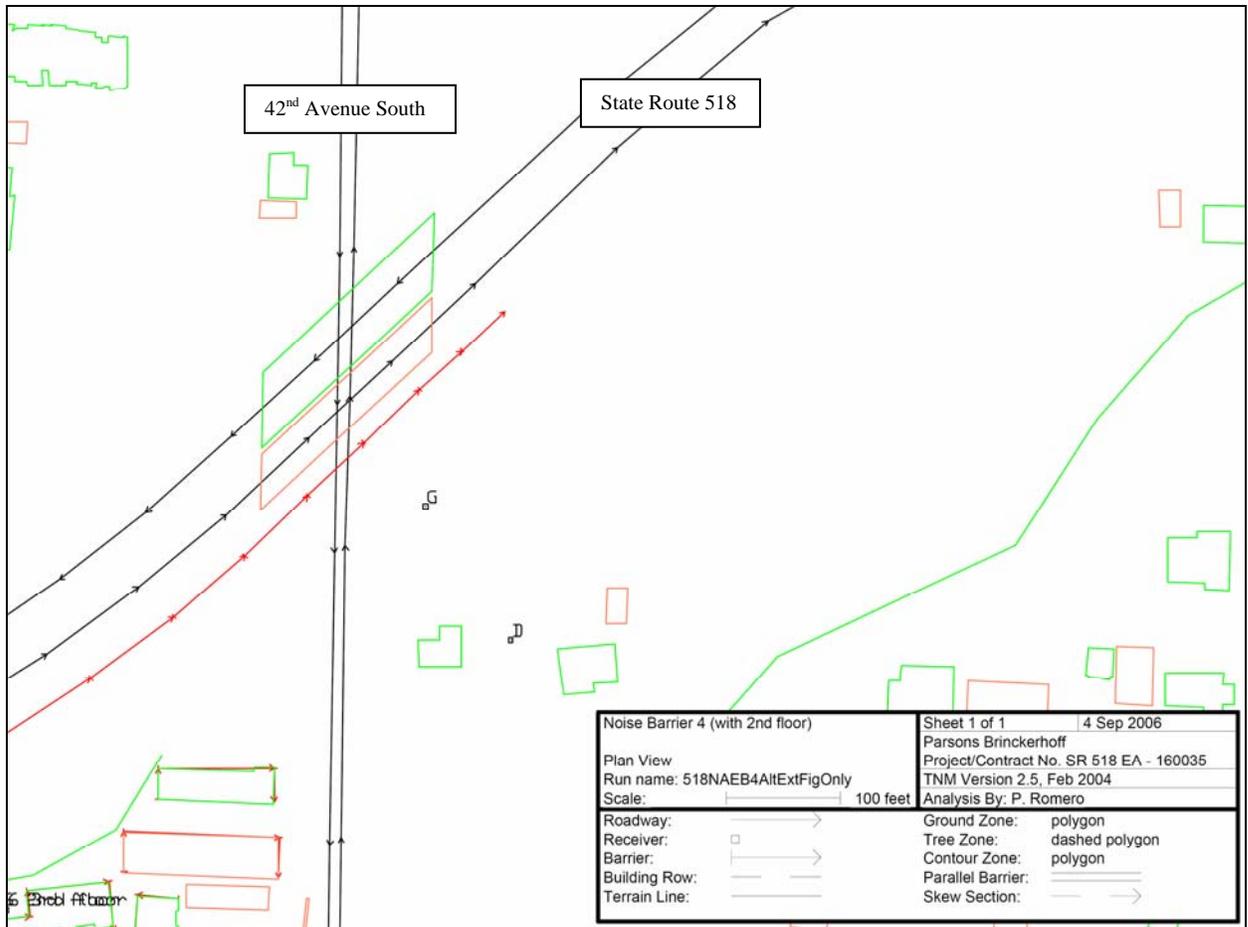


Figure 2. Noise Model Plan View of Noise Barrier 4 Extension

Receptors D and G represent one first row and two second row single-family residences, respectively. Project noise levels in this area south of SR 518 and east of 42nd Avenue South were predicted to range between 71 and 74 dBA without a noise barrier (Table 2). As shown in Table 2, a 14-foot tall and approximately 250-foot-long extension would reduce noise levels by 4 dBA at all three residences in the area. By achieving at least a 3 dBA noise reduction, Receptors D and G are included as benefited receivers located behind Noise Barrier 4. Including Receptors D and G as benefited receivers does not change the Feasibility or Reasonableness of Noise Barrier 4. The lengthened Noise Barrier 4 design achieves at least a 7 dBA noise reduction at one location behind the barrier; the barrier reduces noise levels by at least 5 dBA at the majority of the first-row residences; and Noise Barrier 4 is approximately 20,000 square feet while having an allowable area of more than 56,000 square feet. The area included in this 14-foot-tall extension is approximately 4,400 square feet. In an attempt to achieve greater noise

reduction at residences represented by Receptors D and G, this design was lengthened and raised to a height of 30 feet; however, no noticeable noise reduction was present as a result of the taller wall height.

Table 2: Noise Modeling Results, Noise Barrier 4

Receptor		RE	L _{eq} Sound Level (dBA)			
			Existing	No Action	Build	Noise Barrier 4 Extended Across SR 518 bridge over 42 nd Avenue South (14 feet tall)
D	Single-Family Residence along 42 nd Avenue South	2	69	70	71	67
G*	Single-Family Residence Along 42 nd Avenue South	1	73	74	74	70

Bold indicates sound levels that approach or exceed the NAC.
 *First-row residences are marked with an asterisk.
 RE represents Residential Equivalency.

Table 3 shows the coordinates and relative heights of the Noise Barrier 4 extension included in the noise model. Coordinates presented are preliminary and should be used to help guide final design of this noise barrier.

Table 3: Noise Barrier 4 Extension

X Coordinate	Y Coordinate	Bottom Elevation	Height
1,610,300.8	500,610.2	266.00	14
1,610,356.0	500,663.7	261.00	14
1,610,404.9	500,710.6	256.00	14
1,610,453.8	500,757.6	252.00	14
1,610,491.3	500,792.3	249.00	14
1,610,528.9	500,827.1	246.00	14