

# Final Noise Abatement Design Report Technical Memorandum Noise Barrier C

## 495 Express Lanes Northern Extension (NEXT) Project

### Fairfax County, Virginia

VDOT Project No. 0495-029-419; UPC 113414  
Federal Project No. NHPP-495-5(095)

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## 1 Purpose and Background

This Technical Memorandum for Noise Barrier C is an addendum to the 495 Express Lanes Northern Extension (NEXT) Final Noise Abatement Design Report (NADR), dated April 2023. For Noise Barrier C, the final design presented within the NADR was modified to accommodate community requests. The following sections detail the evaluation of design year noise levels, results of the noise impact assessment, and evaluation of noise abatement and recommended noise barrier configurations.

## 2 Evaluation of Design Year Noise Levels (2045) and Noise Impact Assessment

Noise Barrier C would provide noise abatement to receptors located within CNE C. CNE C is located on the southbound side of I-495 between Rivercrest Drive and the ramp connecting the George Washington Memorial Parkway westbound to I-495 southbound. This CNE contains 57 receptors, including 35 single-family residences (Activity Category B) and a portion of the Potomac Heritage Trail, represented by 22 Activity Category C receptors. CNE C is shown in **Figure 1**.

Design year noise levels within CNE C are predicted to range between 48 and 74 dBA, resulting in a total of 10 impacted receptors along the Potomac Heritage Trail. These results are summarized within **Table 2** of **Appendix A**. To mitigate noise impact to these receptors, Noise Barrier C was designed and presented within the final NADR report. However, per VDOT request, additional modifications were made to the final barrier design after the NADR was finalized. These modifications are further discussed within Section 3 below.

## 3 Noise Abatement Evaluation

With direction from VDOT, the final design for Noise Barrier C was modified to address requests through community engagement, as input obtained during the voting process from the National Park Service and the adjacent noise-affected community requested that the barrier be shortened at the northern terminus and moved closer to I-495, where feasible, through partial mitigation. The total length of Noise Barrier C was reduced by approximately 300 feet and shifted south approximately 20 feet at its eastern end when compared to the design presented in the final NADR. The sound attenuation line was also maintained, at a minimum.

The modified design for Noise Barrier C would range in height from 13 to 18 feet (average height of 14 feet) and would have a length of 672 feet, equating to a surface area of 9,670 square feet. The barrier would benefit six out of the 10 impacted receptors associated with the Potomac Heritage Trail and would benefit one non-impacted residential receptor. The barrier would also meet VDOT's acoustical feasibility goal. When compared to the final design presented in the NADR, it should be noted that a total of two impacted receptors (Receptors C-003 and C-004) would no longer benefit from Noise Barrier C due to the reduction in length. To maintain benefit to receptor C-032, as presented in the NADR,

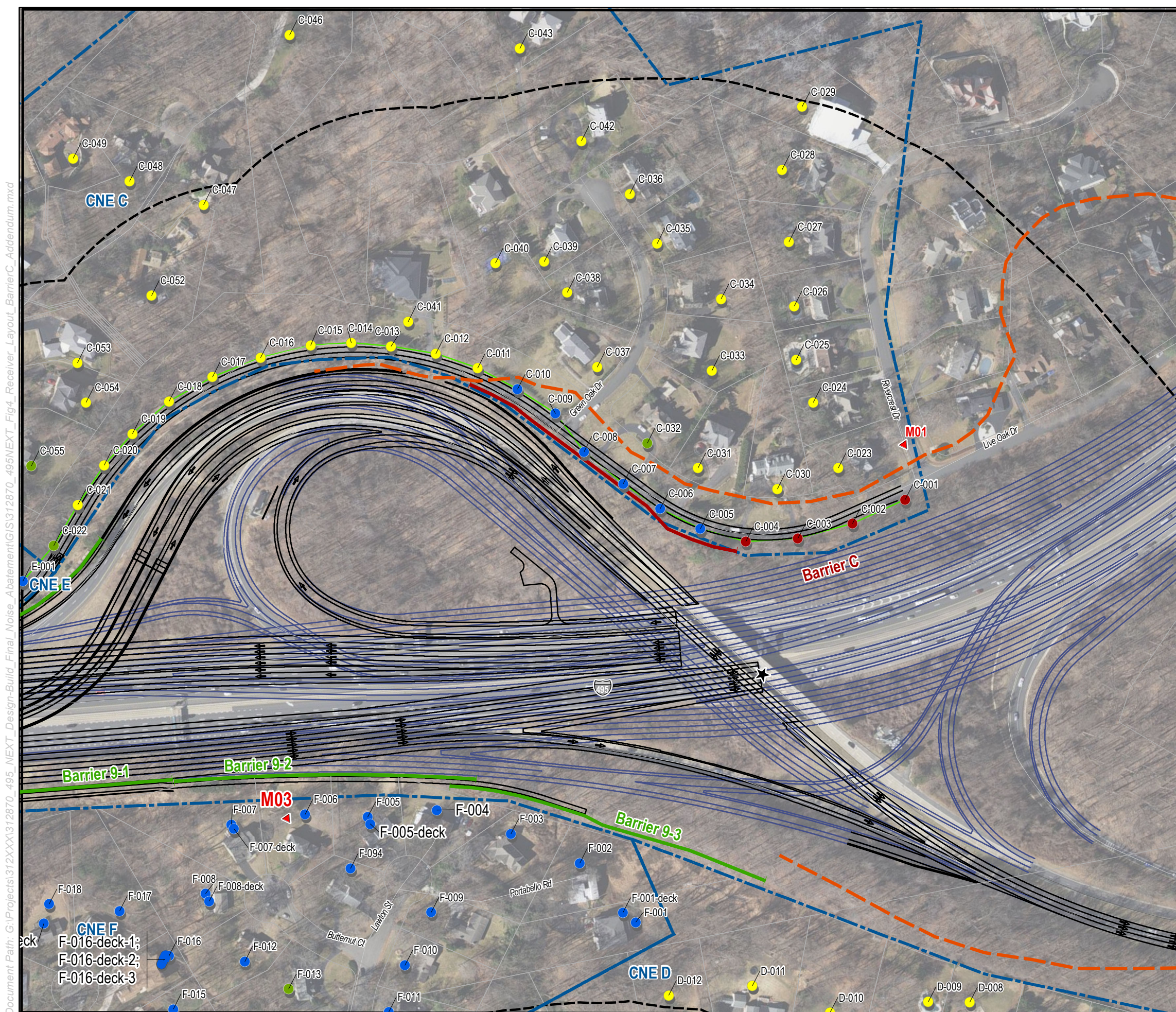
heights were increased by one foot between Stations 14+00 and 15+50. The barrier would provide 7 dBA or more of noise reduction to six impacted receptors, which meets VDOT's noise reduction design goal. With a surface area per benefited receptor value of 1,381 SF/BR, Noise Barrier C meets VDOT's cost-effectiveness criteria of 1,600 SF/BR. Therefore, Noise Barrier C would also be considered reasonable.

**Table 2** within **Appendix A** provides the predicted 2045 Design Year noise levels with and without the modified replacement of Noise Barrier C, along with the predicted insertion loss and the benefit/impact status for receptors located behind the barrier. **Table 4** in **Appendix B** includes barrier details for the modified replacement of Noise Barrier C. The revised Warranted, Feasible, and Reasonable worksheet for Noise Barrier C is included in **Appendix C**.

**Figure 1**  
**Location Map for Common Noise**  
**Environments, Receptors,**  
**Build Contours and Barriers**

**I-495 Express Lanes**  
**Northern Extension Project**

Fairfax County, Virginia



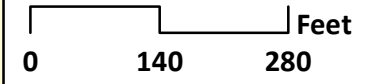
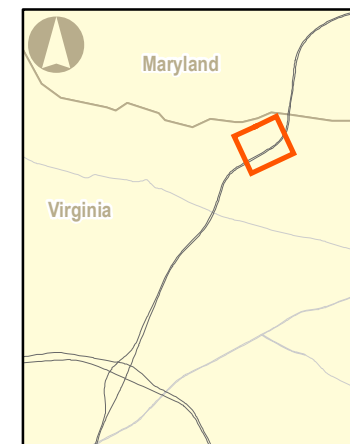
Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Not Impacted, Benefit Not Determined
- Not Use for the Determination

- Top Floor Noise Prediction Result
- Bottom Floor Noise Prediction Result

Note: Grouped Receiver Labels are in order of Leader Occurrence.

- ▲ **M#** Measurement Site
  - CNE Boundary
  - 500' Noise Study Area
  - 495 NEXT
  - Trails
  - 66 dBA Noise Contour with Recommended Barrier
  - Future Improvements by Others
- Noise Barriers
- Feasible and Reasonable
  - Feasible and Not Reasonable
  - Not Feasible
  - Not Reasonable
  - Existing Barrier to Remain
  - Existing Barrier to be Replaced



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## Appendix A Results Tables

**Table 2. Predicted Traffic Noise Levels for Noise Barrier C**

Rec. ID	Address/ Location <sup>1</sup>	No. of Units	FHWA NAC	Floor	2045 Noise Levels, dBA L <sub>eq</sub>		
					Without Barrier	With Barrier	Insertion Loss <sup>2</sup>
C-001	Potomac Heritage Trail	1	C	1	66	66	0
C-002	Potomac Heritage Trail	1	C	1	66	66	0
C-003	Potomac Heritage Trail	1	C	1	67	67	0
C-004	Potomac Heritage Trail	1	C	1	73	71	2
C-005	Potomac Heritage Trail	1	C	1	74	63	12
C-006	Potomac Heritage Trail	1	C	1	71	60	11
C-007	Potomac Heritage Trail	1	C	1	71	58	14
C-008	Potomac Heritage Trail	1	C	1	71	57	15
C-009	Potomac Heritage Trail	1	C	1	68	59	10
C-010	Potomac Heritage Trail	1	C	1	67	58	8
C-011	Potomac Heritage Trail	1	C	1	65	61	4
C-012	Potomac Heritage Trail	1	C	1	65	65	0
C-013	Potomac Heritage Trail	1	C	1	63	63	0
C-014	Potomac Heritage Trail	1	C	1	59	59	0
C-015	Potomac Heritage Trail	1	C	1	58	58	0
C-016	Potomac Heritage Trail	1	C	1	57	57	0
C-017	Potomac Heritage Trail	1	C	1	58	58	0
C-018	Potomac Heritage Trail	1	C	1	59	59	0
C-019	Potomac Heritage Trail	1	C	1	61	61	0
C-023	640 Live Oak Dr	1	B	1	61	61	0
C-024	640 Rivercrest Dr	1	B	1	54	54	0
C-025	636 Rivercrest Dr	1	B	1	51	50	1
C-026	632 Rivercrest Dr	1	B	1	50	50	0
C-027	628 Rivercrest Dr	1	B	1	50	50	0
C-028	624 Rivercrest Dr	1	B	1	54	54	0

Rec. ID	Address/ Location <sup>1</sup>	No. of Units	FHWA NAC	Floor	2045 Noise Levels, dBA L <sub>eq</sub>		
					Without Barrier	With Barrier	Insertion Loss <sup>2</sup>
C-029	620 Rivercrest Dr	1	B	1	54	54	0
C-030	644 Live Oak Dr	1	B	1	61	60	1
C-031	648 Live Oak Dr	1	B	1	52	52	0
C-032	650 Live Oak Dr	1	B	1	62	58	5
C-033	7004 Green Oak Dr	1	B	1	49	48	1
C-034	7008 Green Oak Dr	1	B	1	49	49	0
C-035	7012 Green Oak Dr	1	B	1	48	48	0
C-036	7016 Green Oak Dr	1	B	1	50	51	0
C-037	7001 Green Oak Dr	1	B	1	61	57	4
C-038	7009 Green Oak Dr	1	B	1	59	57	2
C-039	7015 Green Oak Dr	1	B	1	59	59	1
C-040	7017 Green Oak Dr	1	B	1	58	58	0
C-041	654 Live Oak Dr	1	B	1	59	59	0
C-042	7018 Green Oak Dr	1	B	1	57	56	0
C-043	7022 Green Oak Dr	1	B	1	55	55	0
C-044	7024 Green Oak Dr	1	B	1	56	56	0
C-045	7035 Green Oak Dr	1	B	1	54	54	0

Notes:

- 1.) All receptors are located in McLean, VA.
- 2.) Rounding of decibels may make some subtractions appear incorrect.
- 3.) For locations where multiple receptors were analyzed, the receptor with the loudest “No Barrier” noise levels were used when determining feasibility and reasonableness.
- 4.) For Category D receptors, exterior noise levels are provided for informational purposes only. Predicted interior noise levels were used for determining noise impact and benefit from noise barrier.

Source: HMMH, 2023.

## Appendix B Noise Barrier Profiles – Sound Attenuation Lines and Barrier Station Detail



**Table 4. Sound Attenuation Line for Noise Barrier C**

Approximate Barrier Station No.	Plan Equivalent Station No.	Barrier Coordinates in TNM (NAD83 VA State Plane North US Survey Feet)			Top of Barrier Elevation (feet)	Estimated Height Above Ground (feet)
		East (X)	North (Y)	Ground		
Barrier C 11+50	11+50 (NB-C)	11856708.78	7036988.92	234.14	239.41	14
Barrier C 12+00	12+00 (NB-C)	11856756.07	7036978.42	237.81	247.66	18
Barrier C 12+50	12+50 (NB-C)	11856804.81	7036968.34	241.00	250.14	16
Barrier C 13+00	13+00 (NB-C)	11856853.76	7036958.19	243.36	251.81	14
Barrier C 13+50	13+50 (NB-C)	11856902.71	7036948.03	245.02	254.00	13
Barrier C 14+00	14+00 (NB-C)	11856951.67	7036937.87	246.31	257.36	14
Barrier C 14+50	14+50 (NB-C)	11857000.62	7036927.72	247.10	259.02	14
Barrier C 15+00	15+00 (NB-C)	11857049.58	7036917.56	247.17	260.31	14
Barrier C 15+50	15+50 (NB-C)	11857110.10	7036893.15	245.26	261.10	14
Barrier C 16+00	16+00 (NB-C)	11857165.32	7036893.31	244.36	260.17	13
Barrier C 16+50	16+50 (NB-C)	11857214.90	7036899.57	242.82	258.26	13
Barrier C 17+00	17+00 (NB-C)	11857263.41	7036911.56	241.66	258.36	14
Barrier C 17+50	17+50 (NB-C)	11856708.78	7036988.92	234.14	257.82	15
Barrier C 18+00	18+00 (NB-C)	11856756.07	7036978.42	237.81	256.66	15

Source: HMMH, 2023.

## Appendix C Warranted, Feasible, and Reasonable Worksheet

**VDOT Highway Traffic Noise Abatement  
Warranted, Feasible, and Reasonable Worksheet**

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	25-Sep-23
Project No. and UPC:	VDOT Project No. 0495-029-419; UPC 113414
County:	Fairfax
District:	Northern Virginia
Barrier System ID:	Barrier C
Community Name and/or CNE#	CNE C
Noise Abatement Category(s)	B, C
Design phase:	Final design

**Warranted**

1	Community Documentation (if applicable)	
a.	Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued).	_____
b.	Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	_____
c.	Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate."	_____
		Yes
2	Criteria requiring consideration of noise abatement	
a.	Project causes design year noise levels to approach or exceed the Noise Abatement Criteria?	_____
		Yes
b.	Project causes a substantial noise increase of 10 dB(A) or more?	_____
		No

**Feasibility**

1	Impacted receptor units	
a.	Number of impacted receptor units:	10
b.	Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL):	6
c.	Percentage of impacted receptor units receiving 5 dB(A) or more IL	60%
d.	Is the percentage 50 or greater?	Yes
2	Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues?	NA
3	Will placement of the noise barrier restrict access to vehicular or pedestrian travel?	NA
4	Will placement of the noise barrier conflict with existing utility locations?	NA

**Reasonableness****1 Surface Area (Square foot)-Benefit Factors**

a. Surface Area (Total square foot) of the proposed noise barrier. (ft <sup>2</sup> )	9,670 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	6
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	1
d. Total number of benefited receptors.	7
e. Surface Area per benefited receptor unit. (ft <sup>2</sup> /BR)	1,381 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	Yes
g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

**2 Additional Noise Barrier Details**

a. Length of the proposed noise barrier. (ft)	672 ft
b. Height range of the proposed noise barrier. (ft)	13 - 18 ft
c. Average height of the proposed noise barrier. (ft)	14 ft
d. Cost per square foot. (\$/ft <sup>2</sup> )	\$42/SF
e. Total Barrier Cost (\$)	\$406,140
f. Barrier Material	Absorptive

**3 Community Desires Related to the Barrier**

Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to "decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier."

Yes

**Decision**

Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	Yes

Additional Reasons for Decision:

Noise Barrier C was updated after the final NADR was approved. The barrier was shortened and shifted south approximately 20 feet to accommodate community requests. A barrier survey was previously sent for this barrier and therefore would not be re-surveyed due to these changes.