I-75 Modernization Corridor
Construction Segment 1 Build Year 2040
Noise Segment 13 South Hills
Noise Segment 14 Williamsburg & Orchard Villages

Draft Noise Report

Oakland County, Michigan

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1.0 PROJECT STUDY AREA

The proposed I-75 roadway improvement project, identified as the I-75 Modernization Project, is in Oakland County, Michigan. The proposed roadway improvements cover a 17-mile portion of I-75 from north of 8 Mile Road to north of South Boulevard. This particular noise study represents a portion of the I-75 roadway improvements from Squirrel Road to north of South Boulevard, which is north of the study area. The present study maintains the previous analysis format of delineating the I-75 Modernization Project into defined noise study area segments consisting of the 12 original 2005 noise segments plus two additional noise segments covering from Squirrel Road to the Clinton River Trail. Therefore, the noise analysis was conducted for 14 noise study segments. Additionally, the entire length of the I-75 Modernization Project roadway improvements is further organized into three construction segments. Construction Segment One extends from north of Coolidge Highway to north of South Boulevard; Construction Segment Two extends from north of 13 Mile Road to north of Coolidge Highway; and Construction Segment Three extends from north of 8 Mile Road to north of 13 Mile Road.

This report focuses on the retro-fit area referred to as Construction Segment 1 as illustrated in Figure 1 which includes both noise study Segments 13 and 14. To maintain consistency with previously completed noise abatement analysis completed along the I-75 corridor, the South Hills and Williamsburg-Bloomfield Village communities are identified as part of the Noise Segment 13 and Noise Segment 14 study areas respectively.

In December 2010, revisions to the Federal Highway Administration (FHWA) traffic noise regulations defined in 23 CFR 772, were formulated and became effective nationally in July 2011. In Michigan, the traffic noise impact and abatement process procedures and requirements are contained in the Michigan Department of Transportation (MDOT) Highway Noise Analysis and Abatement Handbook (dated July 2011). The most noteworthy changes in 23 CFR 772 include expanding the Noise Abatement Criteria (NAC) from five to seven land use categories, how dwelling unit equivalents (DUE) are calculated, and how "feasibility and reasonableness" are determined. Furthermore, this traffic noise impact and abatement analysis was completed using the mandated and latest version of the FHWA Traffic Noise Model (TNM), Version 2.5, which has been widely vetted and found to be more accurate than the earlier versions and was used for all noise modeling. The study area was validated using noise measurement and traffic count data collected in July 2018. The field validated TNM model adjustments are included in all 2040 Build Year noise unabated and abated noise models developed within the Segment 13 and Segment 14 study areas.

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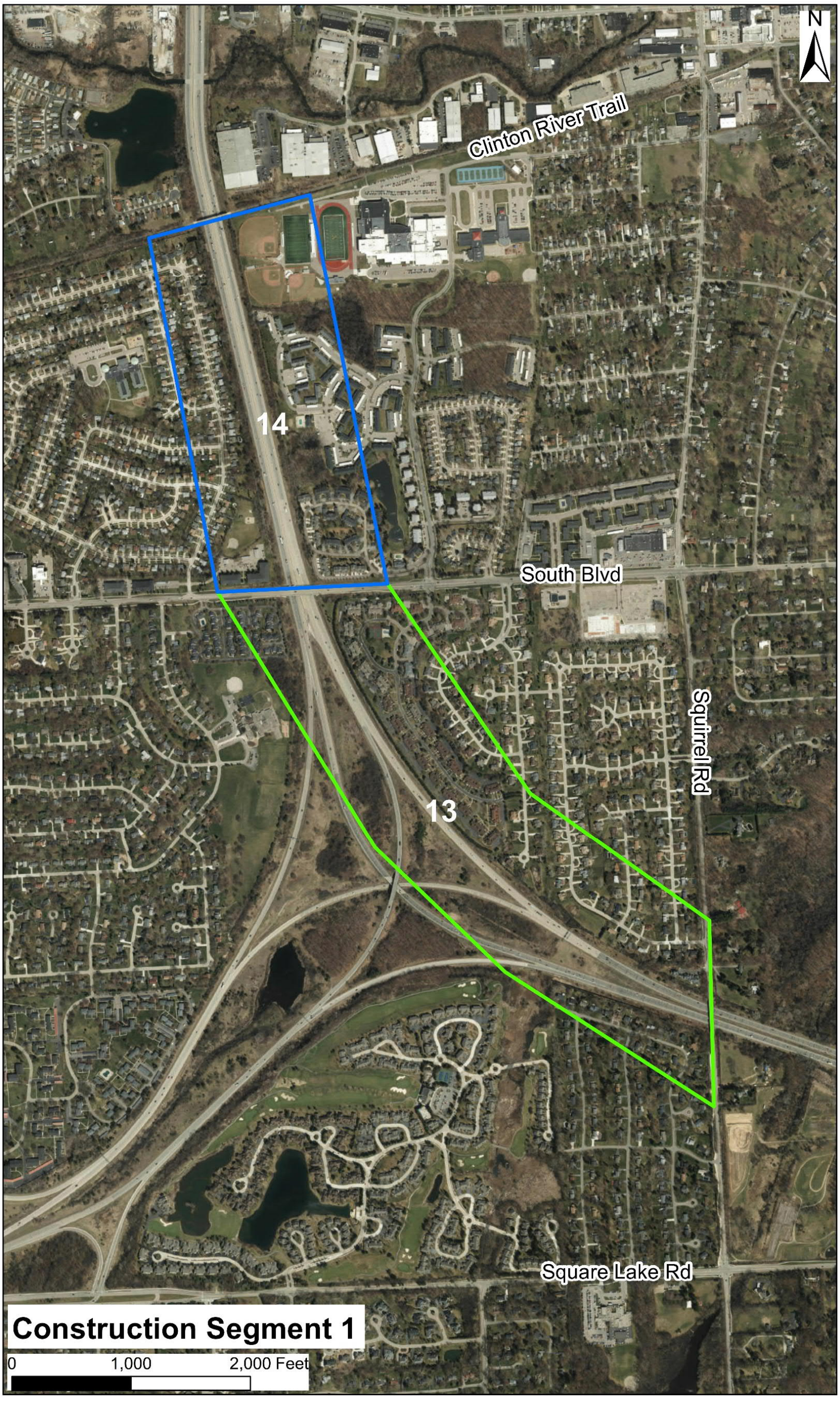
Figure 1 – Construction Segment 1 Study Area



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1.1 Summary of Abatement Analysis Findings Noise Segment 13

The proposed I-75 roadway improvement project, identified as the I-75 Modernization Project, is in Oakland County, Michigan. The proposed roadway improvements cover a 17-mile portion of I-75 from north of 8 Mile Road to north of South Boulevard. This particular noise study represents a portion of the I-75 roadway improvements from Squirrel Road to north of South Boulevard, which is north of the study area. The present study maintains the previous analysis format of delineating the I-75 Modernization Project into defined noise study area segments consisting of the 12 original 2005 noise segments plus two additional noise segments covering from Squirrel Road to the Clinton River Trail. Therefore, the noise analysis was conducted for 14 noise study segments. Additionally, the entire length of the I-75 Modernization Project roadway improvements is further organized into three construction segments. Construction Segment One extends from north of Coolidge Highway to north of South Boulevard; Construction Segment Two extends from north of 13 Mile Road to north of Coolidge Highway; and Construction Segment Three extends from north of 8 Mile Road to north of 13 Mile Road. The South Hills Community is part of is part of the Noise Segment 13 study area as depicted in Figure 2. The noise analysis utilized 2040 Build Year peak hour PM traffic projections under free-flowing traffic conditions to determine noise impacts and evaluation of the acoustic effectiveness of abatement measures that would help reduce noise exposure at noise sensitive properties adjacent to the northbound lanes of I-75 between South Boulevard and Squirrel Road. The build year noise impact analysis found that future 2040 peak hour noise levels behind the existing sound wall would exceed the 66 dB(A) impact threshold. Therefore, two sound barrier design configurations were evaluated to help improve noise reduction at the effected residential properties. The Design Option 1 noise barrier design consisted of evaluating a taller replacement sound barrier just inside the right-of-way in the same general location where the present wall exists today. The Design Option 2 noise barrier design consists of a portion of Option 1 plus two new sound barrier elements along the new relocated northbound I-75 shoulder and the eastbound East Square Lake Road to northbound I-75 on ramp shoulder. In both abatement analysis evaluations, the proposed sound barrier design configuration options did not achieve adequate noise reduction at a sufficient number of benefiting dwellings resulting in a unit cost well above the MDOT's $46,697 maximum allowable limit per benefit and thus not meeting MDOT's reasonable cost requirement. Therefore, based on these analysis findings, no new replacement sound barriers are able to be constructed in this area. The existing sound barrier that provides some abatement for the South Hills community should remain unaltered.

1.2 Summary of Abatement Analysis Findings Noise Segment 14

The proposed I-75 roadway improvement project, identified as the I-75 Modernization Project, is in Oakland County, Michigan. The proposed roadway improvements cover a 17-mile portion of I-75 from north of 8 Mile Road to north of South Boulevard. This particular noise study represents a portion of the I-75 roadway improvements from Squirrel Road to north of South Boulevard, which is north of the study area. The present study maintains the previous analysis format of delineating the I-75 Modernization Project into defined noise study area segments consisting of the 12 original 2005 noise segments plus two additional noise segments covering from Squirrel Road to the Clinton River Trail.

Therefore, the noise analysis was conducted for 14 noise study segments. Additionally, the entire length of the I-75 Modernization Project roadway improvements is further organized into three construction segments. Construction Segment One extends from north of Coolidge Highway to north of South Boulevard; Construction Segment Two extends from north of 13 Mile Road to north of Coolidge Highway; and Construction Segment Three extends from north of 8 Mile Road to north of 13 Mile Road. The Williamsburg Village and Bloomfield Village Communities that are part of the Noise Segment 14 study area as depicted in Figure 3. The noise analysis utilized 2040 Build Year peak hour PM traffic projections under free-flowing traffic conditions to determine noise impacts and evaluation of the acoustic effectiveness of abatement measures that would help reduce noise exposure at noise sensitive properties adjacent to the northbound lanes of I-75 between Clinton River Trail and South Boulevard. Two sound barrier designs were evaluated: Option 1 consists of a replacement sound barrier solely for the Williamsburg Village residential community and an extended sound barrier design, identified as Design Option 2, which includes the entire northbound communities between South Blvd and the Clinton River Trail. The Design Option 2 sound barrier configuration included abatement consideration for both the Williamsburg Village and Bloomfield Village communities. In both abatement analysis evaluations, the proposed sound barrier design configuration options did not achieve adequate noise reduction at a sufficient number of benefiting dwellings resulting in a unit cost well above the MDOT's $46,697 maximum allowable limit per benefit and thus not meeting MDOT's reasonable cost requirement. Therefore, based on these analysis findings, no new replacement sound barriers are able to be constructed in this area. The existing sound barrier that provides some abatement for portions of the Williamsburg Village community should remain unaltered.

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Figure 2 – Noise Segment 13 Study Area Limits

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Figure 3 – Noise Segment 14 Study Area Limits

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2.0 FUNDAMENTAL CONCEPTS OF ROADWAY NOISE

Physically in the natural environment, sound is generated by the vibration of the air molecules. The vibrations of the air molecules result in small fluctuations in air pressure. A sound wave is created when a series of these pressure waves move through the air. Sound waves vibrate at different rates or "frequencies." The faster an object vibrates, the higher the frequency of the sound wave. Slower vibration rates produce lower frequencies of sound. The human ear can detect a wide range of frequencies from about 20 Hz to 17,000 Hz. The decibel scale was developed to measure and quantify the loudness of sound energy of different levels of intensity. However, because human hearing sensitivity varies with the frequency of the sound, a weighting system was developed to provide a single number measure that better account for the human responses to environmental noise. The following sections describe some of the noise descriptors and impact criteria developed associated with the range of human hearing.

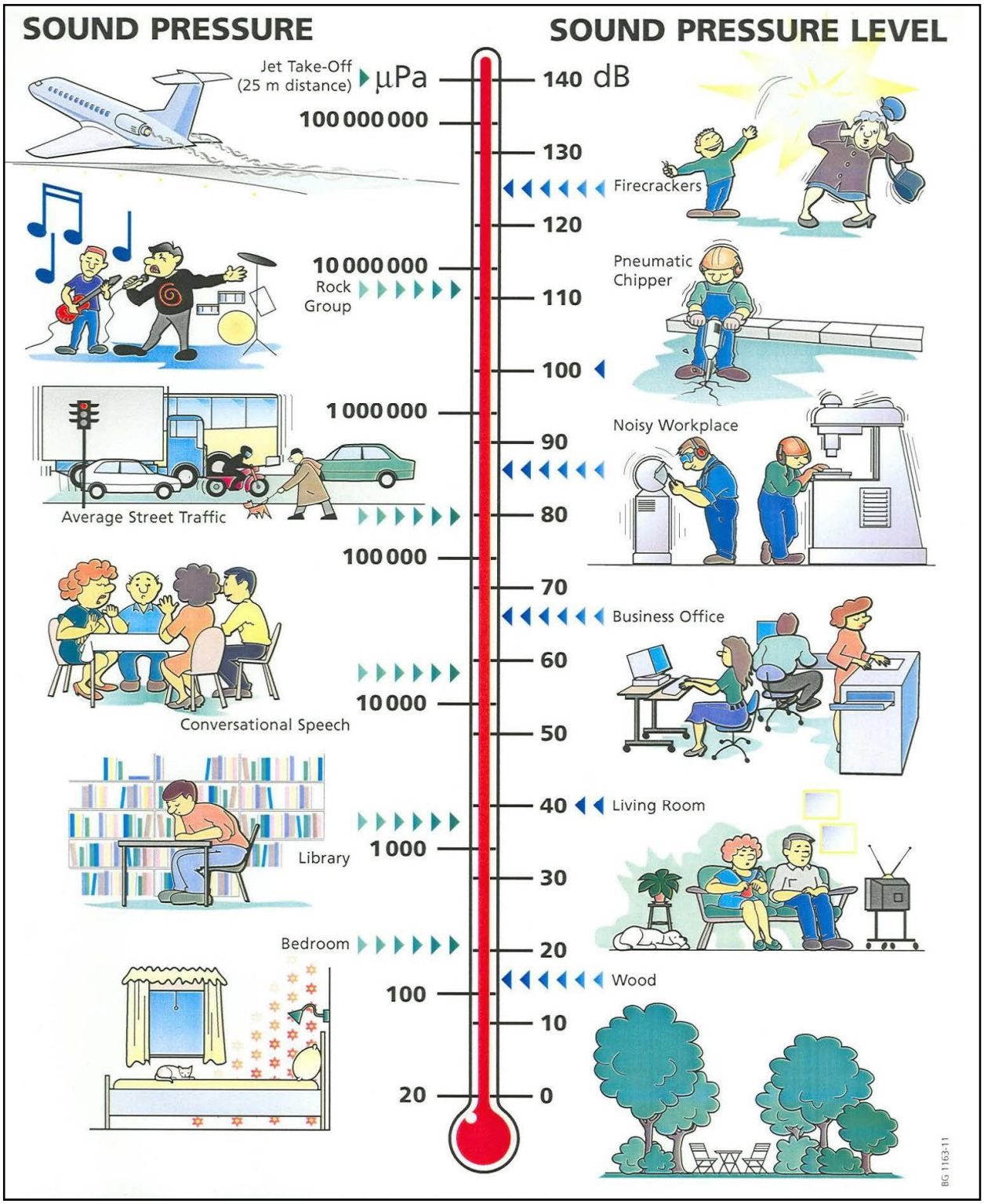
2.1 A-Weighted Sound Level

Sounds affecting humans occur in the natural environment at all times. Some sounds are necessary or desirable for communication or pleasure, many go unnoticed, and other sounds are truly unwanted or irritating. These unwanted sounds, result in annoyance and disturbance to the people living or working in the area. Therefore, unwanted sound is referred to as noise.

From many experiments with human participants, scientists have found that—unlike animals—the human ear is more sensitive to midrange frequencies as compared to either low or very high frequencies. Therefore, at the same sound level, the human ear perceives to hear midrange frequencies louder than low or very high frequencies. This characteristic of the human ear is considered by adjusting or weighting the spectrum of the measured sound level for the sensitivity of human hearing range. The weighting scale that best accounts for the sensitivity of the human hearing range is referred to as the A-weighted scale and is denoted by the "dB(A)" notation. The A-weighted sound level is a measure of sound intensity with one-third octave frequency characteristics that correspond to human response to noise. Acousticians accept the A-weighted sound level as a preferred descriptor for assessing human exposure and annoyance from environmental noise. Figure 4 below illustrates some common noise sources and sound pressure levels. An understanding of the following relationships is also helpful in providing a subjective impression of changes in the A-weighted sound level:

- A 3 dB(A) decrease in A-weighted noise level is considered Barely Perceptible and represents a 50% loss in sound energy.
- A 5 dB(A) decrease in A-weighted noise level is considered Readily Perceptible and represents a 67% loss in sound energy.
- A 10 dB(A) decrease in A-weighted noise level is considered Half as Loud and represents a 90% loss in sound energy.
- A 20 dB(A) decrease in A-weighted noise level is considered One-Fourth as Loud and represents a 99% loss in sound energy.

Figure 4 – Typical Noise Levels



Source: Bruel and Kjaer: Environmental Noise, Sound and Vibration Measurements, 2000.

2.2 Noise Level Descriptors

A basic characteristic parameter of environmental noise, particularly near roadways; is its time-varying nature that fluctuates from moment to moment. These fluctuations constitute the time-varying property of roadway noise. Because traffic noise fluctuations vary from moment to moment, it is common practice to condense all the information into a single number, called the "equivalent" sound level (L_{eq}). The L_{eq} is a measure of the average sound energy during a specified period (typically 1-hour duration). The L_{eq} is defined as the constant level that, over a given period, transmits the same amount of acoustical energy to the receiver as the actual time-varying sound. Studies have shown that the A-weighted L_{eq} noise descriptor is well correlated with human annoyance to sound; therefore, this descriptor is widely used by government agencies for environmental noise impact assessments. The L_{eq} measured over a 1-hour period is referred to as the hourly $L_{eq\ or}$ L_{eq} (1-hour) and has been established by Federal Highway Administration as the preferred noise descriptor to evaluate, analyze and assess highway traffic noise exposure.

2.3 Noise Impact Criteria

The proposed I-75 Modernization Project Noise Segment 14 roadway improvements are defined as a Type I roadway improvement. This classification refers to projects that include federal funding for construction of highways on a new location alignment or the alteration of an existing highway resulting in a substantial change in either the horizontal or vertical alignment and or an increase in the number of through-traffic lanes. The noise analysis for this project was conducted in general compliance with the Code of Federal Regulations (CFR), Title 23, Part 772, the United States Department of Transportation, Federal Highway Administration (FHWA), Highway Traffic Noise Analysis and Abatement - Policy and Guidance (FHWA, 2011). The basic goals of noise criteria, as they apply to highway projects, are to minimize potential adverse noise impacts to a community and, where determined appropriate, provide feasible and reasonable measures to abate noise impacts.

To determine if highway noise levels are compatible with various land uses, the FHWA has developed noise abatement criteria and procedures to be used in the planning and design of highways. A summary of the FHWA Noise Abatement Criteria (NAC) for various land uses is presented in Table 1. These NAC levels represent the lower limit of what would constitute as a highway traffic noise impact for specific exterior land uses and activities and for certain indoor activities. Impact occurs when the predicted noise level at a qualified receptor approaches or exceeds the FHWA NAC, or when the difference between existing and future noise levels results in a substantial increase in noise level.

Table 1 – FHWA Noise Abatement Criteria (NAC)[1] Hourly A-Weighted Sound Level in dB(A)

ACTIVITY CATEGORY	ACTIVITY CRITERIA[2]		EVALUATION LOCATION	ACTIVITY DESCRIPTION
	$L_{eq}(h)$[3]	L10(h)[4]		
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[5]	67	70	Exterior	Residential.
C[5]	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[5]	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	--	--		Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities and warehousing.
G	--	--		Undeveloped lands that are not permitted.

[1] MDOT defines a noise impact as a 10 dB(A) increase between the existing noise level to the design year predicted noise level OR a predicted design year noise level that is 1 dB(A) less than the levels shown in Table 1.

[2] Either $L_{eq}(h)$ or L10(h) (but not both) may be used on a project. MDOT uses $L_{eq}(h)$. The $L_{eq}(h)$ and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

[3] L_{eq} is the equivalent steady-state sound level which in a stated period contains the same acoustic energy as the time-varying sound level during the same time period, with $L_{eq}(h)$ being the hourly value of L_{eq}.

[4] L10 is the sound level that is exceeded ten percent of the time (90th percentile) for the period under consideration, with L10 being the hourly value of L10.

[5] Includes undeveloped lands permitted for this activity category.

The Michigan Department of Transportation's (MDOT) interpretation of the federal requirement is in the MDOT Highway Noise Analysis and Abatement Handbook, July 2011. MDOT defines "approach" as being within one decibel (dB(A)) of each NAC category. Therefore, all residential properties that have an exterior L_{eq} levels of 66 dB(A) or higher are considered to "approach or exceed" the NAC "B" land use activity criteria. Similarly, all properties covered by NAC "C" with L_{eq} values of 66 dB(A) or higher would "approach or exceed" the NAC "C" criteria. In addition to the approach threshold impact, MDOT also considers an impact to occur if there is projected "substantial" noise level increase. A substantial noise level increase is defined as a projected build design noise level increase of 10 dB(A) or more above the corresponding existing noise level. Therefore, a noise impact can occur two separate ways: either when build noise levels approach or exceed the NAC or when a substantial increase from existing noise levels to project build conditions is predicted to occur.

When changes to the horizontal or vertical alignment of existing roadways are proposed (Type I roadway improvements) and as a result of these roadway modifications, traffic noise impacts are identified, noise mitigation must be considered. A noise abatement measure is any positive action taken to reduce the impact of traffic noise on an activity area. Consideration for noise abatement does not in itself guarantee the abatement is warranted. In impacted communities, several assessment steps are evaluated to determine the feasibility and reasonableness of the abatement. The evaluation is based on many factors and considerations, which in equal order of importance include the following:

- Engineering constructability
- Restriction to traffic flow or property access
- Cost effectiveness
- Wall height constraints
- Acoustic effectiveness
- Whether zoning revisions to the existing land use are expected in the near future

MDOT's specific feasibility and reasonableness requirements are described in the section that follows.

2.4 Feasibility and Reasonableness

In the communities where impacts are predicted to occur, MDOT has defined a specific two-step process required to determine if abatement is possible. The following two steps, in respective order, must be considered. It should be noted that if a proposed sound barrier does not pass the feasibility phase, the second step of analysis for the reasonableness phase is not required. If a proposed sound barrier does not meet the requirements in the feasibility phase it is no longer considered viable.

Step 1: Is it feasible to provide highway traffic noise abatement from engineering, safety and the acoustic effectiveness standpoint?

Step 2: Is it reasonable to provide highway traffic noise abatement based on the consideration of the cost/benefit analysis, view point of a majority of the benefiting residences and property owners, and in providing sufficient noise attenuation?

Step 1: Feasibility Consideration: Once the future build highway design noise modeling analysis has been completed and the properties that exceed the NAC are identified, the noise abatement design is evaluated and assessed for feasibility. If a proposed sound barrier does not pass the feasibility phase it does not move forward to the reasonableness phase. The following factors must all be met in the feasibility phase (step 1) to continue to the reasonableness phase (step 2):

(1) Can a noise reduction of at least 5 dB(A) be achieved by 75% of impacted receptors?
(2) Can the sound barrier be designed and physically constructed at the proposed location?
(3) Will placement of the sound barrier cause a visual safety problem?
(4) Will placement of the sound barrier restrict access to vehicular or pedestrian travel?

(5) Will the sound barrier impact utilities or will the utilities impact the sound barriers?
(6) Will the sound barrier impact drainage or will the drainage impact the sound barrier?

Step 2 Reasonableness Consideration: Once the feasibility phase has been evaluated and each feasible requirement above is satisfied, a proposed sound barrier is evaluated for reasonableness. All of the following cost and acoustic requirements must be satisfied for a proposed sound barrier to be considered reasonable:

(1) Determine the total square-footage (length multiplied by height) assuming a $45 per square foot unit cost, can a proposed sound barrier be constructed such that the cost per benefiting unit (CPBU) must remain below $46,967.
(2) A benefited receptor is an impacted receptor that achieves a noise reduction of 5 dB(A) or greater noise reduction as a result of the sound barrier.
(3) The reasonableness phase requires a proposed sound barrier to achieve a noise reduction of 10 dB(A) or greater for at least one benefiting receptor and provide at least a 7 dB(A) reduction for 50% or more of the benefiting receptor sites.

2.5 Public Involvement Phase

In general, the public involvement phase takes place during the Early Preliminary Engineering (EPE) and Preliminary Engineering (PE) Phases as part of MDOT's Context Sensitive Solution (CSS) process. This also occurs throughout project development and has been completed over the course of the last ten years with the development of the I-75 corridor aesthetic design guide, community open houses, public meetings and public preference polls. The public coordination helped create the aesthetic concept design. Additional coordination can occur if needed to communicate the final locations of the proposed noise walls and to review the aesthetics that have been previously shared.

2.6 Third Party Funds

Third party funding for abatement enhancements above and beyond that what MDOT is responsible for is limited to aesthetics and functional elements such as vegetation plantings and specific wall graphics like a city seal. In addition, these funds cannot be used to contribute to the cost of barrier that has not satisfied the $46,697 per benefit reasonableness cost criteria. Regardless of contribution sharing, no sound barrier will be funded by MDOT which does not meet the feasibility and reasonableness requirements.

3.0 FUTURE 2040 BUILD CONDITIONS NOISE LEVEL ESTIMATES

3.1 Noise Segment 13 Noise Impact Analysis Findings

A single TNM receiver site is a discrete or representative exterior modeling location of sensitive properties for any of the land uses listed in Table 1 where each TNM receiver site represents a single or multiple dwelling receptors. Noise predictions for modeling sites located adjacent to I-75 northbound lanes and behind the Option 1 sound barrier design configuration are presented in Table 2 and those associated with the noise abatement Option 2 configuration are contained in Table 3. Receivers modeled in the study area consists of both single-family residences and multi-family dwelling units. In both tables the information contained in columns one, two and three are the same.

The first column of each table identifies the TNM modeling receiver sites, column two provides an estimate of the TNM predicted unabated 2040 Design Build Year noise levels with impacted levels shown in bold text. Additionally, column three specifies whether a noise impact occurs with the number of dwelling impacts shown in parenthesis. Column four in Table 2 provides a summary of the noise reduction at each receptor site and the number of benefitting dwelling units (shown in parenthesis) for noise abatement design Option 1. Similarly, column 4 in Table 3 indicates the noise reduction with abatement at each receptor site and shown in parenthesis are the number of benefits.

Figure 5 provides a graphical representation of each of the modeled TNM receivers, the represented properties and their relative noise exposure versus the MDOT impacted criteria for future 2040 peak hour unabated build traffic conditions. A red dot in Figure 5 indicates a noise impact and a green dot represents a non-impacted property projected to remain below the 66 dB(A) impact threshold. The existing sound barrier at the right-of-way of the South Hills community is illustrated by the solid green line in Figure 5. A total of 79 TNM modeling locations representing both single and multi-family dwellings, Tennis Courts, and a Club House and pool were modeled representing 188 dwelling units (receptors) for potential impact and abatement assessment.

In general, the analysis findings indicate that the noise exposure above the 66 dB(A) impact threshold is projected at most first-row and many second-row residential properties in the South Hills community. In fact, under future 2040 peak hour traffic conditions, the existing sound barrier, depicted by the solid green line on Figure 5, is projected to provide only limited noise reduction benefit to the residential properties located behind the existing wall. A total of 147 residential noise impacts are projected to occur throughout the South Hills community.

Table 2 – Summary of Noise Segment 13 Predicted 2040 Future Build Unabated Noise Levels & Noise Reductions Achieved with Abatement[1] for Sound Barrier Design Option 1 Combined Northbound Replacement R/W Sound Barriers (NB1, NB1A, NB1B & NB1C)

TNM RECEIVER ID	PREDICTED 2040 UNABATED BUILD NOISE LEVEL L_{eq} (1 HR) dB(A)	MDOT/FHWA IMPACT YES or NO (NUMBER OF IMPACTS)	NOISE REDUCTION ACHIEVED WITH ABATEMENT (NUMBER OF BENEFITS)
R122	76	Yes (1)	11 (1)
R123	77	Yes (1)	9 (1)
R124	77	Yes (1)	11 (1)
R125	77	Yes (1)	9 (1)
R126	71	Yes (1)	2(0)
R127	68	Yes (1)	1(0)
R128	68	Yes (1)	1(0)
R129	69	Yes (1)	2(0)
R130	62	No	0(0)
R131	71	Yes (1)	0(0)
R132	69	Yes (1)	2(0)
R133	73	Yes (1)	6 (1)
R134	74	Yes (1)	5 (1)
R135	74	Yes (1)	4 (0)
R136	72	Yes (1)	0(0)
R137	73	Yes (1)	0(0)
R138	62	No	0(0)
R139	72	Yes (1)	0(0)
R140	73	Yes (1)	0(0)
R141	74	Yes (1)	1(0)
R142	72	Yes (1)	1(0)
R143	72	Yes (1)	1(0)
R144	67	Yes (1)	0(0)
R145	66	Yes (1)	0(0)
R146	65	No	0(0)
R147	59	No	0(0)
R148	75	Yes (1)	5 (1)
R149	74	Yes (1)	4(0)
R150	74	Yes (1)	3(0)
R151	63	No	3(0)
R152	69	Yes (1)	1(0)

Table 2 – Summary of Noise Segment 13 Predicted 2040 Future Build Unabated Noise Levels & Noise Reductions Achieved with Abatement[1] for Sound Barrier Design Option 1
Combined Northbound Replacement R/W Sound Barriers (NB1, NB1A, NB1B & NB1C) (continued)

TNM RECEIVER ID	PREDICTED 2040 UNABATED BUILD NOISE LEVEL L_{eq} (1 HR) dB(A)	MDOT/FHWA IMPACT YES or NO (NUMBER OF IMPACTS)	NOISE REDUCTION ACHIEVED WITH ABATEMENT (NUMBER OF BENEFITS)
R153	58	No	2(0)
R154	75	Yes (1)	6 (1)
R155	73	Yes (1)	2(0)
R156	55	No	2(0)
R157	65	No	1(0)
R158	66	Yes (1)	13 (1)
R159	71	Yes (1)	5 (1)
R160	70	Yes (1)	4(0)
R162	71	Yes (5)	6 (5)
R164	75	Yes (5)	7 (5)
R166	67	Yes (5)	2(0)
R168	69	Yes (5)	2(0)
R169	55	No	2(0)
R170	56	No	2(0)
R171	60	No	1(0)
R173	64	No	7 (4)
R174	68	Yes (4)	4(0)
R176	68	Yes (5)	1(0)
R178	63	No	0 (0)
R180	67	Yes (5)	2(0)
R182	66	Yes (5)	0 (0)
R183	63	No	2(0)
R184	61	No	6 (5)
R186	58	No	2(0)
R188	57	No	4(0)
R189	55	No	3(0)
R190	62	No	6 (5)
R192	57	No	3(0)
R194	56	No	4(0)
R195	69	Yes (1)	4(0)

Table 2 – Summary of Noise Segment 13 Predicted 2040 Future Build Unabated Noise Levels & Noise Reductions Achieved with Abatement[1] for Sound Barrier Design Option 1 Combined Northbound Replacement R/W Sound Barriers (NB1, NB1A, NB1B & NB1C) (continued)

TNM RECEIVER ID	PREDICTED 2040 UNABATED BUILD NOISE LEVEL L_{eq} (1 HR) dB(A)	MDOT/FHWA IMPACT YES or NO (NUMBER OF IMPACTS)	NOISE REDUCTION ACHIEVED WITH ABATEMENT (NUMBER OF BENEFITS)
R196	72	Yes (5)	4(0)
R198	69	Yes (5)	5 (5)
R200	56	No	3(0)
R202	71	Yes (4)	3(0)
R204	72	Yes (5)	2(0)
R205	69	Yes (1)	2(0)
R208	69	Yes (5)	7 (5)
R210	69	Yes (4)	2(0)
R211	71	Yes (1)	5 (1)
R214	69	Yes (5)	7 (5)
R216	71	Yes (4)	1(0)
R217	68	Yes (1)	5 (1)
R220	75	Yes (5)	7 (5)
R223	74	Yes (5)	6 (5)
Tennis Court	67	Yes (4)	1(0)
Club House and Pool	72	Yes (10)	2(0)
R226	68	Yes (6)	7 (6)
R228	71	Yes (6)	1(0)
TOTAL NUMBER OF RECEPTOR IMPACTS & BENEFITS		147	67[2]

Note: [1]All noise level and noise reduction estimates shown are rounded to nearest whole number.

[2] Includes 14 non-impacted benefited dwellings.

Table 3 – Summary of Noise Segment 13 Predicted 2040 Future Build Unabated Noise Level & Noise Reduction Achieved with Abatement[1] for Sound Barrier Design Option 2
Seg 13 NB Shoulder Plus Seg 13 NB Ramp Plus Seg 13 NB1, Seg 13 NB1A, Seg 13 NB1B

TNM RECEIVER ID	PREDICTED 2040 UNABATED BUILD NOISE LEVEL L_{eq} (1 HR) dB(A)	MDOT/FHWA IMPACT YES or NO (NUMBER OF IMPACTS)	NOISE REDUCTION ACHIEVED WITH ABATEMENT (NUMBER OF BENEFITS)
R122	76	Yes (1)	11 (1)
R123	77	Yes (1)	9 (1)
R124	77	Yes (1)	10 (1)
R125	77	Yes (1)	8 (1)
R126	71	Yes (1)	1(0)
R127	68	Yes (1)	1(0)
R128	68	Yes (1)	0 (0)
R129	69	Yes (1)	1(0)
R130	62	No	0 (0)
R131	71	Yes (1)	0 (0)
R132	69	Yes (1)	1(0)
R133	73	Yes (1)	4 (0)
R134	74	Yes (1)	3 (0)
R135	74	Yes (1)	2 (0)
R136	72	Yes (1)	0 (0)
R137	73	Yes (1)	0 (0)
R138	62	No	0 (0)
R139	72	Yes (1)	0 (0)
R140	73	Yes (1)	1(0)
R141	74	Yes (1)	1(0)
R142	72	Yes (1)	1(0)
R143	72	Yes (1)	1(0)
R144	67	Yes (1)	0 (0)
R145	66	Yes (1)	0 (0)
R146	65	No	0 (0)
R147	59	No	0 (0)
R148	75	Yes (1)	2 (0)
R149	74	Yes (1)	3 (0)
R150	74	Yes (1)	2 (0)
R151	63	No	3 (0)
R152	69	Yes (1)	5 (1)
R153	58	No	5 (1)

Table 3 – Summary of Noise Segment 13 Predicted 2040 Future Build Unabated Noise Level & Noise Reduction Achieved with Abatement[1] for Sound Barrier Design Option 2
Seg 13 NB Shoulder Plus Seg 13 NB Ramp Plus Seg 13 NB1, Seg 13 NB1A, Seg 13 NB1B
(continued)

TNM RECEIVER ID	PREDICTED 2040 UNABATED BUILD NOISE LEVEL L_{eq} (1 HR) dB(A)	MDOT/FHWA IMPACT YES or NO (NUMBER OF IMPACTS)	NOISE REDUCTION ACHIEVED WITH ABATEMENT (NUMBER OF BENEFITS)
R154	75	Yes (1)	3 (0)
R155	73	Yes (1)	0 (0)
R156	55	No	5 (1)
R157	73	No	0 (0)
R158	55	Yes (1)	5 (1)
R159	65	Yes (1)	0 (0)
R160	66	Yes (1)	1 (0)
R162	71	Yes (5)	3 (0)
R164	70	Yes (5)	6 (5)
R166	71	Yes (5)	1 (0)
R168	75	Yes (5)	1 (0)
R169	67	No	4 (0)
R170	69	No	6 (1)
R171	55	No	1 (0)
R173	56	No	5 (4)
R174	60	Yes (4)	1 (0)
R176	64	Yes (5)	0 (0)
R178	68	No	2 (0)
R180	68	Yes (5)	1 (0)
R182	63	Yes (5)	1 (0)
R183	67	No	3 (0)
R184	66	No	8 (5)
R186	63	No	6 (5)
R188	61	No	6 (1)
R189	58	No	5 (1)
R190	57	No	8 (5)
R192	55	No	6 (5)
R194	62	No	6 (1)
R195	57	Yes (1)	4 (0)
R196	72	Yes (5)	6 (5)
R198	69	Yes (5)	6 (5)

Table 3 – Summary of Noise Segment 13 Predicted 2040 Future Build Unabated Noise Level & Noise Reduction Achieved with Abatement[1] for Sound Barrier Design Option 2
Seg 13 NB Shoulder Plus Seg 13 NB Ramp Plus Seg 13 NB1, Seg 13 NB1A, Seg 13 NB1B
(continued)

TNM RECEIVER ID	PREDICTED 2040 UNABATED BUILD NOISE LEVEL L_{eq} (1 HR) dB(A)	MDOT/FHWA IMPACT YES or NO (NUMBER OF IMPACTS)	NOISE REDUCTION ACHIEVED WITH ABATEMENT (NUMBER OF BENEFITS)
R200	56	No	4 (0)
R202	71	Yes (4)	4 (0)
R204	72	Yes (5)	6 (5)
R205	69	Yes (1)	4 (0)
R208	69	Yes (5)	8 (5)
R210	69	Yes (4)	5 (4)
R211	71	Yes (1)	3 (0)
R214	69	Yes (5)	6 (5)
R216	71	Yes (4)	2 (0)
R217	68	Yes (1)	2 (0)
R220	75	Yes (5)	7 (5)
R223	74	Yes (5)	2 (0)
Tennis Court	67	Yes (4)	0 (0)
Club House and Pool	72	Yes (10)	1 (0)
R226	68	Yes (6)	0 (0)
R228	71	Yes (6)	0 (0)
TOTAL NUMBER OF RECEPTOR IMPACTS & BENEFITS		147	75[2]

Note: [1]All noise level and noise reduction estimates shown are rounded to nearest whole number.
[2]Includes 30 non-impacted benefited dwellings.

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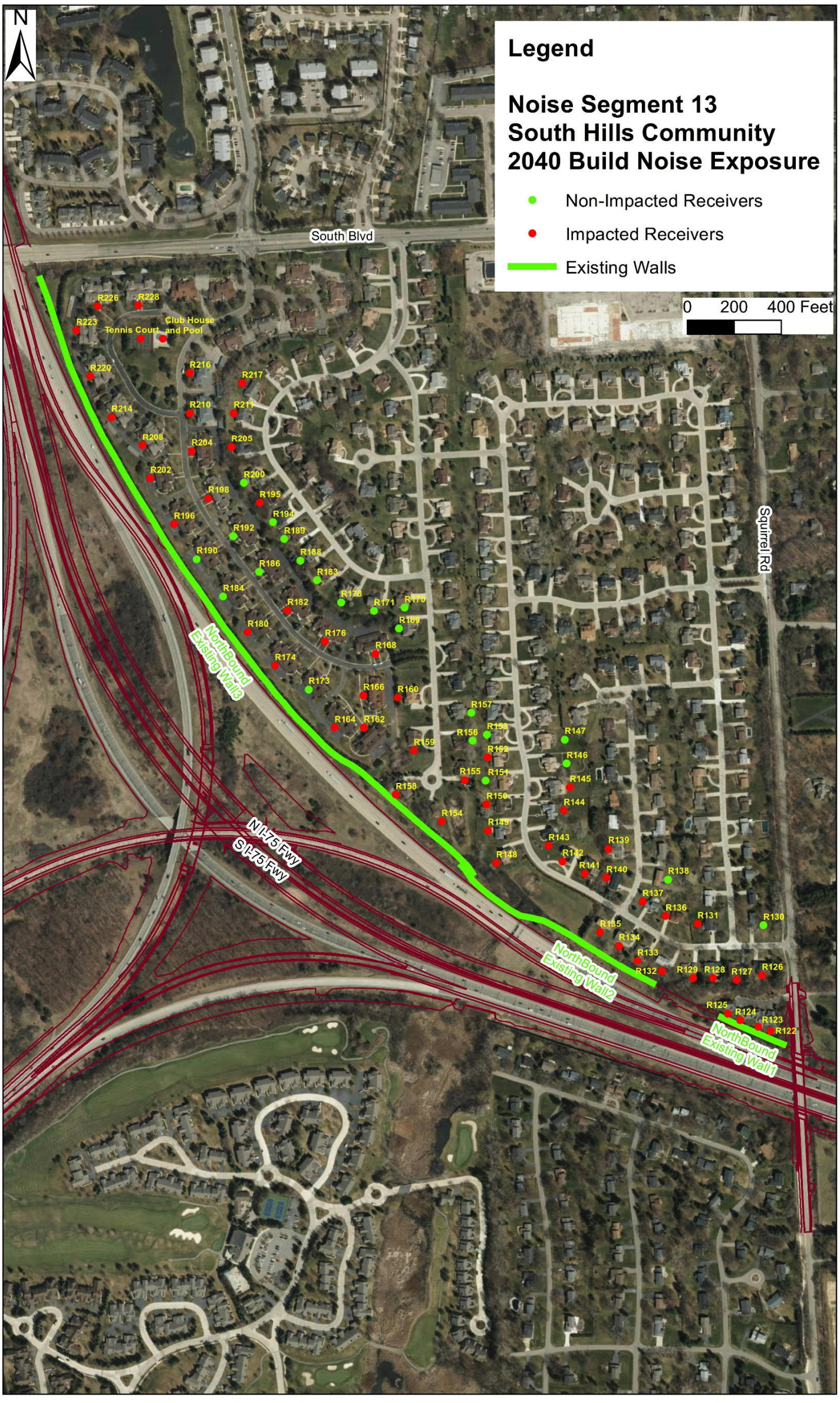
Figure 5 – Summary of Noise Segment 13 Projected 2040 Build Year Impacted Receivers



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3.2 Noise Segment 14 Noise Impact Analysis Findings

A single TNM receiver site is a discrete or representative exterior modeling location of sensitive properties for any of the land uses listed in Table 1 where each TNM receiver site represents a single or multiple dwelling receptors. Noise predictions for modeling sites located adjacent to I-75 northbound lanes and behind Northbound Sound Barrier 1 (NB1) are presented in Table 4 and Table 5. Receivers modeled behind the northbound Sound Barrier 1 (NB1) for the Williamsburg Village study area consist of multi-family apartment units. Receivers modeled behind the northbound Sound Barrier 1 (NB1) and (NB2) for the Williamsburg Village, Bloomfield Village and the Avondale High School consist of multi-family apartment units, an apartment pool, a batting cage and two baseball fields. The first column of each table identifies the TNM modeling receiver sites, column two provides an estimate of the TNM predicted unabated 2040 Design Build Year noise levels with impacted levels shown in bold text. Additionally, column three specifies whether a noise impact occurs with the number of dwelling impacts shown in parenthesis. Column four indicates the noise reduction level achieved with abatement and the number of benefitting dwellings are indicated in parenthesis.

Figure 6 provides a graphical representation of each of the modeled TNM receivers, the represented properties and their relative noise exposure versus the MDOT impacted criteria for future 2040 peak hour unabated build traffic conditions. A red dot in Figure 6 indicates a noise impact and a green dot represents a non-impacted property projected to remain below the 66 dB(A) impact threshold. The existing sound barrier located at the right-of-way of the Williamsburg Village community is illustrated by the solid green line. A total of 28 TNM modeling locations representing multi-family dwellings were modeled for potential traffic noise impact and abatement assessment. In addition, further north adjacent to the Bloomfield Village community, a total of 50 TNM modeling locations representing a combination of multi-family dwellings, a club house, an outdoor swimming pool, a batting cage and two baseball fields associated with the Avondale High School were modeled for noise impact and potential abatement consideration. The combined study area consists of 151 dwellings units (receptors).

In general, the analysis findings indicate that the noise exposure above the 66 dB(A) impact threshold are projected to occur at all first-row and many second and some third-row residential properties in the Williamsburg Village community. In fact, under future 2040 peak hour traffic conditions, the existing sound barrier, depicted by the solid green line on Figure 6, provides very limited noise reduction benefit to the residential properties behind the current wall. A total of 31 noise impacts are projected to occur scattered throughout the Williamsburg Village community. On the other hand, noise impacts in the Bloomfield Village community are restricted to first row residential properties and the baseball fields where there is no shielding from buildings. A total of 93 impacts are projected to occur within the northbound area between South Boulevard and the Clinton River Trail.

Table 4 – Summary of Noise Segment 14 Predicted 2040 Future Build Unabated Noise Level & Noise Reduction with Abatement[1] Adjacent to Sound Barrier Design Option 1 Sound Barrier 1 (Seg 14 NB1)

TNM RECEIVER ID	PREDICTED 2040 UNABATED BUILD NOISE LEVEL L_{eq} (1 HR) dB(A)	MDOT/FHWA IMPACT YES or NO (NUMBER OF IMPACTS)	NOISE REDUCTION ACHIEVED WITH ABATEMENT (NUMBER OF BENEFITS)
R230	70	Yes (1)	1 (0)
R231	67	Yes (2)	0 (0)
R232	66	Yes (2)	0 (0)
R233	65	No	1 (0)
R234	64	No	1 (0)
R235	64	No	1 (0)
R236	63	No	1 (0)
R237	63	No	1 (0)
R238	63	No	1 (0)
R239	68	Yes (2)	1 (0)
R240	70	Yes (2)	2 (0)
R241	63	No	3 (0)
R242	63	No	2 (0)
R243	62	No	2 (0)
R244	60	No	2 (0)
R245	63	No	1 (0)
R246	64	No	1 (0)
R247	68	Yes (3)	0 (0)
R248	69	Yes (3)	1 (0)
R249	67	Yes (3)	6 (3)
R250	67	Yes (2)	6 (2)
R251	75	Yes (2)	11 (2)
R252	72	Yes (2)	8 (2)
R253	68	Yes (3)	6 (3)
R254	67	Yes (3)	5 (3)
R255	64	No	2 (0)
R256	63	No	2 (0)
M3	75	Yes (1)	7 (1)
TOTAL NUMBER OF RECEPTOR IMPACTS & BENEFITS		31	16

Note: [1]All noise level and noise reduction estimates shown are rounded to nearest whole number.

Table 5 – Summary of Noise Segment 14 Predicted 2040 Future Build Unabated Noise Level & Noise Reduction with Abatement[1] Adjacent to Sound Barrier Design Option 2 Combination Sound Barrier 1 (Seg 14 NB1) Plus Sound Barrier 2 (Seg 14 NB2)

TNM RECEIVER ID	PREDICTED 2040 UNABATED BUILD NOISE LEVEL L_{eq} (1 HR) dB(A)	MDOT/FHWA IMPACT YES or NO (NUMBER OF IMPACTS)	NOISE REDUCTION ACHIEVED WITH ABATEMENT (NUMBER OF BENEFITS)
R230	70	Yes (1)	1 (0)
R231	67	Yes (2)	0 (0)
R232	66	Yes (2)	0 (0)
R233	65	No	1 (0)
R234	64	No	1 (0)
R235	64	No	1 (0)
R236	63	No	1 (0)
R237	63	No	1 (0)
R238	63	No	1 (0)
R239	68	Yes (2)	1 (0)
R240	70	Yes (2)	2 (0)
R241	63	No	3 (0)
R242	63	No	2 (0)
R243	62	No	2 (0)
R244	60	No	2 (0)
R245	63	No	1 (0)
R246	64	No	1 (0)
R247	68	Yes (3)	0 (0)
R248	69	Yes (3)	1 (0)
R249	66	Yes (3)	5 (3)
R250	67	Yes (2)	5 (2)
R251	74	Yes (2)	10 (2)
R252	72	Yes (2)	8 (2)
R253	68	Yes (3)	6 (3)
R254	67	Yes (3)	6 (3)
R255	64	No	3 (0)
R256	63	No	2 (0)
R257	70	Yes (3)	2 (0)
R258	70	Yes (3)	3 (0)
R259	67	Yes (3)	1(0)
R260	68	Yes (3)	0 (0)
Club House and Pool	70	Yes (10)	4 (0)
R261	66	Yes (2)	1 (0)

Table 5 – Summary of Noise Segment 14 Predicted 2040 Future Build Unabated Noise Level & Noise Reduction with Abatement[1] Adjacent to Sound Barrier Design Option 2 Combination Sound Barrier 1 (Seg 14 NB1) Plus Sound Barrier 2 (Seg 14 NB2) (Continued)

TNM RECEIVER ID	PREDICTED 2040 UNABATED BUILD NOISE LEVEL L_{eq} (1 HR) dB(A)	MDOT/FHWA IMPACT YES or NO (NUMBER OF IMPACTS)	NOISE REDUCTION ACHIEVED WITH ABATEMENT (NUMBER OF BENEFITS)
R262	64	No	1(0)
R263	65	No	1(0)
R264	64	No	0 (0)
R265	60	No	1(0)
R266	67	Yes (4)	1 (0)
R267	64	No	1 (0)
R268	63	No	0 (0)
R269	73	Yes (2)	10 (2)
R270	63	No	0 (0)
R271	67	Yes (4)	3 (0)
R272	60	No	1 (0)
Baseball Batting Cage	76	Yes (10)	9 (10)
Infield 1	68	Yes (6)	1 (0)
Infield 2	68	Yes (6)	1 (0)
Outfield 1	72	Yes (3)	5 (3)
Outfield 2	76	Yes (3)	9 (3)
M3	75	Yes (1)	7 (1)
TOTAL NUMBER OF RECEPTOR IMPACTS & BENEFITS		93	34

[1] All noise level and noise reduction estimates shown are rounded to nearest whole number.

Figure 6 – Summary of Noise Segment 14 Projected 2040 Build Year Impacted Receivers

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4.0 FUTURE 2040 BUILD CONDITIONS WITH ABATEMENT

4.1 Noise Segment 13 Noise Abatement Findings

Two sound barriers design options were evaluated for feasibility and reasonableness within the Noise Segment 13 study area. Noise abatement Design Option 1, depicted in Figure 7, consists of a continuous replacement right-of-way sound barrier identified as Noise Segment 13 NB1, NB1A, NB1B, and NB1C adjacent to the South Hills community. Design Option 2 depicted Figure 8, consists of a combination of various abatement walls: mainline northbound shoulder sound barrier (Seg 13 NB Shoulder), a Ramp Shoulder Barrier (Seg 13 NB Ramp) and the lower portions of the Design Option 1 sound barriers, (Noise Segment 13 NB1, NB1A, and NB1B). Both Design Option 1 and Design Option 2 sound barriers were optimized for height, length and noise reduction. In addition, barrier terminus end point locations were determined to achieve the best possible noise reduction at the last impacted property near each barrier end point. Furthermore, each sound barrier configuration included a line-of-site evaluation to ensure first row ground level residences were fully shielded from viewing the highway. The details of the 2040 traffic noise analysis findings are described below.

A summary of the noise reduction levels achieved and the number of benefitting dwellings for each modeled TNM receiver is shown in the far-right hand column of Table 2 for noise abatement Design Option 1 and Table 3 for noise abatement Design Option 2. In both summary tables the number of dwelling benefits is shown in parenthesis and impacted receptor benefits that achieve the minimum 5 decibel noise reduction are shown in bold font. A total of 67 dwelling benefits were identified behind proposed noise abatement Design Option 1 and a total of 75 dwelling benefits were identified behind the proposed noise abatement Design Option 2.

A summary of the feasibility and reasonableness assessment of proposed northbound right-of-way replacement sound barrier Design Option 1 is provided in Table 6. The total cost of the noise abatement Design Option 1 is $4,962,132 dollars.. Furthermore, noise reduction of 5 dB(A) or more is realized at only 36% of the impacted receptors which is well below MDOT's 75% minimum requirement. Additionally, only 52% of all benefiting receptors achieve a 7 dB(A) reduction or more. Thus, the proposed replacement sound barrier did not meet the MDOT acoustic feasibility and reasonableness cost requirements. Therefore, based on these findings, the replacement noise abatement Design Option 1 cannot be constructed. The existing sound barrier which provides some abatement for the South Hills community should remain unaltered. The sound barrier height and stationing location design in 50 to 100 foot increments are provided in the report appendix Tables A-1 and A-2.

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Figure 7 – Noise Segment 13 Sound Barrier Design Option 1 Configuration for Benefitting Receivers Behind Combined Proposed Northbound Replacement R/W Sound Barrier (Seg 13 NB1, Seg 13 NB1A, Seg 13 NB1B and Seg 13 NB1C)

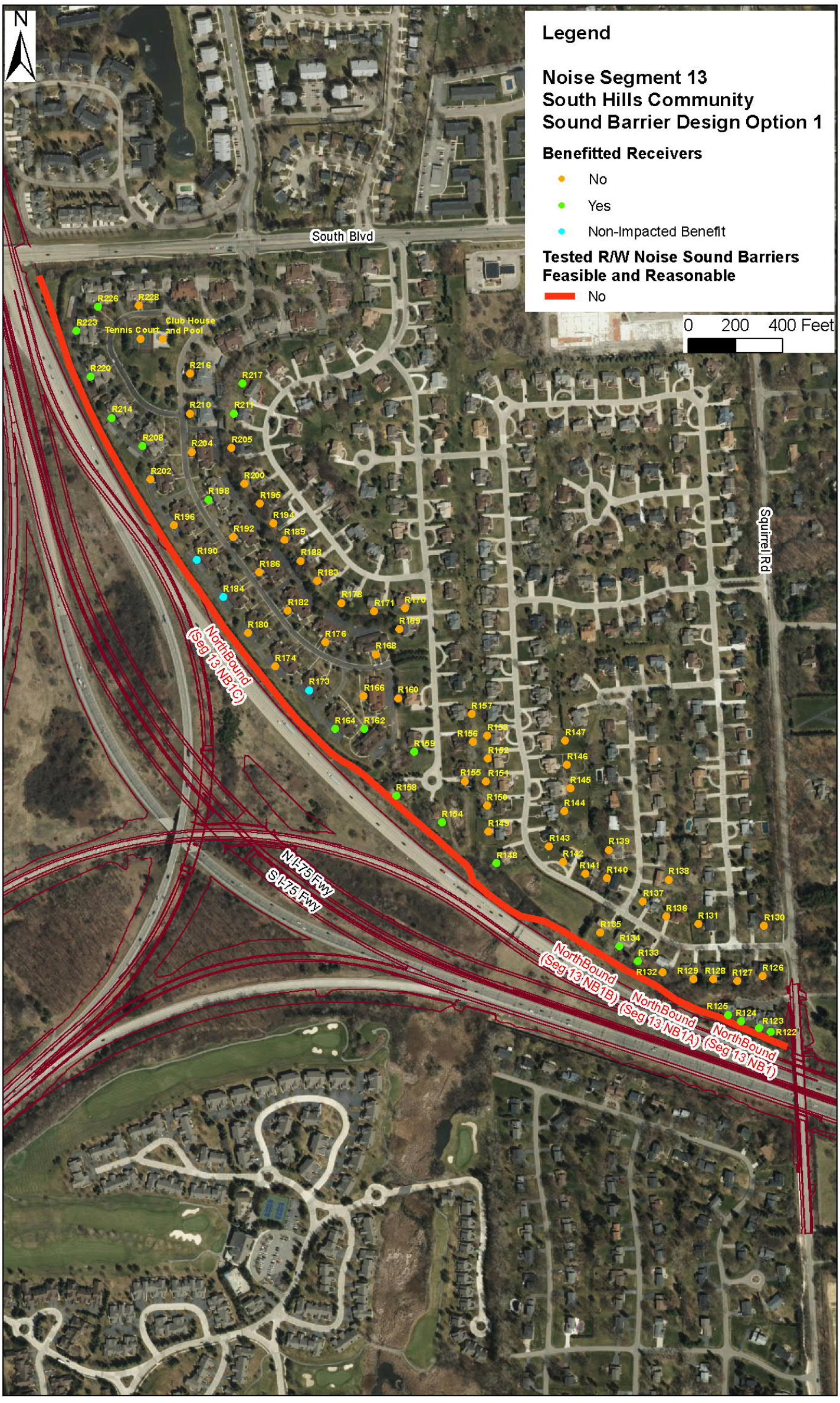

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Figure 8 – Noise Segment 13 Sound Barrier Design Option 2 for Benefitting Receivers Behind Combined Proposed Replacement Northbound Sound Barrier at Shoulder (Seg 13 NB1), RAMP (Seg 13 NB Ramp) and R/W (Seg 13 NB1, Seg 13 NB1A & Seg 13 NB1B)

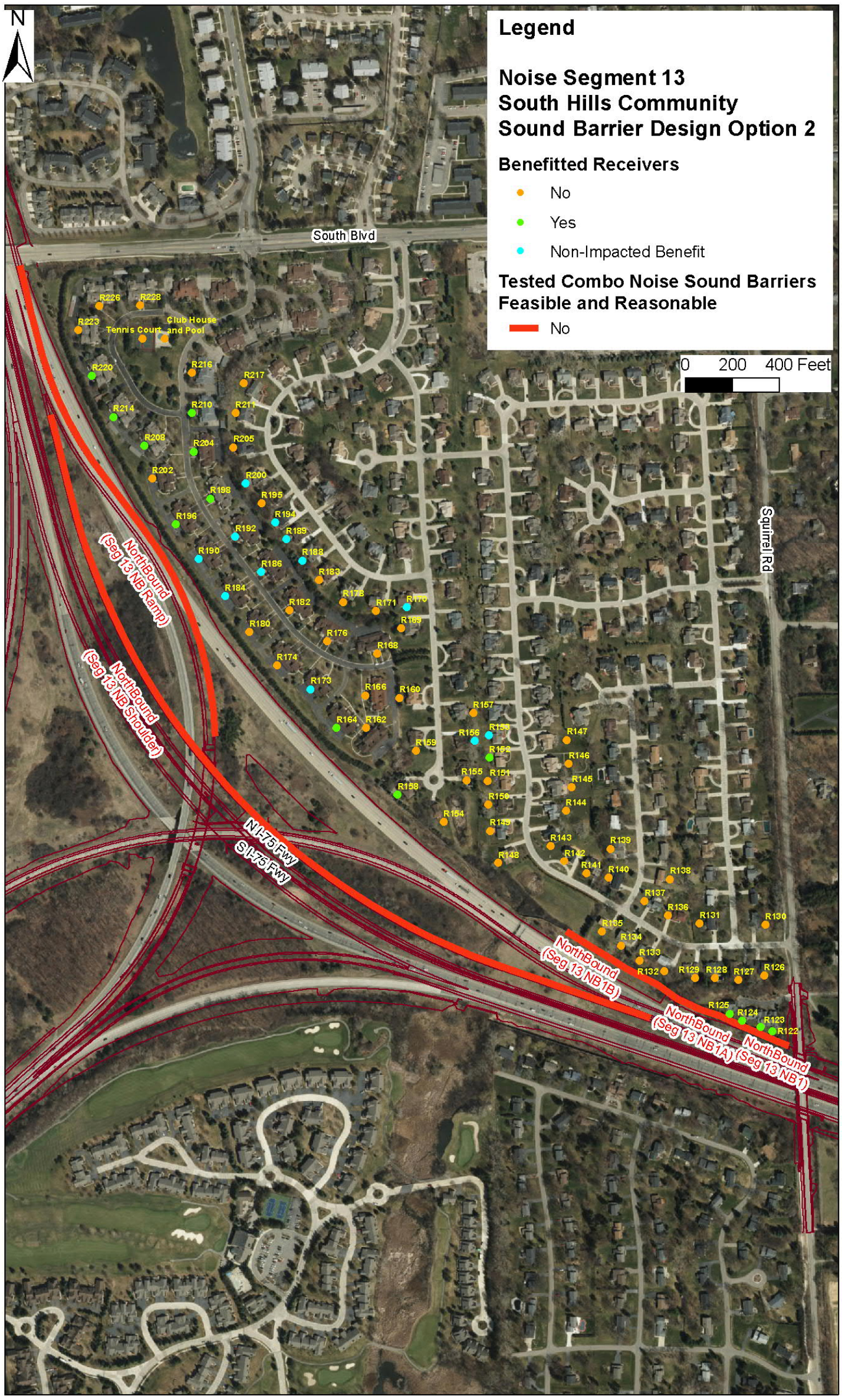

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Table 6 – Noise Segment 13 Feasibility and Reasonableness Assessment for Proposed Sound Barrier Design Option 1 Northbound Replacement R/W Sound Barriers: (Seg 13 NB1, Seg 13 NB1A, Seg 13 NB1B and Seg 13 NB1C)

FEASIBILITY CONSIDERATION	YES OR NO
Engineering Consideration: Can the abatement measure be built?	Yes [(1)]
Acoustic Consideration: Does the proposed abatement measure provide a reduction of at least 5 dB(A) at 75% of the impacted receptors?	No [(1)]
REASONABLENESS CONSIDERATION	
Design Goal: Does the proposed abatement measure provide a reduction of 10 dB(A) for one benefiting receptor and at least 7 dB(A) at 50% or more of the benefiting receptor sites?	No [(1)]
Design Goal: Does the proposed abatement measure cost less than $46,967 per benefiting receptor site?	No [(1)]
Viewpoint of Benefiting Property Owners and Residences: Were positive responses in favor of the abatement measure obtained from at least 50% or more of the tallied votes?	Not Necessary [(1)]
DETAILS OF THE ABATEMENT MEASURE COST AND ACOUSTIC EFFECTIVE FINDINGS	
Impacted Receptors Behind Proposed Sound Barrier(s)	147
# of Impacted Receptors with 5 dB(A) Noise Reduction	53
# of Impacted and Non-Impacted Benefiting Receptors with 5 dB(A) Noise Reduction	67
% of Impacted Receptors with 5 dB(A)Noise Reduction	36%
# of Impacted and Non-Impacted Benefiting Receptors with 7 dB(A) Noise Reduction	35
% of Impacted and non-impacted Benefiting Receptors with 7 dB(A) Noise Reduction	52%
# of Impacted Receptors with 10 dB(A)Noise Reduction	3
Total Cost (dollars)	$4,962,132
Cost Per Benefitting Receptor Unit (CPBU in dollars)	$74,062
Total Length (feet)	4,753 ft.
Average Height (feet)	23.2 ft.
Total Square Footage	110,270 ft.^{2}

[(1)] If all the questions can be answered "Yes" then the abatement measure is considered feasible and reasonable.

A summary of the feasibility and reasonableness of proposed Design Option 2 is summarized in Table 7 and illustrated in Figure 8. The noise abatement Design Option 2 consists of the southernmost portion of sound barrier Design Option 1 (Noise Segment 13 NB1, NB1A and NB1B) combined with a shoulder barrier (Noise Segment 13 NB Shoulder) and a Ramp sound barrier (Seg 13 NB Ramp). The total cost of the noise abatement Option 2 is approximately $5.6 million dollars. The combined lengths of the various elements of abatement Option 2 is 7,129 total linear feet at an average height of 17.5 feet providing abatement to 75 benefitting dwellings at CPBU of $74,855 which is well above MDOT's $46,967 maximum allowable limit. Furthermore, noise reduction of 5 dB(A) or more is realized at only 31% of the impacted receptors which is well below MDOT's 75% minimum requirement. Additionally, only 32% of all benefiting receptors achieve a noise reduction of 7 dB(A) or more. Thus, proposed replacement sound barrier Design Option 2 did not meet the MDOT acoustic feasibility and reasonableness cost requirements. Therefore, based on these findings, the noise abatement Design Option 2 is not able to be constructed. The existing sound barrier which provides some abatement for the South Hills community should remain unaltered. The sound barrier height and stationing location design in 50 to 100-foot increments are provided in the report appendix Tables A-3 to A-5.

4.1.1 Statement of Likelihood Noise Segment 13

Based on the findings of the noise abatement analysis, MDOT does not intend to construct replacement sound barriers as indicated by the solid red line depicted in Figure 7 and Figure 8. The indications are that all proposed abatement measures evaluated between South Blvd and Squirrel Road along the northbound lanes do not satisfy the MDOT feasibility and reasonableness requirements for cost and acoustical effectiveness. If it subsequently develops in the future that highway design conditions have substantially changed, the abatement measures may not be provided based on additional analysis.

Table 7 – Noise Segment 13 Feasibility and Reasonableness Assessment for Proposed Sound Barrier Design Option 2 Northbound Replacement Combination Sound Barriers: Mainline Shoulder (Seg 13 NB Shoulder), RAMP (Seg 13 NB Ramp) & R/W Sound Barriers (Seg 13 NB1, Seg 13 NB1A, Seg 13 NB1B)

FEASIBILITY CONSIDERATION	YES OR NO
Engineering Consideration: Can the abatement measure be built?	Yes (1)
Acoustic Consideration: Does the proposed abatement measure provide a reduction of at least 5 dB(A) at 75% of the impacted receptors?	No (1)
REASONABLENESS CONSIDERATION	
Design Goal: Does the proposed abatement measure provide a reduction of 10 dB(A) for one benefiting receptor and at least 7 dB(A) at 50% or more of the benefiting receptor sites?	No (1)
Design Goal: Does the proposed abatement measure cost less than $46,967 per benefiting receptor site?	No (1)
Viewpoint of Benefiting Property Owners and Residences: Were positive responses in favor of the abatement measure obtained from at least 50% or more of the tallied votes?	Not Necessary (1)
DETAILS OF THE ABATEMENT MEASURE COST AND ACOUSTIC EFFECTIVE FINDINGS	
Impacted Receptors Behind Proposed Sound Barrier(s)	147
# of Impacted Receptors with 5 dB(A) Noise Reduction	45
# of Impacted and Non-Impacted Benefiting Receptors with 5 dB(A) Noise Reduction	75
% of Impacted Receptors with 5 dB(A)Noise Reduction	31%
# of Impacted and Non-Impacted Benefiting Receptors with 7 dB(A) Noise Reduction	24
% of Impacted and non-impacted Benefiting Receptors with 7 dB(A) Noise Reduction	32%
# of Impacted Receptors with 10 dB(A)Noise Reduction	2
Total Cost (dollars)	$5,614,088
Cost Per Benefitting Receptor Unit (CPBU in dollars)	$74,855
Total Length (feet)	7,129 ft.
Average Height (feet)	17.5 ft.
Total Square Footage	124,758 ft.^{2}

(1) If all the questions can be answered "Yes" then the abatement measure is considered feasible and reasonable.

4.2 Noise Segment 14 Noise Abatement Findings

Two sound barrier design options were evaluated for feasibility and reasonableness within the Noise Segment 14 study area. A single replacement sound barrier was evaluated solely for the Williamsburg Village community and a second sound barrier design covered the entire length of the study area between South Blvd and the Clinton River Trail that would provide abatement for both the Williamsburg Village Bloomfield Village communities and adjacent baseball fields. The abatement evaluation for the entire northbound area was an attempt to capture as many benefitting dwellings as possible and thereby reduce the overall CPBU. Each barrier was optimized for height, length and noise reduction. Barrier terminus locations were determined to achieve the best possible noise reduction at the last impacted property near each barrier end point. Furthermore, each sound barrier configuration included a line-of-site evaluation to ensure first row ground level residences were fully shielded from viewing the highway.

Sound Barrier Design Option 1 is depicted in Figure 9 and Design Option 2 in Figure 10. In the northbound direction, the proposed sound barriers are identified as Northbound Sound Barrier 1 (Seg 14 NB1) and 14 Northbound South Barrier 2 (Seg 14 NB2). The details of the 2040 traffic noise abatement analysis findings are described below.

A summary of the noise reduction levels achieved and the number of benefitting dwellings for each modeled TNM receiver is shown in the far-right hand column of Table 4 for Northbound Noise Barrier 1 (Seg 14 NB1) and Table 5 for the combined Northbound Sound Barrier 1 (Seg 14 NB1) plus Northbound Sound Barrier 2 (Seg 14 NB2) proposed replacement wall design. In both tables the number of dwelling benefits is shown in parenthesis and impacted receptor benefits that achieve the minimum 5 decibel noise reduction are shown in bold font. A total of 16 dwelling benefits were identified under the Northbound Barrier (NB1) proposed sound barrier design whereas 34 dwelling benefits were identified behind the Sound Barrier Design Option 2 combination Seg 14 NB1 plus Seg 14 NB2 proposed sound wall.

A summary of the feasibility and reasonableness of Northbound Replacement Noise Barrier 1 (Seg 14 NB1) is provided in Table 8. The proposed replacement Sound Barrier Design Option 1 consisted of 1,205 linear feet, at an average height of 19.8 feet and costing $1,073,655 dollars. Design Option 1 provided abatement to 16 benefitting dwellings at CPBU of $67,103 which is significantly higher than MDOT's $46,967 maximum allowable limit. Furthermore, noise reduction of 5 dB(A) or more is realized at only 52% of the impacted receptors which is below MDOT's 75% minimum requirement. Additionally, only 31% of all benefiting receptors achieve a 7 dB(A) or more noise reduction. Therefore, the proposed replacement sound barrier did not satisfy MDOT acoustic feasibility and reasonableness cost requirements. Based on these findings, the Design Option 1 replacement abatement measure cannot be constructed. The existing sound barrier that provides some abatement for the Williamsburg Village community should remain unaltered. The evaluated sound barrier heights and stationing location design in 50 to 100 foot increments are provided in the report appendix Table B-1.

Figure 9 – Noise Segment 14 Sound Barrier Design Configuration for Benefitting Receivers Behind Proposed Sound Barrier Design Option 1 (Seg 14 NB1)

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Figure 10 – Noise Segment 14 Sound Barrier Design Configuration for Benefitting Receivers Behind Proposed Sound Barrier Design Option 2 (Seg 14 NB1 Plus Seg 14 NB2)

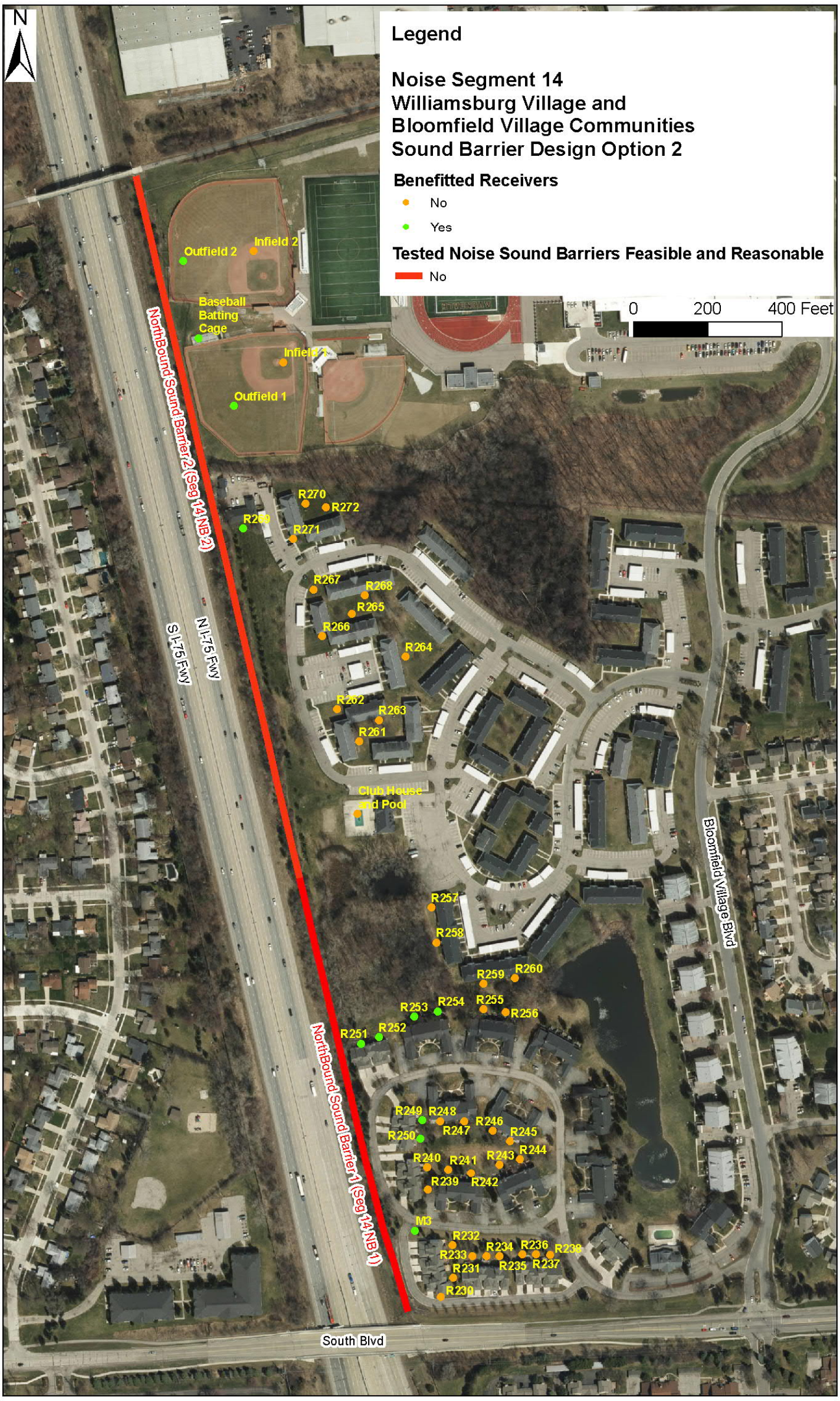

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Table 8 – Noise Segment 14 Feasibility and Reasonableness Assessment Proposed Design Option 1 Replacement Northbound Sound Barrier 1(Seg 14 NB1)

FEASIBILITY CONSIDERATION	YES OR NO
Engineering Consideration: Can the abatement measure be built?	Yes (1)
Acoustic Consideration: Does the proposed abatement measure provide a reduction of at least 5 dB(A) at 75% of the impacted receptors?	No (1)
REASONABLENESS CONSIDERATION	
Design Goal: Does the proposed abatement measure provide a reduction of 10 dB(A) for one benefiting receptor and at least 7 dB(A) at 50% or more of the benefiting receptor sites?	No (1)
Design Goal: Does the proposed abatement measure cost less than $46,967 per benefiting receptor site?	No (1)
Viewpoint of Benefiting Property Owners and Residences: Were positive responses in favor of the abatement measure obtained from at least 50% or more of the tallied votes?	Not Necessary (1)
DETAILS OF THE ABATEMENT MEASURE COST AND ACOUSTIC EFFECTIVE FINDINGS	
Impacted Receptors Behind Proposed Sound Barrier(s)	31
# of Impacted Receptors with 5 dB(A) Noise Reduction	16
# of Impacted and Non-Impacted Benefiting Receptors with 5 dB(A) Noise Reduction	16
% of Impacted Receptors with 5 dB(A)Noise Reduction	52%
# of Impacted and Non-Impacted Benefiting Receptors with 7 dB(A) Noise Reduction	5
% of Impacted and non-impacted Benefiting Receptors with 7 dB(A) Noise Reduction	31%
# of Impacted Receptors with 10 dB(A)Noise Reduction	2
Total Cost (dollars)	$ 67,103
Cost Per Benefitting Receptor Unit (CPBU in dollars)	$1,073,655
Total Length (feet)	1,205 ft.
Average Height (feet)	19.8 ft.
Total Square Footage	23,859 ft^2

(1) If all the questions can be answered "Yes" then the abatement measure is considered feasible and reasonable.

A summary of the feasibility and reasonableness of the proposed Sound Barrier Design Option 2 abatement measure for both Williamsburg Village and the Bloomfield Village communities is provided in Table 9 and illustrated in Figure 9. Proposed Design Option 1 was found to provide insufficient noise reduction at a sufficient number of benefiting dwellings resulting in a cost well above MDOT's $46,967 maximum limit. Therefore, the longer Design Option 2 sound wall which includes both the Bloomfield and Williamsburg Village communities is an attempt to capture more benefitting dwellings and thereby reduce the overall CPBU. Proposed sound barrier design Option 2 was optimized to achieve the best possible noise reduction at the most reasonable cost possible. Sound Barrier Design Option 2 consisted of 3,064 total linear feet, at an average height of 20 feet and costing $2.75 million dollars. Proposed Sound Barrier Design Option 2 provides abatement to 34 benefitting dwellings at CPBU of $81,106 which is significantly higher than MDOT's $46,967 maximum allowable limit. Additionally, a noise reduction of 5 dB(A) or more is realized at only 37% of impacted receptors which is well below MDOT's 75% minimum requirement. Therefore, the proposed Design Option 2 sound barrier design, did not satisfy MDOT acoustic feasibility and reasonableness cost requirements. Based on these findings, the proposed Design Option 2 abatement measure cannot be constructed. The existing Williamsburg Village sound barrier should remain unaltered. The sound barrier height and stationing location design in 50 to 100 foot increments for the proposed combination sound barrier design are provided in the report appendix Table B-2.

4.2.1 Statement of Likelihood Noise Segment 14

Based on the results of the noise abatement analysis, MDOT does not intend to construct replacement sound barriers as indicated by the solid red lines depicted in Figure 9 and Figure 10. The indications are that all proposed abatement measures evaluated between South Blvd and the Clinton River Trail along the northbound lanes do not satisfy the MDOT feasibility and reasonableness requirements for cost and acoustical effectiveness. If it subsequently develops in the future that highway design conditions have substantially changed, the abatement measures may not be provided based on additional analysis.

Table 9 – Noise Segment 14 Feasibility and Reasonableness Assessment Proposed Option 2 Combined Northbound Replacement Barrier 1 (Seg 14 NB1) Plus Sound Barrier 2 (Seg 14 NB2)

FEASIBILITY CONSIDERATION	YES OR NO
Engineering Consideration: Can the abatement measure be built?	Yes (1)
Acoustic Consideration: Does the proposed abatement measure provide a reduction of at least 5 dB(A) at 75% of the impacted receptors?	No (1)
REASONABLENESS CONSIDERATION	
Design Goal: Does the proposed abatement measure provide a reduction of 10 dB(A) for one benefiting receptor and at least 7 dB(A) at 50% or more of the benefiting receptor sites?	No (1)
Design Goal: Does the proposed abatement measure cost less than $46,967 per benefiting receptor site?	No (1)
Viewpoint of Benefiting Property Owners and Residences: Were positive responses in favor of the abatement measure obtained from at least 50% or more of the tallied votes?	Not Necessary (1)
DETAILS OF THE ABATEMENT MEASURE COST AND ACOUSTIC EFFECTIVE FINDINGS	
Impacted Receptors Behind Proposed Sound Barrier(s)	93
# of Impacted Receptors with 5 dB(A) Noise Reduction	34
# of Impacted and Non-Impacted Benefiting Receptors with 5 dB(A) Noise Reduction	34
% of Impacted Receptors with 5 dB(A)Noise Reduction	37%
# of Impacted and Non-Impacted Benefiting Receptors with 7 dB(A) Noise Reduction	20
% of Impacted and non-impacted Benefiting Receptors with 7 dB(A) Noise Reduction	59%
# of Impacted Receptors with 10 dB(A)Noise Reduction	4
Total Cost (dollars)	$81,106
Cost Per Benefitting Receptor Unit (CPBU in dollars)	$2,757,600
Total Length (feet)	3,064 ft.
Average Height (feet)	20.0 ft.
Total Square Footage	61,280 ft^2

(2) If all the questions can be answered "Yes" then the abatement measure is considered feasible and reasonable.

5.0 CONCLUSION

5.1 Noise Segment 13

Within the Noise Segment 13 study area, the impact analysis determined that despite the existing sound wall, peak hour 2040 Build Year noise exposure levels above the 66 dB(A) impact threshold are projected to occur at most first-row properties and many second-row properties adjacent to I-75 in the northbound direction. The abatement analysis considered two noise abatement design configurations: Option 1 which consisted of a continuous taller replacement sound barrier at the right-of-way between South Blvd and Squirrel Road. The Option 2 abatement design consists of three sound wall elements: a portion of the lower right-of-way Option 1 barrier plus a I-75 mainline shoulder barrier and a northbound ramp shoulder barrier approaching South Boulevard. However, both proposed sound barrier design configurations failed to achieve adequate noise reduction at a sufficient number of benefiting dwellings to result in a unit cost below MDOT's $46,697 maximum allowable limit per benefit. Therefore, no new replacement sound barrier in the northbound direction in Noise Segment 13 can be constructed. The existing sound barrier, which provides some noise reduction benefit to the South Hills residential community, should remain unaltered.

5.2 Noise Segment 14

Within the Noise Segment 14 study area, the impact analysis determined peak hour 2040 Build Year noise exposure levels above the 66 dB(A) impact threshold at all first-row properties and some second-row properties adjacent to I-75 in the northbound direction. The abatement analysis considered two noise abatement design configurations: Option 1 consists of a single taller replacement sound barrier solely for the Williamsburg Village community and Option 2 includes a second extended sound barrier which attempts to provide abatement for the entire northbound area between South Blvd and the Clinton River Trail. However, both sound barrier design configurations did not achieve adequate noise reduction at a sufficient number of benefiting dwellings to result in a unit cost below MDOT's $46,697 maximum allowable limit per benefit. Therefore, no new replacement sound barrier in the northbound direction in Segment 14 can be constructed. The existing sound barrier, which provides some noise reduction benefit to the Williamsburg Village residential community, should remain unaltered.

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Appendix A
Noise Segment 13 Study Area
Sound Barrier Station Point Segments
Two Sound Barrier Design Options

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Table A-1 – I-75 Sound Barrier Design Option 1: Northbound Noise Segment 13 Right-of-way Replacement Sound Barriers (Seg 13 NB1, Seg 13 NB1A and Seg 13 NB1B) Stationing Location and Approximate Length

NOISE SEGMENT 13 OPTION1: NORTHBOUND REPLACEMENT ROW SOUND BARRIERS (SEG13 NB1+SEG13 NB1A+SEG13 NB1B)					
BARRIER ID	LENGTH (FEET)	HEIGHT (FEET)	BOTTOM WALL ELEVATION (FT)	TOP WALL ELEVATION[1] (FT)	WALL LOCATION
Sound Barrier Design Option 1 Sound Barrier Seg 13 NB1					
Barrier Pt. 1	50	16	870	886	Offset Approximate R/W
Barrier Pt. 2	50	16	871	887	Offset Approximate R/W
Barrier Pt. 3	49	16	872	888	Offset Approximate R/W
Barrier Pt. 4	50	16	872	888	Offset Approximate R/W
Barrier Pt. 5	49	16	871	887	Offset Approximate R/W
Barrier Pt. 6	69	16	871	887	Offset Approximate R/W
Barrier Pt. 7[2]	N/A	16	871	887	Offset Approximate R/W
Sound Barrier Design Option 1 Sound Barrier Seg 13 NB1A					
Barrier Pt. 1	89	14	871	885	Offset Approximate R/W
Barrier Pt. 2	109	14	874	888	Offset Approximate R/W
Barrier Pt. 3	101	14	879	893	Offset Approximate R/W
Barrier Pt. 4[2]	N/A	14	885	899	Offset Approximate R/W
Sound Barrier Design Option 1 Sound Barrier Seg 13 NB1B					
Barrier Pt. 1	50	16	885	901	Offset Approximate R/W
Barrier Pt. 2	101	16	886	902	Offset Approximate R/W
Barrier Pt. 3	100	16	883	899	Offset Approximate R/W
Barrier Pt. 4	101	16	875	891	Offset Approximate R/W
Barrier Pt. 5	100	16	867	883	Offset Approximate R/W
Barrier Pt. 6[2]	N/A	16	863	879	Offset Approximate R/W

Table Notes:

1 The top-of-wall elevation for all proposed noise barriers must be maintained if any vertical or horizontal revisions are made to the barrier base elevation.

2 This Station is the actual end of the barrier.

Table A-2 – I-75 Sound Barrier Design Option 1: Northbound Noise Segment 13 ROW Replacement Sound Barrier (Seg 13 NB1C) Location & Approximate Length

NOISE SEGMENT 13 ABATEMENT OPTION 1: NORTHBOUND REPLACEMNT ROW SOUND BARRIER (SEG 13 NB1C)					
BARRIER ID	LENGTH (FEET)	HEIGHT (FEET)	BOTTOM WALL ELEVATION (FT)	TOP WALL ELEVATION[1] (FT)	WALL LOCATION
Barrier Pt. 1	101	24	862	886	Offset Approximate R/W
Barrier Pt. 2	101	24	863	887	Offset Approximate R/W
Barrier Pt. 3	100	24	863	887	Offset Approximate R/W
Barrier Pt. 4	101	24	863	887	Offset Approximate R/W
Barrier Pt. 5	100	24	865	889	Offset Approximate R/W
Barrier Pt. 6	101	24	866	890	Offset Approximate R/W
Barrier Pt. 7	51	24	873	897	Offset Approximate R/W
Barrier Pt. 8	50	24	873	897	Offset Approximate R/W
Barrier Pt. 9	50	24	875	899	Offset Approximate R/W
Barrier Pt. 10	102	24	875	899	Offset Approximate R/W
Barrier Pt. 11	102	24	877	901	Offset Approximate R/W
Barrier Pt. 12	100	24	879	903	Offset Approximate R/W
Barrier Pt. 13	102	24	880	904	Offset Approximate R/W
Barrier Pt. 14	100	24	881	905	Offset Approximate R/W
Barrier Pt. 15	101	24	882	906	Offset Approximate R/W
Barrier Pt. 16	100	24	884	908	Offset Approximate R/W
Barrier Pt. 17	100	24	886	910	Offset Approximate R/W
Barrier Pt. 18	100	24	888	912	Offset Approximate R/W
Barrier Pt. 19	101	24	890	914	Offset Approximate R/W
Barrier Pt. 20	100	24	891	915	Offset Approximate R/W
Barrier Pt. 21	100	24	891	915	Offset Approximate R/W
Barrier Pt. 22	100	24	892	916	Offset Approximate R/W
Barrier Pt. 23	100	24	893	917	Offset Approximate R/W
Barrier Pt. 24	100	24	893	917	Offset Approximate R/W
Barrier Pt. 25	100	24	892	916	Offset Approximate R/W
Barrier Pt. 26	100	24	892	916	Offset Approximate R/W
Barrier Pt. 27	101	24	892	916	Offset Approximate R/W
Barrier Pt. 28	101	24	891	915	Offset Approximate R/W
Barrier Pt. 29	100	24	892	916	Offset Approximate R/W
Barrier Pt. 30	101	24	892	916	Offset Approximate R/W
Barrier Pt. 31	51	24	892	916	Offset Approximate R/W
Barrier Pt. 32	50	24	894	918	Offset Approximate R/W
Barrier Pt. 33	50	24	894	918	Offset Approximate R/W
Barrier Pt. 34	50	24	895	919	Offset Approximate R/W
Barrier Pt. 35	50	24	895	919	Offset Approximate R/W
Barrier Pt. 36	50	24	894	918	Offset Approximate R/W
Barrier Pt. 37[2]	N/A	24	893	917	Offset Approximate R/W

Table Notes:

1 The top-of-wall elevation for all proposed noise barriers must be maintained if any vertical or horizontal revisions are made to the barrier base elevation.

2 This Station is the actual end of the barrier.

Table A-3 – I-75 Sound Barrier Design Option 2: Northbound Noise Segment 13 Right-of-way Replacement Sound Barriers (Seg 13 NB1, Seg 13 NB1A and Seg 13 NB1B) Stationing Location and Approximate Length

NOISE SEGMENT 13 OPTION 2: NORTHBOUND REPLACEMENT ROW SOUND BARRIERS (SEG13 NB1+SEG13 NB1A+SEG13 NB1B)					
BARRIER ID	LENGTH (FEET)	HEIGHT (FEET)	BOTTOM WALL ELEVATION (FT)	TOP WALL ELEVATION[1] (FT)	WALL LOCATION
Sound Barrier Design Option 2 Sound Barrier Seg 13 NB1					
Barrier Pt. 1	50	16	870	886	Offset Approximate R/W
Barrier Pt. 2	50	16	871	887	Offset Approximate R/W
Barrier Pt. 3	49	16	872	888	Offset Approximate R/W
Barrier Pt. 4	50	16	872	888	Offset Approximate R/W
Barrier Pt. 5	49	16	871	887	Offset Approximate R/W
Barrier Pt. 6	69	16	871	887	Offset Approximate R/W
Barrier Pt. 7[2]	N/A	16	871	887	Offset Approximate R/W
Sound Barrier Design Option 2 Sound Barrier Seg 13 NB1A					
Barrier Pt. 1	89	14	871	885	Offset Approximate R/W
Barrier Pt. 2	109	14	874	888	Offset Approximate R/W
Barrier Pt. 3	101	14	879	893	Offset Approximate R/W
Barrier Pt. 4[2]	N/A	14	885	899	Offset Approximate R/W
Sound Barrier Design Option 2 Sound Barrier Seg 13 NB1B					
Barrier Pt. 1	50	16	885	901	Offset Approximate R/W
Barrier Pt. 2	101	16	886	902	Offset Approximate R/W
Barrier Pt. 3	100	16	883	899	Offset Approximate R/W
Barrier Pt. 4	101	16	875	891	Offset Approximate R/W
Barrier Pt. 5	100	16	867	883	Offset Approximate R/W
Barrier Pt. 6[2]	N/A	16	863	879	Offset Approximate R/W

Table Notes:

1 The top-of-wall elevation for all proposed noise barriers must be maintained if any vertical or horizontal revisions are made to the barrier base elevation.

2 This Station is the actual end of the barrier.

Table A-4 – I-75 Sound Barrier Design Option 2: Northbound Noise Segment 13 Replacement Shoulder Sound Barrier (Seg 13 NB Shoulder) Location & Approximate Length

NOISE SEGMENT 13 ABATEMENT OPTION 2: NORTHBOUND REPLACEMNT SHOULDER SOUND BARRIER (SEG 13 NB SHOULDER)					
BARRIER ID	LENGTH (FEET)	HEIGHT (FEET)	BOTTOM WALL ELEVATION (FT)	TOP WALL ELEVATION[1] (FT)	WALL LOCATION
806+00.00	100	16	863	879	I-75 NB Shoulder
807+00.00	99	18	865	883	I-75 NB Shoulder
808+00.00	100	18	866	884	I-75 NB Shoulder
809+00.00	100	18	867	885	I-75 NB Shoulder
810+00.00	99	18	869	887	I-75 NB Shoulder
811+00.00	100	18	870	888	I-75 NB Shoulder
812+00.00	99	18	872	890	I-75 NB Shoulder
813+00.00	98	18	873	891	I-75 NB Shoulder
814+00.00	99	18	874	892	I-75 NB Shoulder
815+00.00	99	18	875	893	I-75 NB Shoulder
816+00.00	98	18	877	895	I-75 NB Shoulder
817+00.00	98	18	878	896	I-75 NB Shoulder
818+00.00	99	18	880	898	I-75 NB Shoulder
819+00.00	99	18	881	899	I-75 NB Shoulder
820+00.00	98	18	883	901	I-75 NB Shoulder
821+00.00	99	18	884	902	I-75 NB Shoulder
822+00.00	98	18	886	904	I-75 NB Shoulder
823+00.00 Bridge	99	18	887	905	I-75 NB Shoulder
824+00.00 Bridge	99	18	889	907	I-75 NB Shoulder
825+00.00 Bridge	98	18	890	908	I-75 NB Shoulder
826+00.00	99	18	891	909	I-75 NB Shoulder
827+00.00	98	18	892	910	I-75 NB Shoulder
828+00.00	98	18	893	911	I-75 NB Shoulder
829+00.00	99	18	893	911	I-75 NB Shoulder
830+00.00	98	18	893	911	I-75 NB Shoulder
831+00.00	99	18	892	910	I-75 NB Shoulder
832+00.00	99	18	892	910	I-75 NB Shoulder
833+00.00	99	18	891	909	I-75 NB Shoulder
834+00.00	99	18	890	908	I-75 NB Shoulder
835+00.00	98	18	889	907	I-75 NB Shoulder
836+00.00	99	18	889	907	I-75 NB Shoulder
837+00.00	99	18	889	907	I-75 NB Shoulder
838+00.00	99	18	890	908	I-75 NB Shoulder
839+00.00	98	18	890	908	I-75 NB Shoulder

Table A-4 – I-75 Sound Barrier Design Option 2: Northbound Noise Segment 13 Replacement Shoulder Sound Barrier (Seg 13 NB Shoulder) Location & Approximate Length (continued)

NOISE SEGMENT 13 ABATEMENT OPTION 2: NORTHBOUND REPLACEMNT SHOULDER SOUND BARRIER (SEG 13 NB SHOULDER)					
BARRIER ID	LENGTH (FEET)	HEIGHT (FEET)	BOTTOM WALL ELEVATION (FT)	TOP WALL ELEVATION[1] (FT)	WALL LOCATION
840+00.00	99	18	889	907	I-75 NB Shoulder
841+00.00	99	18	889	907	I-75 NB Shoulder
842+00.00	100	18	889	907	I-75 NB Shoulder
843+00.00	100	18	889	907	I-75 NB Shoulder
844+00.00	100	18	888	906	I-75 NB Shoulder
845+00.00[2]	N/A	18	887	905	I-75 NB Shoulder

Table Notes:

[1] The top-of-wall elevation for all proposed noise barriers must be maintained if any vertical or horizontal revisions are made to the barrier base elevation.

[2] This Station is the actual end of the barrier.

Table A-5 – I-75 Northbound Sound Barrier Design Option 2: Noise Segment 13 Ramp to Shoulder Sound Barrier (Seg 13 NB Ramp) Stationing Location and Approximate Length

NOISE SEGMENT 13 ABATEMENT OPTION 2: NORTHBOUND SOUND RAMP SHOULDER BARRIER (SEG 13 NB RAMP)					
BARRIER ID	LENGTH (FEET)	HEIGHT (FEET)	BOTTOM WALL ELEVATION (FT)	TOP WALL ELEVATION[1] (FT)	WALL LOCATION
1343+00.00	101	18	920	938	I-75 NB Ramp Shoulder
1344+00.00	101	18	918	936	I-75 NB Ramp Shoulder
1345+00.00	101	18	915	933	I-75 NB Ramp Shoulder
1346+00.00	102	18	912	930	I-75 NB Ramp Shoulder
1347+00.00	101	18	908	926	I-75 NB Ramp Shoulder
1348+00.00	101	18	904	922	I-75 NB Ramp Shoulder
1349+00.00	102	18	900	918	I-75 NB Ramp Shoulder
1350+00.00	101	18	896	914	I-75 NB Ramp Shoulder
1351+00.00	102	18	893	911	I-75 NB Ramp Shoulder
1352+00.00	101	18	891	909	I-75 NB Ramp Shoulder
1353+00.00	100	18	889	907	I-75 NB Ramp Shoulder
1354+00.00	100	18	888	906	I-75 NB Ramp Shoulder
1355+00.00	99	18	886	904	I-75 NB Ramp Shoulder
1356+00.00	99	18	885	903	I-75 NB Ramp Shoulder
1357+00.00	98	18	885	903	I-75 NB Ramp Shoulder
1358+00.00	99	18	884	902	I-75 NB Ramp Shoulder
1359+00.00	98	18	884	902	I-75 NB Ramp Shoulder
1360+00.00	99	18	884	902	I-75 NB Ramp Shoulder
1361+00.00	99	18	884	902	I-75 NB Ramp Shoulder
1362+00.00	100	18	885	903	I-75 NB Ramp Shoulder
1363+00.00	100	18	885	903	I-75 NB Ramp Shoulder
1364+00.00	50	18	884	902	I-75 NB Ramp Shoulder
851+00.00	50	18	884	902	I-75 NB Ramp Shoulder
851+50.00[2]	N/A	18	884	902	I-75 NB Ramp Shoulder

Table Notes:

[1] The top-of-wall elevation for all proposed noise barriers must be maintained if any vertical or horizontal revisions are made to the barrier base elevation.

[2] This Station is the actual end of the barrier.

Appendix B
Noise Segment 14 Study Area
Sound Barrier Station Point Segments
Two Sound Barrier Design Options

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Table B-1 – I-75 Northbound Noise Segment 14 Option 1 Replacement Sound Barrier 1 (Seg 14 NB1) Map Stationing Location and Approximate Length

NOISE SEGMENT 14 NORTHBOUND REPLACEMENT SOUND BARRIER 1 (Seg 14 NB1)					
BARRIER ID	LENGTH (FEET)	HEIGHT (FEET)	BOTTOM WALL ELEVATION (FT)	TOP WALL ELEVATION[1] (FT)	WALL LOCATION
852+50.00	50	20	894	914	NB Mainline Inside R/W line
853+00.00	50	20	886	906	NB Mainline Inside R/W line
853+50.00	50	20	884	904	NB Mainline Inside R/W line
854+00.00	31	20	886	906	NB Mainline Inside R/W line
854+50.00	50	20	883	903	NB Mainline Inside R/W line
855+00.00	100	20	878	898	NB Mainline Inside R/W line
856+00.00	101	20	876	896	NB Mainline Inside R/W line
857+00.00	99	20	876	896	NB Mainline Inside R/W line
858+00.00	99	20	875	895	NB Mainline Inside R/W line
859+00.00	100	20	876	896	NB Mainline Inside R/W line
860+00.00	100	20	877	897	NB Mainline Inside R/W line
861+00.00	100	20	875	895	NB Mainline Inside R/W line
862+00.00	89	20	874	894	NB Mainline Inside R/W line
863+00.00	93	20	875	895	NB Mainline Inside R/W line
864+00.00	93	20	877	896	NB Mainline Inside R/W line
865+00.00[2]	N/A	20	879	897	NB Mainline Inside R/W line

Table Notes:

1 The top-of-wall elevation for all proposed noise barriers must be maintained if any vertical or horizontal revisions are made to the barrier base elevation.

2 This Station is the actual end of the barrier.

Table B-2 – I-75 Northbound Noise Segment 14 Option 2 Combined Replacement Sound Barrier 1 (Seg 14 NB1) Plus Proposed Sound Barrier 2 (Seg 14 NB2) Location and Approximate Length

NOISE SEGMENT 14 NORTHBOUND COMBINED REPLACEMNT SOUND BARRIER 1 (Seg 14 NB1) + PROPOSED SOUND BARRIER 2 (Seg 14 NB2)					
BARRIER ID	LENGTH (FEET)	HEIGHT (FEET)	BOTTOM WALL ELEVATION (FT)	TOP WALL ELEVATION[1] (FT)	WALL LOCATION
852+50.00	50	20	894	914	NB Mainline Inside R/W line
853+00.00	50	20	886	906	NB Mainline Inside R/W line
853+50.00	50	20	884	904	NB Mainline Inside R/W line
854+00.00	31	20	886	906	NB Mainline Inside R/W line
854+50.00	50	20	883	903	NB Mainline Inside R/W line
855+00.00	100	20	878	898	NB Mainline Inside R/W line
856+00.00	101	20	876	896	NB Mainline Inside R/W line
857+00.00	99	20	876	896	NB Mainline Inside R/W line
858+00.00	99	20	875	895	NB Mainline Inside R/W line
859+00.00	100	20	876	896	NB Mainline Inside R/W line
860+00.00	100	20	877	897	NB Mainline Inside R/W line
861+00.00	100	20	875	895	NB Mainline Inside R/W line
862+00.00	89	20	874	894	NB Mainline Inside R/W line
863+00.00	93	20	875	895	NB Mainline Inside R/W line
864+00.00	93	20	877	897	NB Mainline Inside R/W line
865+00.00	93	20	879	899	NB Mainline Inside R/W line
866+00.00	93	20	880	900	NB Mainline Inside R/W line
867+00.00	93	20	880	900	NB Mainline Inside R/W line
868+00.00	93	20	881	901	NB Mainline Inside R/W line
869+00.00	93	20	882	902	NB Mainline Inside R/W line
870+00.00	93	20	882	902	NB Mainline Inside R/W line
871+00.00	93	20	882	902	NB Mainline Inside R/W line
872+00.00	93	20	882	902	NB Mainline Inside R/W line
873+00.00	93	20	882	902	NB Mainline Inside R/W line
874+00.00	93	20	881	901	NB Mainline Inside R/W line
875+00.00	93	20	881	901	NB Mainline Inside R/W line
876+00.00	93	20	881	901	NB Mainline Inside R/W line
877+00.00	93	20	882	902	NB Mainline Inside R/W line
878+00.00	93	20	883	903	NB Mainline Inside R/W line
879+00.00	93	20	885	905	NB Mainline Inside R/W line
880+00.00	93	20	886	906	NB Mainline Inside R/W line
881+00.00	93	20	886	906	NB Mainline Inside R/W line
882+00.00	92	20	883	903	NB Mainline Inside R/W line
883+00.00	93	20	883	903	NB Mainline Inside R/W line
884+00.00	93	20	883	903	NB Mainline Inside R/W line
885+00.00	N/A	20	883	903	NB Mainline Inside R/W line

Table Notes:

1 The top-of-wall elevation for all proposed noise barriers must be maintained if any vertical or horizontal revisions are made to the barrier base elevation.

2 This Station is the actual end of the barrier.