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GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF TRANSPORTATION

KIRK T. STEUDLE  
DIRECTOR

METRO REGION OFFICE

June 22, 2009

Country Club Village (CCV)  
Rochester Hills, Michigan

RE: Sound Wall NB-10, MDOT responses to the Subdivision's questions.

To the Residents of the CCV Subdivision:

This letter is in reference to our meeting of May 21, 2009, held at the Metro Region Office in Southfield. During this meeting, the Michigan Department of Transportation (MDOT) met with representatives of the CCV Community to discuss the Noise Study conducted as part of the upcoming M-59 widening project (i.e.: Sound Wall Segment NB-10 specifically).

During this meeting, the CCV Community gave a detailed presentation, and left MDOT with a list of 15 questions to address. Later, during a subsequent e-mail, six more questions were added, resulting in a total of 21. Please know that the answers to these questions are enclosed.

In summary, I would like to report that, based on our re-evaluation of the September 2008 Noise Analysis Report, and the corresponding TNM model following our May 21, 2009 meeting, it was determined that nine additional benefiting units will receive at least a five dBA reduction in noise. This raises the total of benefiting units for NB-10 to 44, and lowers the cost per benefiting unit to \$59,173. Unfortunately, this amount is still above the \$38,060 threshold for making the noise barrier reasonable, so NB-10 remains ineligible for Federal Funds and will not be included within the M-59 project. But again, and as was discussed at our meeting, please remember that this determination does not mean that a wall cannot be constructed. It means that, should the Community choose to construct a wall on their own, the State of Michigan would not be able to participate with its cost.

Also, within your questions was a request for MDOT to provide information that correlated changing wall heights to their respective "noise shadows". However, in attempting to provide this information, we found that our computer model was not set up for this, which necessitates that additional work be completed on our part to accommodate the request. This information will be forwarded as soon as it becomes available.

I appreciate your time, and should you have any questions, please contact me at (248) 483-5151.

Sincerely,

Mark A. Sweeney, P.E.  
Metro Region Design Engineer

Enclosure

## Response to Citizens' Summary of Questions

1. The results of the sound study which included the simulation of the noise barriers with their potential noise reduction by receiver locations are not included in the report. The number of DU's for the shaded fields in table 6 doesn't correlate to qualified DU's in table 7. How do Receiver Locations qualify for table 7?

**Response** – Table 6 has been revised, see Attachment A. This revised Table identifies the number of dwelling units adjacent to NB-10 that qualify for Table 7. The shaded Dwelling Units in the fourth column identify the receivers that receive 5 or more decibels reduction as shown in the far right column.

2. 1) Field Measurement Site FS-11 shows 69.9 dBA on Noise Measurement Data Sheet (page 11 of 12) and the report shows only 68 dBA (pages 9 & 10) 2) Modeled noise level for FS-11 is at 64 dBA per table 7

**Response** – As stated on the FS-11 Noise Measurement Data Sheet, there was local traffic on E. Nawaka Rd. Local traffic which is that close to the noise monitor has the potential to skew the noise model based on “spikes” in the field measured noise data. Standard practice is to delete those spikes in noise level from the numerical data and to logarithmically average the remaining data, which results in the 68 dBA noise level shown in Table 4.

The field site was then modeled with the M-59 traffic counted during the noise measurement period, with a resulting noise level of 65 dBA as shown in Table 4. Since the measured and modeled existing noise levels were within +/-3 dB of one another (i.e., 65 modeled vs. 68 measured), the model was deemed to be within accepted standard tolerances. Once the model is validated, the field data plays no further role in the analysis.

The existing noise level of 64 dBA shown in Table 6 for FS-11 is a typographical error. It should be 65 dBA to match what is shown in Table 4.

3. Average deviation of simulation program is lower than field measurements (NOT in favor of the people suffering from the noise! Table 4 on page 10)

**Response** – As stated in the response for Question 2, once the model is validated to within +/- 3 dB, the field data plays no further role in the analysis. No average deviation is applied to the modeling.

4. For FS-11 on table 4, page 10 the deviation of the model shows -3 dBA at 68 dBA but it really is at -5 dBA at the measured level of 69.9 dBA. The correlation between the field data and the model need to be improved and more dwelling units will qualify. Affected measurement points (N88 — N93, N157-N 169).

**Response** – Based on the response to Question 2, the noise model is within the accepted standard tolerance of +/- 3 dBA.

5. There are no field study points in the area of NB-08. How have the 40 qualified units been calculated? Only 24 measurement points qualify with the noise level of > 66 dBA. Data for potential noise reduction through noise barriers is not part of the report.

**Response** – The noise barrier analysis is based on the TNM modeled noise levels, not on the field measurements. Based upon aerial photos and ground level photos taken of the development, 40 first floor units were identified that received a noise level reduction of 5 decibels. Based on a field review just prior to the May 21<sup>st</sup> meeting at the MDOT Metro Region office and a discussion with the on-site staff, there are actually 43 benefited receivers adjacent to NB-08.

6. Within CCV and next to it there are areas (wetlands, nesting grounds, natural areas from MDEQ,OCDC) that should qualify as Activity Category A according to Table 2 or appendix A. The Noise Abatement Criteria (NEC) Leq is 57 dBA versus 67 dBA for category B which includes residential areas. These areas have not been considered or accounted for in the report at all. What good is a lower NAC if they don't get accounted for?

**Response** – The nesting grounds, natural areas, and wetlands do not qualify as Activity Category A. Per Table 2 of the Noise Analysis Report, these areas qualify as Activity Category D (Undeveloped Lands) for which there is no defined NAC noise level. Therefore, they were not considered in the analysis.

A more specific explanation can be found in the following from FHWA's *Noise Policy FAQs- Frequently Asked Questions*:

“18. What is a Category A activity?

Activity Category A includes 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. Some examples of lands that have been analyzed as Activity Category A receivers include the Tomb of the Unknown Soldier, a monastery, an outdoor prayer area of a facility for nuns, and an amphitheater.”

7. How many DU's (dwelling units) does what size of Activity Category A area account for?

**Response** – Since there are no Activity Category A areas along the M-59 corridor, no dwelling units are accounted for based on this activity category.

8. Many dwelling units behind measurement points N88-N93 have not been modeled or accounted for although the houses next to the highway reach up to 73dBA. Several additional units are expected to qualify.

**Response** –Based on the additional property information provided by the City of Rochester Hills, two (2) additional properties along East Nawakwa have been

identified that would receive a minimum of 5 decibel reduction from NB-10. This increases the number of benefited units to 37. Noise modeling receptor N93 is below the Noise Abatement Criteria and would not receive a 5 decibel reduction.

9. Has the impact to the North side of M-59 due to sound reflections from the approved wall NB-6a on the South side been considered in this study? If so, what is the impact?

**Response** – The present version of TNM<sup>®</sup> 2.5 does not model reflection from a single noise barrier, as the reflected noise from a single barrier is not considered to be perceptible by the average human ear.

A more detailed explanation can be found in the following from FHWA's *Noise Policy FAQs- Frequently Asked Questions*:

“32. When only one side of the highway has a noise barrier, does the noise level increase for the opposite side of the highway where there is no noise barrier?”

Highway traffic noise levels are not substantially increased by construction of a noise barrier on the opposite side of a highway from a receiver. If both the direct noise levels and the reflected noise levels are not abated by natural or artificial terrain features, the noise increase is theoretically limited to 3 dB(A), due to a doubling of energy from the noise source. In practice, however, not all of the acoustical energy is reflected back to the receiver. Some of the energy is diffracted over the barrier, some is reflected to points other than the receiver, some is scattered by ground coverings (e.g., grass and shrubs), and some blocked by the vehicles on the highway. Additionally, some of the reflected energy to the receiver is lost due to the longer path that it must travel. Attempts to conclusively measure this reflective increase have never shown an increase of greater than 1-2 dB(A), an increase that is not perceptible to the average human ear.”

10. Noise level has been measured at about 6 feet above ground (per pictures in Noise Measurement Data Sheet). Noise impact on second floor is even more significant (bedrooms).

**Response** – The 2-story homes in CCV were treated the same as 1-story homes. Noise barriers provide the most benefit for ground level receptors. Federal guidance states to focus on outdoor active use areas where there is evidence of consistent use. This is where the greatest traffic noise impact is experienced. The standard practice across the United States is to place the noise receptors 5 ft above ground level in the outdoor active use areas of the front or rear yards of residences facing the roadway. First and second story interior use for properties is only considered if there is no exterior use.

11. Club house, pool and tennis court at CCV should be accounted for with separate dwelling units each. Currently the report shows 1 unit for all three locations together.

**Response** - The pool and tennis courts at CCV were to be counted as two separate units since the pool was a few hundred feet west of the tennis courts. The original noise analysis misinterpreted this direction and did not count the CCV pool and tennis courts in this manner. Based on the revising the counts to accommodate the CCV pool and tennis courts separately, the benefited units for NB-10 increases to 39.

The club house is not counted as a benefiting unit as it is not a public place or residence, and its exterior uses are the pool and tennis courts.

12. What are the results of the Air Quality Study per the categorical exclusion requirements?

**Response** – There are two specific conclusions stated in the Air Technical Report for the proposed M-59 improvements. In regard to mobile source air toxics (MSAT), “The amount of MSATs emitted by traffic on M-59 would be proportional to the traffic for each alternative. Since the vehicle miles traveled (VMT) for the No-Build and Build alternatives are the same, it is expected that there would be no appreciable difference in overall MSAT emissions. Emissions will likely be lower than present levels in the design year as a result of the Environmental Protection Agency’s (EPA) national control programs that are projected to reduce MSAT emissions by 57 to 87 percent between 2000 and 2020.” In the conclusion section of the report it states “Based on the air quality analysis completed for the proposed improvements, this project will not contribute to any violation of the national ambient air quality standards (NAAQS).”

13. Most cost of any construction project have gone down during the current economical situation. The cost of NB-10 of \$2,603,612 (page 26) should be significantly less today which requires less qualified DU’s to make this wall reasonable. Can we get a real quote for NB-10?

**Response** – The total cost of \$2,603,612 for NB-10 is based on a linear foundation cost of \$250/ft and a square foot surface cost of \$25.50/sft. These are based on historical MDOT noise barrier construction costs for proven noise abatement technology considering both initial construction cost and long-term maintenance costs.

14. Could noise barrier NB-10 end west of John R instead of east of John R to reduce the cost (no reinforcement of bridge for concrete wall required, wall is about 450 ft shorter)? According to the chart from May-04-2009 receiver locations N80-N82 don’t qualify.

**Response** – If NB-10 was shortened at the east end, N152 would no longer receive a 5 decibel reduction. So while shortening NB-10 would reduce the cost of the wall, it would also reduce the number of benefiting units by 2.

15. How does MDOT, HNTB or the TNM2.5 define locations and design of the sound barriers?

**Response** – Theoretically, a sound barrier should be located as close to the source or as close to the receiver as possible. Because of property constraints, the location of the noise barrier is limited to being located within the M-59 MDOT right-of-way. Since the elevation of M-59 is slightly higher than the edge of the right-of-way the noise barrier was located along the edge of the shoulder (i.e., as close to the source as possible given the need to maintain adequate shoulder width for traffic safety) to help to maximum the level of attenuation achieved while minimizing the wall height and ultimately its cost.

### **Additional questions for NB-10 to be answered by MDOT**

16. Confirm the speed used for noise calculation shown in Table 3 as 60-70 mph. It should have been 75 mph per guidelines (5 mph above maximum limit). If not correct, will the study be re-done?

**Response** - The speeds used in the proposed M-59 improvements or future TNM run were 70 mph for automobiles and 60 mph for medium and heavy trucks, which are the posted speed limits. The 5 mph above the posted limit is not guideline, it is something typically done to account for traffic running above the posted speed limit. A quick re-run of the TNM model at 75 and 65 indicates that the Leq noise level would increase 0.7 to 1.0 dB depending on whether a receiver was further from or closer to M-59. Because both the existing and proposed modeled noise levels would both increase by these same amounts, the level of attenuation would not change, therefore, there would be no change in the number of benefiting units.

17. What is the latest date to add a noise barrier to the project?

**Response** – MDOT will be holding public meetings within the M-59 Crooks to Ryan Roads project area. The total project including the noise analysis will be presented at those times. No additional noise barriers will be considered once the project moves to the Design phase.

18. If the widening project brings noise levels above 80 dB, this being considered a health impact. What is MDOT's position on this?

**Response** - The MDOT policy addresses that question. Page 4 of the Procedures and Rules for Implementation #11, "Where an extreme noise impact is identified (80 dBA Leq or greater), special consideration may be warranted. These sites will be considered on an individual basis." This is not considered a "health impact".

19. When will the new version of the TNM software be available? We are asking in reference to its ability to replicate noise reflection from existing barriers. If this is before the end of 2010 will a new study be conducted to analyze the impact of NB-6a? Please put us in contact with a TNM representative who can answer this question?

**Response** – The FHWA expects to have a beta version sometime in 2010. Date for the final release will be based upon the results of the beta testing.

20. Complete data on NB-10 (north side of M-59) including location and altitude of each panel considered in the current designed wall is requested. As well as it's shadow information and the benefiting units.

**Response** – The data is being run through the FHWA TNM2.5 model and is not ready at this time. The information will be made available when completed.

21. Additional “shadow” coverage and dBA noise reduction for each 3 ft of wall height, along with the cost associated with it is also requested.

**Response** – See response to question 20.

**ADDITIONAL BENEFITING UNITS BASED ON CITY MAPPING RECEIVED AT MAY 21 MEETING:**

City of Rochester Hills mapping received at the end of the May 21 meeting also identified an additional developable property southeast of N161 and four (4) additional properties west of John R Road, two (2) north and two (2) south of Michelson Road that would receive a minimum of 5 decibel reduction from NB-10. This increases the number of benefited units to 44.

Attachment A

Noise Barrier NB-10

Attachment B

North of M-59, between John R. and Joshua Dr.

Receiver Location	Figure #	Land Use <sup>a</sup>	Dwelling Units	Noise Level, L <sub>eq</sub> (1h) (dBA)		Build with Barrier	Noise Reduction
				Existing Noise Levels (2006)	Build (2035)		
N82	7	Res.	1	65	68	64	4
N83	7	Res.	1	61	64	61	3
N84	7	Res.	2	61	64	60	4
N85	7	Res.	4	62	65	60	5
N86	7	Res.	2	<b>68</b>	<b>71</b>	64	7
N87	7	Res.	2	<b>69</b>	<b>72</b>	64	8
N88	6	Res.	3	<b>68</b>	<b>72</b>	65	7
N89	6	Res.	3	<b>69</b>	<b>73</b>	66	7
N90	6	Res.	4	<b>69</b>	<b>73</b>	66	7
N91	6	Res.	2	<b>69</b>	<b>73</b>	66	7
N92	6	Res.	1	<b>69</b>	<b>73</b>	68	5
N152	7	Res.	3	64	<b>67</b>	62	5
N153	7	Res.	4	<b>67</b>	<b>69</b>	63	6
N154	7	Res.	1	61	64	60	4
N155	7	Res.	2	63	<b>66</b>	61	5
FS-10	7	Res.	1	61	65	60	5
N156	7	Res.	1	62	<b>66</b>	61	5
N157	7	Tennis Courts	1	<b>69</b>	<b>73</b>	64	9
N158	7	Res.	1	64	<b>67</b>	61	6
N159	7	Res.	6	61	64	60	4
N160	7	Res. & CCV Pool	3	<b>68</b>	<b>72</b>	63	9
FS-11	7	Res.	2	64	<b>68</b>	62	6
N161	6	Res.	2	64	<b>67</b>	62	5
N162	6	Res.	1	62	65	62	3
N163	6	Res.	1	60	64	60	4
N164	7	Res.	3	59	63	57	6

Barrier Characteristics		Cost	Number of Units Attenuated	Cost/Unit
Length (ft)	Height (ft)			
4,562	9 - 15	\$2,603,612	44	\$59,173