

**APPENDIX C**  
**NOISE SCOPING ANALYSIS**



# Memorandum

Date: September 5, 2012

To: Theresa Petko, URS Grand Rapids Office

From: Paul Burge, INCE Bd. Cert., Susumu Shirayama, INCE, URS San Diego Office

Subject: I-75 North Down River Road Interchange Improvement Noise Assessment

The Crawford County Road Commission is proposing interchange improvements on I-75 at North Down Road in Crawford County, MI. The proposed project includes the addition of an I-75 Northbound off ramp, an I-75 Southbound on ramp, realignments of existing ramps, and widening North Down River Road with a center turning lane.

This screening noise analysis was conducted to help determine if a full noise analysis would be required since the proposed project is considered as a Type I Project under MDOT and FHWA.

This memorandum presents the noise assessment including regulatory settings and impact criteria, methodology, existing predicted noise levels, future impact assessment, and findings.

Please call me at (858) 812-8282 if you have any questions or would like to discuss any of the results or findings.

## INTRODUCTION

This report presents the screening noise analysis for the proposed I-75 North Down River Road Interchange Improvements (Project). Currently, the interchange of I-75 at North Down River Road consists of a northbound on ramp and a southbound off ramp. With the proposed project, the interchange will consist of on and off loop ramps for both northbound and southbound. In addition, a center turning lane will be added to North Down River Road.

Noise sensitive receivers identified for the Project are residential dwellings, a recreation area, a church and a hospital along North Down River Road west of I-75.

## REGULATORY SETTINGS

The impact criteria included in the Michigan Department of Transportation (MDOT) Highway Noise Analysis and Abatement Handbook (Handbook) published in July 13, 2011 were used to determine the project impact. The following describes Section 3.3.1 of the Handbook:

### 3.3.1 Phase 1 – Identifying Noise Impacts

This first phase of the process is to identify the impacted receptors as modeled in the Traffic Noise Model (TNM).

23 CFR 772.5 describes highway traffic noise impacts as “design year build condition noise levels that approach or exceed the Noise Abatement Criteria (NAC) listed in Table 1 for the future build condition; or design year build condition noise levels that create a substantial noise increase over existing noise levels.” 23 CFR 772.11(f) states, “Highway agencies shall define substantial noise increase between 5 dBA to 15 dBA over existing noise levels. The substantial noise increase criterion is independent of the absolute noise level.”

MDOT defines “approach” as 1 dBA less than the levels of the NAC shown in Table 1. MDOT defines a substantial noise increase as a 10 dBA increase between the existing noise level and the design year predicted noise level. Either condition identifies a noise impact.

**Table 1. FHWA Noise Abatement Criteria (NAC)<sup>1</sup>  
Hourly A-Weighted Sound Level in Decibels (dB(A))**

Activity Category	Activity Criteria <sup>2</sup>		Evaluation Location	Activity description
	Leq(h) <sup>3</sup>	L10(h) <sup>4</sup>		
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 <sup>5</sup>	67	70	Exterior	Residential.
C <sup>5</sup>	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 <sup>5</sup>	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 (water resources, water treatment, electrical), and warehousing.
G	--	--	--	Undeveloped lands that are not permitted.

<sup>1</sup> MDOT defines a noise impact as a 10 dB(A) increase between the existing noise level and 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.

<sup>2</sup> Either Leq(h) or L10(h) (but not both) may be used on a project. MDOT uses Leq(h). The Leq(h) and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

<sup>3</sup> Leq is the equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period, with Leq(h) being the hourly value of Leq.

<sup>4</sup> L10 is the sound level that is exceeded 10 percent of the time (90<sup>th</sup> percentile) for the period under consideration, with L10(h) being the hourly value of L10.

<sup>5</sup> Includes undeveloped lands permitted for this activity category

**METHODOLOGY AND ASSUMPTIONS**

The screening noise analysis was conducted to help determine if a full noise analysis would be required since the proposed project is considered as a Type I Project under MDOT and FHWA policy. This section describes the methodology and assumptions used for this analysis.

TNM was used to predict noise levels for both existing and future conditions. Traffic volumes used in the prediction models are presented in Table 2. The model used the following assumptions:

- Terrain features were not included.
- I-75 was modeled 15 feet below North Down River Road.
- The elevations of North Down River Road and all receivers were modeled as 0 feet.
- Loose soil ground type was selected.

**Table 2. Modeled Traffic Volumes**

Roadways	Description	2012 AM Peak Hour	2012 PM Peak Hour <sup>3</sup>	2035 AM Peak Hour	2035 PM Peak Hour <sup>3</sup>
North Down River Road <sup>1</sup>		510		640	
I-75 Northbound <sup>2</sup>	I-75BL to North Down River Road	400	515	580	750
	North Down River Road to M-93	465	615	580	770
	On Ramp from North Down River Road	65	100	80	125
	Off Ramp to North Down River Road	NA	NA	80	105
I-75 Southbound <sup>2</sup>	M-93 to North Down River Road	430	730	540	915
	North Down River Road to I-75BL	340	675	595	980
	Off Ramp to North Down River Road	90	55	115	70
	On Ramp from North Down River Road	NA	NA	170	135

Notes:

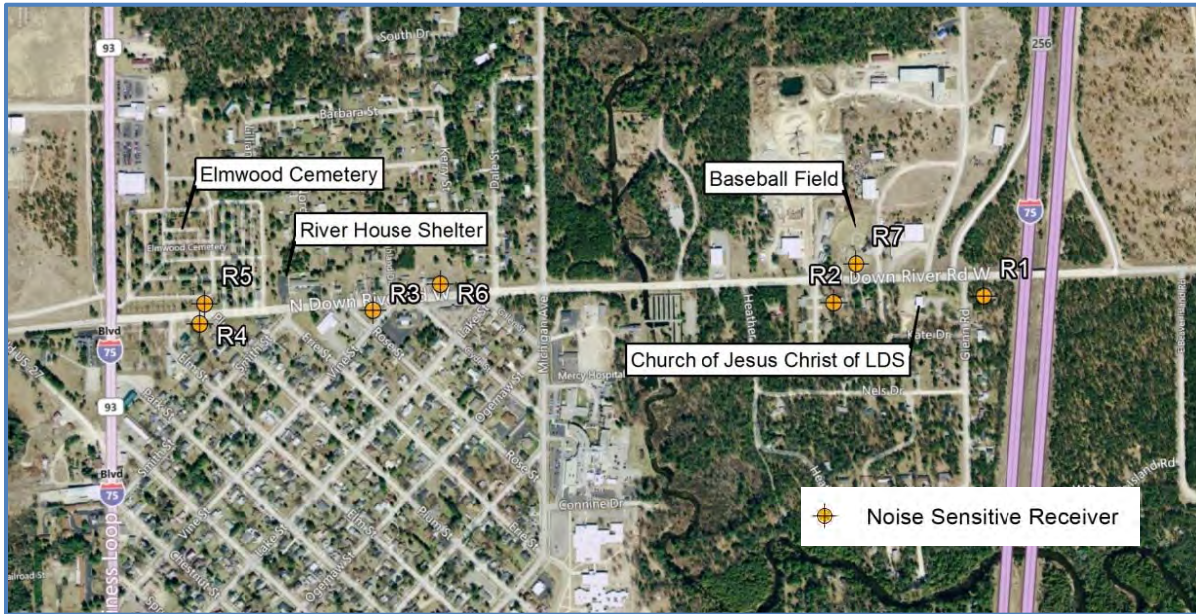
<sup>1</sup> North Down River Road traffic volumes are based on 10% of ADT. The speed limit of North Down River Road is 35 mph. Traffic mix is assumed to be 95% auto and 5% heavy truck.

<sup>2</sup> I-75 traffic volumes are based on draft report for I-75 at North Down River Road Interchange Access Justification Report, August 2012. The speed limit of I-75 is 70 mph. Traffic mix is assumed to be 91% auto and 9% heavy truck.

<sup>3</sup> For the modeling purpose, the PM Peak Hour volumes are used since the PM Peak Hour volumes are higher than the AM Peak Hour volumes.

**NOISE SENSITIVE RECEIVERS**

As presented in Table 1, noise sensitive receivers would include Activity Categories B and C in the vicinity of the project. Along North Down River Road, the identified Category C noise sensitive receivers are a Church of Jesus Christ of LDS, Baseball Fields, River House Shelter, and the Elmwood Cemetery. Modeled receivers presented in Figure 1 were representative and were placed to represent a similar noise environment for nearby noise sensitive receivers.



**Figure 1: Modeled Noise Sensitive Receivers**

**EXISTING NOISE LEVELS**

Because MDOT defines a noise impact when either proposed future project noise levels approach to within 1 dBA of the NAC or when project noise levels result in a substantial increase of 10 dBA over the existing noise level, it was required to establish the existing noise environment in the vicinity of the proposed project.

The existing noise levels were predicted by using FHWA’s Traffic Noise Model 2.5 (TNM). Traffic data were presented in Table 2. Table 3 includes calculated noise levels at each modeled receiver illustrated in Figure 1.

**Table 3. Existing Noise Levels**

Receivers	Land Use	Activity Category	Distance to N. Down River Road (feet) <sup>1</sup>	Distance to I-75 (feet) <sup>2</sup>	Noise Level (Leq(h) dBA)
R1	Residential	B	119	262	64
R2	Res./church	B/C	132	1181	57
R3	Residential	B	44	3985	63
R4	Residential	B	44	5051	63
R5	Cemetery	C	66	5018	61
R6	Residential	B	69	3608	61
R7	Ball fields	C	86	1050	60

<sup>1</sup> Distance between a receiver and the near lane of North Down River Road.

<sup>2</sup> Distance between a receiver and the center line of I-75 Southbound.

### IMPACT ASSESSMENTS

The same representative receiver locations were analyzed for the future condition. The TNM model was adjusted as follows:

- North Down River Road was widened to incorporate a center turning lane.
- Exiting on and off ramps at I-75 Interchange were realigned.
- Additional ramps (I-75 southbound on ramp and northbound off ramp) were added.

Table 4 presents the future noise levels at each representative receiver.

**Table 4. Future Noise Levels and Potential Noise Impacts**

Receivers		Distance (feet)		Noise Level (Leq(h), dBA)				Impact
ID	Activity Category	To North Down River Rd <sup>1</sup>	to I-75 <sup>2</sup>	Existing Noise Level	Future Noise Level	Impact Threshold	Increase over Existing	
R1	B	113	262	64	65	66	1	No
R2	B	126	1181	57	59	66	2	No
R3	B	38	3985	63	64	66	1	No
R4	B	38	5051	63	64	66	1	No
R5	C	60	5018	61	62	66	1	No
R6	B	63	3608	61	62	66	1	No
R7	C	80	1050	60	61	66	1	No

<sup>1</sup> Distance between a receiver and the near lane of North Down River Road.

<sup>2</sup> Distance between a receiver and the center line of I-75 Southbound.

### FINDINGS AND RECOMMENDATIONS

Based on this limited screening analysis no noise impacts were identified, but predicted traffic noise levels may approach (within 1 to 2 dBA) the noise impact threshold (66 dBA) at several representative receiver locations. These results suggest that a full noise analysis should be conducted in compliance with MDOT noise policy, including actual field noise measurements, and full analysis level noise modeling including all available topographic and terrain features and a wider variety of modeled receiver locations.