

## US 41 and US 10/WIS 441 Tri-County Freeway – Noise Analysis – System Interchange, Northwest Quadrant

Existing noise level measurements were conducted on May 16, 2013 at two locations northwest of the system interchange. The measurements were made in accordance with FHWA guidelines using an integrating sound level analyzer meeting American National Standards Institute and International Electrical Commission Type 1 specifications. Noise measurements were conducted for a period of 20 minutes at each site. Traffic counts were taken at each site, concurrent with the noise measurements. The measured noise levels and traffic counts are presented in the table placed on the attached exhibit. The traffic counts taken during the noise measurements were compared to existing peak hour traffic counts from 2010 and peak hour noise levels were created based upon the change in traffic volumes.

The noise analysis modeled the future design year noise levels at various locations in the study area. The determination of noise abatement measures and locations is within the framework of the Wisconsin Department of Transportation's, Facilities Development Manual, Chapter 23, Noise (FDM 23 Noise), effective July 28, 2011. FDM 23 Noise is WisDOT's FHWA approved interpretation of 23 CFR Part 772. The noise level criteria for considering barriers abutting various land uses are presented in **Table 1**. The noise level descriptor used is the equivalent sound level,  $L_{eq}(1h)$ , defined as the steady state sound level which, in a stated time period (usually one hour) contains the same sound energy as the actual time-varying sound.

Noise abatement measures are considered when the predicted noise levels approach or exceed those values shown for the appropriate activity category in **Table 1**, or when the predicted traffic noise levels substantially exceed the existing noise levels. "Approach" is defined as being within 1 dBA less than the noise levels shown in **Table 1**. The WisDOT has defined an increase over existing noise levels of 15 decibels or more as being a noise impact.

The FHWA Traffic Noise Model®, Version 2.5, was used to model the future 2038 design year noise levels.

The following parameters were used in this model to calculate an hourly  $L_{eq}(1h)$  at a specific receiver location based upon the proposed design of the system interchange:

- Distance between roadway and receiver
- Relative elevations of roadway and receiver (all receivers are assumed to be 5 feet off the ground)
- Hourly traffic volume in light-duty (two axles, four tires), medium-duty (two axles, six tires), and heavy-duty (three or more axles) vehicles
- Vehicle speed
- Roadway grade
- Topographic features, including retaining walls and berms

The results of the analysis are presented on the attached exhibit. Comparing the noise levels at the various residential receivers with the Activity Category B criteria of 67 dBA  $L_{eq}$ , none of the residents in the northwest quadrant of the proposed redesigned system interchange approach or exceed 67 dBA  $L_{eq}$ . Therefore, noise mitigation was not analyzed.

**TABLE 1**  
**Noise Level Criteria for Considering Barriers**

<b>Activity Category</b>	<b>Leq(h) (dBA)<sup>1</sup></b> (Evaluation Criteria)	<b>Description of Land Use Category</b>
A	57 (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>2</sup>	67 (Exterior)	Residential
C <sup>2</sup>	67 (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 <sup>3</sup>	52 (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>2</sup>	72 (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> "Leq" means 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 period. For purposes of measuring or predicting noise levels, a receptor is assumed to be at ear height, located 5 feet above ground surface. "Leq(h)" means the hourly value of Leq.

<sup>2</sup> Includes undeveloped lands permitted for this activity category or publicly-owned recreation lands formally designated in a public agency's Master Plan.

<sup>3</sup> Use of interior noise levels shall be limited to situations where a determination has been made that exterior abatement measures will not be feasible and reasonable and after exhausting all outdoor mitigation options.

*Source: Wisconsin Department of Transportation, Facilities Development Manual, Chapter 23, Noise, Effective July 7, 2011.*