Session 3
23 CFR 772: Noise Screening Procedures

- Facilitator: Michele Fikel, Idaho Transportation Department
- Participants:
  - Mark Ferroni, FHWA
  - Daniel Burgin, Kentucky Transportation Cabinet
  - Cora Helm, Montana DOT
- Discussant: Mariano Berrios, Florida DOT
Session 3

23 CFR 772: Noise Screening Procedures
(Low Traffic Volume Tool)
TNM Low-Volume Tool

Traffic N—180 Direction: ADT, Speed

Distance from roadway to microphone, ft

Microphone

Lane

Characteristics

Pavement Type

Grade (%)

Traffic

Lane Average Speed (mph)

Average Daily Traffic (# Vehicles)

Cars (% of Total ADT Volume)

Medium Trucks (% of Total ADT Volume)

Heavy Trucks (% of Total ADT Volume)

Receiver Distance from Roadway (ft)

Calculate Noise (LAeq, 1 hour)

Results

Lane

Noise (LAeq, 1 hour) [ ] dBA

Opposing Lane

Noise (LAeq, 1 hour) [ ] dBA

Total Noise (LAeq, 1 hour) [ ] dBA
Lane Grades are Linked (If one is Uphill, the other Automatically becomes Downhill)

Traffic volumes and percents are independent, but the sum of percentages for each lane must add to 100%
## Results

**Receiver Distance from Roadway (ft)**

50

**Calculate Noise (LAeq, 1 hour)**

<table>
<thead>
<tr>
<th>Lane</th>
<th>Noise (LAeq, 1 hour)</th>
<th>Opposing Lane</th>
<th>Noise (LAeq, 1 hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50.2 dBA</td>
<td></td>
<td>49.2 dBA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total Noise (LAeq, 1 hour)</td>
</tr>
</tbody>
</table>

U.S. Department of Transportation
Federal Highway Administration
### Traffic Options
(25-70 mph)

<table>
<thead>
<tr>
<th>Lane Average Speed (mph)</th>
<th>35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Daily Traffic (# Vehicles)</td>
<td>300 ADT</td>
</tr>
<tr>
<td>Cars (% of Total ADT Volume)</td>
<td>85 %</td>
</tr>
<tr>
<td>Medium Trucks (% of Total ADT Volume)</td>
<td>5 %</td>
</tr>
<tr>
<td>Heavy Trucks (% of Total ADT Volume)</td>
<td>10 %</td>
</tr>
<tr>
<td>Water Distance from Roadway (ft)</td>
<td>50</td>
</tr>
</tbody>
</table>

U.S. Department of Transportation
Federal Highway Administration
Receiver Distance Options
(25 to 500 feet)
Error Warning for Improper ADT Distribution

Percents sum to 105%, therefore gets error
KYTC’s 2015 Update to the Noise Analysis and Abatement Policy

DANIEL BURGIN
CEE NOISE PRACTITIONERS SUMMIT
OCTOBER 21, 2015
What was wrong with the 2011 policy?

Example Project

- Reconstruct KY 7 in Elliot and Morgan Counties
- 7 miles of rural, mountainous setting
  - 183 Total receptors
  - 15 impacted receptors

Improve safety by correcting geometric deficiencies

- Going off alignment at times to smooth out tight curves.
- Providing better shoulders, sight distance, etc.
What was wrong with the 2011 policy?

- 10 Barrier Analyses
- All Feasible
- 5 meet design goal
- NONE cost effective!
Goals of Change

- Reduce the amount of analysis that’s required in cases of isolated impacted receptors
  - Where “we know a barrier is not going to work”
- Utilize the work that’s been done analyzing the choices of other states
- Fulfill requirement to re-evaluate cost effectiveness requirements.
Feasibility and Reasonableness Criteria

KYTC 2011 policy

- **Acoustical Feasibility**
  - Reduction $\geq 5$ dBA for $\geq 50\%$ of impacted receptors

- **Design Goal**
  - Reduction $\geq 7$ dBA for $\geq 40\%$ of benefitted receptors

- **Cost Effectiveness**
  - Assume $30/\text{ft}^2$ Barrier Cost
  - Maximum allowable Cost per Benefitted Receptor set at $35,000$
NAFRAT Tool - Available from FHWA

- Noise Abatement Feasibility and Reasonableness Analysis Tool
  - Allows testing of different policy scenarios
  - Includes a table of the choices of all states

<table>
<thead>
<tr>
<th>SHAS</th>
<th>Feas NR</th>
<th>Feas Type</th>
<th>Feas Crit #</th>
<th>Feas Crit % 1R (P1)</th>
<th>Feas Crit % All (PA)</th>
<th>NRDG</th>
<th>Ben NR</th>
<th>NRDG Type (#, P1, PA)</th>
<th>NRDG Crit #</th>
<th>NRDG Crit % 1R (P1)</th>
<th>NRDG Crit % All (PA)</th>
<th>APBR Crit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK ($32,000; deter. by design engr)</td>
<td>5</td>
<td>P1</td>
<td></td>
<td>0.5</td>
<td></td>
<td>7</td>
<td>5</td>
<td>P1</td>
<td></td>
<td>50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL</td>
<td>5</td>
<td>PA</td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>5</td>
<td>PA</td>
<td></td>
<td></td>
<td></td>
<td>65%</td>
</tr>
<tr>
<td>AR (NRDG Crit is 1 impacted)</td>
<td>5</td>
<td>#</td>
<td>1</td>
<td>70%</td>
<td></td>
<td>9</td>
<td>5</td>
<td>#</td>
<td>1</td>
<td></td>
<td></td>
<td>67%</td>
</tr>
<tr>
<td>AZ</td>
<td>5</td>
<td>P1</td>
<td></td>
<td>0.5</td>
<td></td>
<td>7</td>
<td>5</td>
<td>PA</td>
<td></td>
<td></td>
<td></td>
<td>50%</td>
</tr>
<tr>
<td>CA (unit cost deter. by design engr)</td>
<td>5</td>
<td>#</td>
<td>1</td>
<td>70%</td>
<td></td>
<td>9</td>
<td>5</td>
<td>#</td>
<td>1</td>
<td></td>
<td></td>
<td>67%</td>
</tr>
<tr>
<td>CO ($6,800/BR/db Red)</td>
<td>5</td>
<td>#</td>
<td>1</td>
<td>70%</td>
<td></td>
<td>9</td>
<td>5</td>
<td>#</td>
<td>1</td>
<td></td>
<td></td>
<td>67%</td>
</tr>
<tr>
<td>CT ($55,000)</td>
<td>5</td>
<td>PA</td>
<td></td>
<td>67%</td>
<td></td>
<td>7</td>
<td>5</td>
<td>PA</td>
<td></td>
<td></td>
<td></td>
<td>67%</td>
</tr>
</tbody>
</table>
Some states use a Number (rather than %) of impacted receptors receiving a certain benefit to achieve noise reduction.

- Many states simply require 1 impacted receptor to benefit
- Florida requires 2 impacted receptors benefit
- In Delaware, the requirement is that there have to be 3 impacted receptors receiving benefit in order to be feasible...
If you have to have 3 impacted receptors benefitted in order to be feasible......

And you only have one or two impacted receptors...

A wall is not going to be feasible

We just reached that conclusion without creating a barrier analysis in TNM.

• Saves time and money!
Our Change to Feasibility

Before:
- Reduction ≥ 5 dBA for ≥ 50% of impacted receptors

After:
- Reduction ≥ 5 dBA for ≥ 3 impacted receptors

Benefit:
- No need to create a barrier analysis in TNM when there’s only 1-2 impacted receptors, it just wont be feasible.

Concerns:
- Will this make it easier for a wall to be found feasible?
KYTC’s Noise Reduction Design Goal:

- 7 dBA reduction for a minimum of 40% of all benefitted receptors

\[
\frac{\# \text{ of receptors with at least } 7 \text{ dBA benefit}}{\# \text{ of receptors with at least } 5 \text{ dBA benefit}} \geq 0.4
\]

\[
\frac{9}{25} = 0.36 \\
\frac{10}{25} = 0.40 \\
\frac{10}{26} = 0.38
\]
Our change to Design Goal

Before:
- Reduction ≥ 7 dBA for ≥ 40% of all benefitted receptors

After:
- Reduction ≥ 7 dBA for ≥ 50% of front row benefitted receptors

Benefit:
- Number of front row benefitted receptors less likely to change than number of all benefitted receptors.
Outcomes

- Feasibility requirement set as a specific number of impacted receptors (3)
  - This can eliminate the need for TNM model in barrier analysis with few/isolated receptors.
- Noise reduction design goal concept is more practical to apply when considering only the front row of receptors.
- Re-evaluated, but ultimately did not change Cost Effectiveness requirement
Questions?

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The case for a SCREENING PROCEDURE

Cora Helm - MDT
Hypothetical Barrier

Legend:
- On System Routes
  - System
    - NHS Non-Interstate
    - Off System Route
  - County Boundary
- Impacted Receptors - Existing
- Hypothetical barrier - 10 x 500 ft
We currently have one fully trained noise person, who works part time.

50% of that employee's time is spent on non-traffic-noise-related tasks.

Hours spent on this project: 35.5

Consultant? Not a wise use of limited resources.
Session 3 - Questions

- Tedford, CT:
  - Do any states use a preliminary screening process for locations to determine if a noise analysis would be required?
  - What would be a logical terminus for receiver distance to be included in the analysis? (i.e. first, second rows enough?)
  - How are other states handling multi-level receptors? How many floors above/below the roadway are analyzed?

- Runkle, IL: Illinois DOT policy requires noise monitoring if a Type I and receptors are present. Monitoring at from 25 to 50% of receptor locations. TNM must be validated. I understand we may be a minority on this… true? Why or why not?
Session 3 - Questions

- Polcak, MD: Guidance is needed on what is acceptable in developing a streamlined noise analysis, and when would such an approach be appropriate?

- Hanf, MI: Would field measurements be required for a half mile or greater corridor project with the presence of one or widely spread noise sensitive land use (e.g., three residences 200 feet apart)? Fits with, “if it is recognized that abatement would not meet warrant are field measurements still required?”

- Possible use of estimated sound contour lines during the planning process to identify potential noise abatement locations?
Session 3 - Questions

- Smith, NC: What will FHWA approve as the minimal analysis needed for lower-impact projects. Can we just identify impacts and a cursory note that abatement is not feasible and reasonable?

- Moch, ND: NDDOT undertook this via a ‘Noise Study Memorandum’ for a border crossing project. A full analysis was not completed due to lack of sensitive receptors near project.

- Moch, ND: NDDOT made revisions to Noise Policy to minimize resources expended for rural projects.

- Alcala, OH: Can a noise screening be done without a modeling requirement? Noise analysis requirements on small projects where we know noise walls are not feasible to construct.
Session 3 - Questions

► Newvine, OR: Where is FHWA in streamlining programmatic agreements? States with screening procedures could discuss their experiences.

► Shellenberger, PA: How to handle projects with no sensitive receptors and only undeveloped land?

► How to remove the need for detailed barrier analysis in cases of isolated receptors.

► What screening methods are being used by other states?