SR 1 Widening
SR 273 to Roth Bridge

Noise Analysis Public Workshop
September 24, 2013
6:00 PM – 9:00 PM
Wilbur Elementary School
Agenda

- Project Background
- What is Noise?
- DelDOT’s Noise Policy
  - Key Definitions
  - Noise Impact
  - Noise Analysis Process
  - Noise Mitigation
  - Feasible & Reasonable
- Noise Analysis Results
- Project Next Steps
- Questions
Project Background

- **Project limits:**
  - North of SR 273 to Roth Bridge

- **Why is this project needed?**
  - Address congestion
  - Improve safety
  - Improve system connectivity
  - Improve local access to SR 1
  - Ensure emergency access & evacuation routes
What is Noise?

- Noise, as associated with roadways, is a function of traffic volume, speed & location relative to user (distance & height).
### COMMON INDOOR AND OUTDOOR NOISE LEVELS

<table>
<thead>
<tr>
<th>Common Outdoor Noise Levels</th>
<th>Noise Level dBA</th>
<th>Common Indoor Noise Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet Flyover at 1,000 ft.</td>
<td>110</td>
<td>Rock Band</td>
</tr>
<tr>
<td>Gas Lawn Mower at 3 feet</td>
<td>100</td>
<td>Inside Subway Train (NY)</td>
</tr>
<tr>
<td>Diesel Truck at 50 feet</td>
<td>90</td>
<td>Food Blender at 3 feet</td>
</tr>
<tr>
<td>Noisy Urban Daytime</td>
<td>80</td>
<td>Garbage Disposal at 3’ Shouting at 3 feet</td>
</tr>
<tr>
<td>Gas Lawn Mower at 100'</td>
<td>70</td>
<td>Vacuum Cleaner at 10'</td>
</tr>
<tr>
<td>Commercial Area</td>
<td><strong>66</strong></td>
<td><strong>Normal Speech at 3’</strong></td>
</tr>
<tr>
<td></td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Quiet Urban Daytime</td>
<td>50</td>
<td>Large Business Office</td>
</tr>
<tr>
<td>Quiet Urban Nighttime</td>
<td>40</td>
<td>Dishwasher Next Room</td>
</tr>
<tr>
<td>Quiet Suburban Nighttime</td>
<td></td>
<td>Small Theater, Large Conference Room (Background)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Library</td>
</tr>
<tr>
<td>Quiet Rural Nighttime</td>
<td>30</td>
<td>Bedroom at Night, Concert Hall (Background)</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>Broadcast &amp; Recording Studio</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Threshold of Hearing</td>
</tr>
<tr>
<td></td>
<td>0</td>
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</tr>
</tbody>
</table>

DeLDOT’s Noise Policy

Key Definitions

- **Receptor** - A discrete or representative location of a noise sensitive area(s), for any of the defined land uses

- **Benefited Receptor** - The recipient of an abatement measure that receives a noise reduction at or above 9 dBA. A benefited receptor shall be classified as either an impacted receptor or a non-impacted receptor that receives a 9 dBA or greater reduction

- **Design Year** - The future year used to estimate the probable traffic volumes for which a roadway is designed

- **Common Noise Environment** - A group of receptors within the same Activity Category that are exposed to similar noise sources and levels; traffic volumes, traffic mix, and speed; and topographic features. Generally, common noise environments occur between two secondary noise sources, such as interchanges, intersections, or cross-roads
DelDOT’s Noise Policy

- **DelDOT’s Noise Abatement Policy (Summarized)**


  - A noise impact is assessed and mitigation is considered, when either of the following conditions are satisfied:
    - Predicted design-year noise levels approach (defined as 1 dBA less) or exceed the FHWA noise abatement criteria, e.g., for Category B, a design-year noise level of 66 dBA; or
    - An increase of 12 dBA, or greater, over existing conditions.
### DeIDOT’s Noise Policy

#### FHWA’s Noise Abatement Criteria

<table>
<thead>
<tr>
<th>Activity Category</th>
<th>Activity Leq(h)</th>
<th>Evaluation Location</th>
<th>Activity Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>57</td>
<td>Exterior</td>
<td>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.</td>
</tr>
<tr>
<td>B</td>
<td>67</td>
<td>Exterior</td>
<td>Residential.</td>
</tr>
<tr>
<td>C</td>
<td>67</td>
<td>Exterior</td>
<td>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.</td>
</tr>
<tr>
<td>D</td>
<td>52</td>
<td>Interior</td>
<td>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.</td>
</tr>
<tr>
<td>E</td>
<td>72</td>
<td>Exterior</td>
<td>Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A–D or F.</td>
</tr>
<tr>
<td>F</td>
<td>.................</td>
<td>....................</td>
<td>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.</td>
</tr>
<tr>
<td>G</td>
<td>.................</td>
<td>....................</td>
<td>Undeveloped lands that are not permitted.</td>
</tr>
</tbody>
</table>
DeLDOT’s Noise Policy

- Noise Analysis Process
  - ✔ Identify Noise-Sensitive Land Uses
  - ✔ Collect Existing Ambient Noise Data
  - ✔ Develop Existing Condition Noise Model using FHWA Traffic Noise Model (TNM)
  - ✔ Calibrate Model (i.e., Compare Computed to Ambient Noise Levels)
  - ✔ Analyze Transportation Alternatives
  - ✔ Predict Design-Year Noise Levels
  - ✔ Identify Noise Impacts

Assess Mitigation Options for Feasibility / Reasonableness
DeIDOT’s Noise Policy

- Types of Noise Mitigation
  - Noise Barriers or Berms
  - Traffic Management Measures
  - Alteration of Horizontal or Vertical Alignments
  - Acquisition of Real Property to serve as a noise buffer zone
DelDOT’s Noise Policy

- DelDOT policy for noise mitigation analysis requires that the mitigation be:

  - **FEASIBLE**
    - The combination of acoustical and engineering factors considered in the evaluation of a noise abatement measure.

  - **REASONABLE**
    - The combination of social, economic, and environmental factors considered in the evaluation of a noise abatement measure.
DelDOT’s Noise Policy

FEASIBLE

Mitigation considers the following:

- Safety conditions;
- Barrier height;
- Access requirements for driveways and entrances;
- Maintenance requirements;
- Topography;
- Drainage;
- Utilities;
- Other noise sources in the area;
- Etc.
DeIDOT’s Noise Policy

REASONABLE

- More than 50% of the benefitted receptors want the noise mitigation
- Provides a 9 dBa noise reduction
- Noise mitigation to be cost-effective, i.e., cost not to exceed $25,000 per benefited residence

Noise Mitigation Cost
\[
\frac{\text{# of Benefited Receptors}}{< \$25,000}
\]
905 noise receptors have been analyzed

- 255 receptors exceed the noise level criteria for the existing condition
- 447 to 471 receptors exceed the noise level criteria for the design year future build condition, depending on the alternative
Noise Analysis Results

- Noise mitigation is considered **FEASIBLE** and **REASONABLE** for the following locations:
  - School Bell Apartments
  - Christiana Meadows Apartments
  - Whethersfield/Christiana Meadows Community
  - Proposed Lincoln Center Community
Project Next Steps

- Continue Public Outreach on alternatives
- Draft Environmental Document (spring 2014)
- Environmental Document Public Workshop (spring/summer 2014)
- Final Environmental Document (fall 2014)
Thank You!

Comments / Questions?