Route 7 Corridor Improvements Project
UPC 52328
Public Information Meeting
Noise Study Overview

June 16, 2016
Presenter: Ross Hudnall
Senior Noise Analyst - McCormick Taylor
Please Note:

- Noise study information presented is **preliminary and subject to change**
- Potential noise walls shown on tonight’s plans are **not** a guarantee of their construction
- Remaining tasks include:
  - Completion of the noise study in the upcoming *Detailed Design Phase*
  - Engineering/constructability reviews
  - Voting by benefitted property owners
Presentation Summary

- Why do we do noise studies?
- When do noise studies occur?
- What are the outcomes?
Noise Policy

• **State Noise Abatement Policy**
  - July 2015 (Version 7)

• **Type I Federal-Aid Project**
  - VDOT only constructs noise walls for Type I projects
  - Route 7 CIP is a Type I project since it adds through lanes
Noise Level dB(A)

<table>
<thead>
<tr>
<th>COMMON OUTDOOR</th>
<th>COMMON INDOOR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sound Levels</strong></td>
<td><strong>Sound Levels</strong></td>
</tr>
<tr>
<td>88 dB(A)</td>
<td>Airline Jet Flyover at 1000 ft</td>
</tr>
<tr>
<td></td>
<td>Gas Lawnmower at 3 ft</td>
</tr>
<tr>
<td>40 dB(A)</td>
<td>Quiet Urban Nighttime</td>
</tr>
</tbody>
</table>

| 110 | Rock Band |
| 100 | |
| 90 | |
| 80 | |
| 70 | |
| 60 | |
| 50 | |
| 40 | |
| 30 | |
| 20 | |
| 10 | |
| 0 | Threshold of Hearing |

- Air Compressor at 50 ft
- Lawn Tiller at 50 ft
- Quiet Urban Daytime
- Quiet Rural Nighttime

- Food Blender at 3 ft
- Shouting at 3 ft
- Vacuum Cleaner at 10 ft
- Normal Speech at 3 ft
- Large Business Office
- Dishwasher in Next Room
- Library
- Bedroom at Night
- Broadcast/Recording Studio
Preliminary Design

• Traffic – Existing Year (2015), Design Year (2040)
  – 24-hour Volumes
  – Uninterrupted Speeds
  – Truck Percentages
  – Worst noise hour may not be peak-traffic hour

• Design Files and Survey
  – Plans
  – Profiles
  – Cross-sections
  – Survey
Traffic Noise Model 2.5 (TNM)

- **FHWA Developed**
  - Predicts and assesses noise levels for future design year
  - Rigorous validation testing performed
  - FHWA required use in April ’04

- **Inputs**
  - Noise sensitive receptors
  - Proposed design
  - Peak Hour Traffic (volume, speed, % trucks, etc)
  - Existing or prop barriers
  - Propagation features (cut/fill lines, structures, ground zones, etc.)
Sample Graphics

Common Noise Environment (CNE) limit

500 ft Boundary

Modeled receptors

Barrier/Feasibility

66 dB(A) Contour
Preliminary Design

• **Receptors/Receivers**
  - How many residences per receptor?
  - Why do parks and places of worship have more receptors than a residential home?

• **Warranted (AKA Noise Impact)**
  - Approach or exceed FHWA Noise Abatement Criteria
  - 10 decibel increase above existing
  - Section 4(f) – 3 dB(A) between build and no-build
# Federal Noise Criteria

<table>
<thead>
<tr>
<th>Activity Category</th>
<th>Activity Leq (h)</th>
<th>Evaluation Location</th>
<th>Description of Activity Category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></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><strong>B</strong></td>
<td>67</td>
<td>Exterior</td>
<td>Residential</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>67</td>
<td>Exterior</td>
<td>Active sport areas, amphitheatres, 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><strong>D</strong></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><strong>E</strong></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><strong>F</strong></td>
<td>---</td>
<td>Exterior</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><strong>G</strong></td>
<td>---</td>
<td>---</td>
<td>Undeveloped lands that are not permitted</td>
</tr>
</tbody>
</table>

Source: 23 CFR Part 772

* Includes undeveloped lands permitted for this activity category
Is the Wall Feasible?

• Feasible
  - Does it work acoustically?
    • VDOT requires that 50% or more of the impacted receptors experience 5 dB(A) or more of insertion loss to be feasible;
  
  • Can it be constructed?
    • Factors related to design and construction include: safety, barrier height, topography, drainage, utilities, and maintenance of the abatement measure, maintenance access to adjacent properties, and general access to adjacent properties
Is the Wall Reasonable?

- Reasonable
  - Cost-effectiveness
    - Maximum 1,600 sq ft or less per benefited residence
  - Design goal
    - 7 decibels of noise reduction at 1 impacted receptor
  - Viewpoints of the benefited receptors
    - Democratic vote
    - 50% of the benefited respondents must favor construction
    - Partial mitigation may occur as a result of the vote
Noise Mitigation

• Where do we place the sound wall?
  – Between the source and the receptor

• Is there an optimal location?
• How high should the wall be?
  – Depends on where noise impacts occur
  – Was line of sight broken?
  – Reflection considered?

Each additional 2 feet in height = approximately 1 dBA additional noise reduction
Noise Mitigation

• How long should the wall be?
  – Flanking Noise
Detailed Design

• **Reasonable**
  - **Cost-effectiveness**
    • 1,600 maximum square ft or less per benefited residence
  - **Design goal**
    • 7 decibels of noise reduction at 1 impacted receptor
  - **Viewpoints of the benefited receptors**
    • Democratic vote
    • 50% of the benefited respondents must favor construction
    • Partial mitigation may occur as a result of the vote
• **Right of Way**
  - Construction/maintenance easements - how much easement will be required behind the barrier?

• **Utilities**
  - Are there utilities to be relocated in the area?

• **Special Provisions**
  - Aesthetic Treatment(s)
  - May reflect desires of Residents/Locality

• **Aesthetics Manual**
  - [http://www.virginiadot.org/business/resources/bridge/Manuals/Part12/Part12.pdf](http://www.virginiadot.org/business/resources/bridge/Manuals/Part12/Part12.pdf)
Sample Wall Finish

• Rte. 7 over DTR - Major Bridge Rehabilitation
  – Others treatments available
Sample Wall Finish

- **Route 7 from Rolling Holly Dr to Reston Ave**
  - Others treatments available
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  - Engineering/constructability reviews
  - Voting by benefitted property owners
Thank you

Please address any questions you may have to the individuals at the boards.