Noise Analysis Study
along I - 29

Tim Bjorneberg
Project Development Program Manager
SDDOT
Meeting Format

- Very informal
- Meeting is not recorded
- General questions after presentations
- Specific questions with staff after
- Written comments official record
- Is there someone who did not know about this meeting that should have?
General Location of Noise Study
## Existing & Future Noise Levels

<table>
<thead>
<tr>
<th>Receptor</th>
<th>NAC (dBA)</th>
<th>Existing</th>
<th>&quot;No-Build&quot;</th>
<th>&quot;Build&quot;</th>
<th>Difference</th>
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Figure 1
1-29 Traffic Noise Study
Site Map

Legend
- Monitoring Locations
- Modeled Receptor Locations
- Study Areas
What does all this data mean?

- The current noise is above the 66 dBA criteria in eight locations.
- The future noise projections do not show a substantial increase (15 dBA).
- The addition of the auxiliary lane has almost a negligible effect on the future noise.
## Existing & Future Noise Levels

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</table>
History of Study Area

- The interstate was constructed in 1960

- Although noise data does not exist for this segment when it was developed, the majority of residences built/purchased their property knowing their close proximity to the interstate and its’ traffic capacity.
Aerial Photo (1962)
Aerial Photo (1991)
State and Federal Policy Regarding Noise Analysis & Mitigation


- State Policy: PD-2004-02
Federal Policy

- Defines the procedure for abatement of highway traffic noise and construction noise
  - Provides definitions
  - Defines what is applicable
  - Abatement – measures used to reduce traffic noise levels. (7dBA)
  - Federal Participation
  - Analysis procedure
  - Traffic noise prediction
  - Local official information
State Policy

- Noise analysis & abatement guidelines/policy
  - Defines locations to be considered
  - Outlines how data should be collected and future level predictions
  - Defines “Traffic Noise Impact”
  - Explains abatement considerations
  - Outlines the public involvement
  - Gives guidance on coordination with public officials
  - Supplies definitions of terms
Noise Sensitive Land uses Locations

- Homes
- Schools
- Churches
- Hospitals
- Libraries
Data Collection & Future Projections

- Data was collected according to FHWA “Sound Procedures for Measuring Highway Noise, Final Report”

- Future projections were determined using the FHWA Traffic Noise Model Version 2.1
Identification of Traffic Noise Impacts

“A traffic noise impact occurs when the predicted levels approach or exceed the NAC when predicted traffic noise levels substantially exceed the existing noise level, even though the predicated levels may not exceed the NAC. “Approach” shall mean at least 1dBA less than the NAC and “substantially exceed the existing noise levels” shall mean an increase of at least 15 dBA noise levels.”
Consideration of Abatement

Abatement measures must be feasible and reasonable.

- Feasible – substantial noise reduction, topographically possible, no present safety or maintenance issues
- Reasonable – 7 dBA noise reduction, Abatement shall not exceed $15,000 / benefited residence, public hearings shall be held, future noise level must approach or exceed the NAC, timing of development adjacent to the highway.
Public Involvement & Coordination with Local Officials

- Public hearings shall be held to gain public opinion

- DOT’s & local officials’ responsibilities: “Highway traffic noise should be reduced through a program of shared responsibility. Local government should use their power to regulate land development in such a way that noise sensitive land uses are either prohibited from being located adjacent to a highway or that the developments are planned, designed and constructed in such a way that noise impacts are minimized.”
Interpretation of DOT Policy for this project

- In many locations the existing and future noise levels approach or exceed the NAC
Abatement Options

Options Considered to be Impractical

- Modify horizontal and/or vertical alignments of the roadway (Too expensive)
- Traffic management measures (speed limits, restrict truck traffic) (Not viable)
- Acquisition of property rights for construction of noise barriers (Too expensive)
- Acquisition of property to serve as buffer zone (Too expensive)
- Noise insulation of public use or nonprofit institutional structures (All structures are privately owned)
Abatement Options (contd)

Options considered for further review

- Construction of noise barrier along or within ROW
- Roadway surface type
- Vegetation
Noise Barrier Locations

- **North Barrier**
  - Located near apartment building north of 41st street on the west side of I-29

- **South Barrier**
  - Located near houses on between 57th & 49th street on west side of I-29

- **East Barrier**
  - Located near apartment buildings between 57th & 49th street on the east side of I-29
North Barrier

Wall Cost = $574,080
Number Benefited = 20
Cost/Number Benefited = $28,704
South Barrier

Wall Cost = $2,918,067
Number Benefited = 103
Cost/Number Benefited = $28,330
East Barrier

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Barrier Length (ft)</th>
<th>Average Barrier Height (ft)</th>
<th>Insertion Loss (dBA)</th>
<th>Total Number of Shielded Receptors</th>
<th>Total Number of Impacted Receptors</th>
<th>Number of Benefited Receptors</th>
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<td>16</td>
<td>4-8</td>
<td>60</td>
<td>52</td>
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1. Receptors where the noise level reduction from the barrier is at least 5 dBA.

Wall Cost = $955,880  
Number Benefited = 58  
Cost/Number Benefited = $16,480
Feasibility and Reasonableness of Constructing Noise Walls

- Noise walls are a feasible option
  - Meaning there would be a substantial noise reduction, topographically possible, no present safety or maintenance issues

- Noise walls are not a reasonable option
  - There would be a 7 dBA reduction, but the construction cost must be below $15,000 per number benefited, therefore none of the options are reasonable
Abatement – Surface Type

- **If noise is taken into consideration when designing the surface of the new roadway the noise levels can be reduced by 4-7 dBA**
  - **Asphalt**
    - Results in a smoother pavement and therefore a quieter ride
  - **Concrete**
    - Can be tined differently in order to maintain vehicle control and produce a quieter surface
    - Size and location of joints may be modified
Concrete Textures

- Broomed Surface
- Buralp Drag
- Transverse Tine
- Longitudinal Tine
Asphalt Options

- Asphalt over Concrete
Surface Feasibility

- Alter the surface pattern on concrete
  - Cost = $0
  - Possible Number Benefited = 181
  - Cost / Number Benefited = $0
- Asphalt over Concrete (57th St to 41st St)
  - Cost = $433,000
  - Possible Number Benefited = 181
  - Cost / Number Benefited = $2,400
Abatement – Surface type

- Feasibility
  - Meaning there would be a substantial noise reduction, topographically possible, no present safety or maintenance issues

- Reasonableness
  - A 7 dBA reduction is possible, and cost is below $15,000 per number benefited.
Approximately 100’ of dense vegetation would be needed for a 3dBA loss

- Feasible
  - There would not be a substantial noise reduction, not topographically possible, it might present safety or maintenance issues (snow, animal hits)

- Reasonableness
  - A 7 dBA reduction is not possible, and cost to purchase additional property to provide for dense vegetation would be above $15,000 per number benefited. (Additional 100’ – 300’ of Right of Way would be needed)
Where does this leave us?

- Modify horizontal and/or vertical alignments of the roadway (Not Reasonable)
- Traffic management measures (speed limits, restrict truck traffic) (Not Feasible or Reasonable)
- Acquisition of property rights for construction of noise barriers (Not Reasonable)
- Acquisition of property to serve as buffer zone (Not Reasonable)
- Noise insulation of public use or nonprofit institutional structures (All structures are privately owned)
- Construction of noise barrier along or within ROW (Feasible but not Reasonable due to cost)
- Alter the Surface type or texture (Feasible and Might be Reasonable)
- Vegetation (Not Reasonable or Feasible)
Reconstruct segment and utilize noise conscious surfacing design to reduce noise 4-7dBA.

Measure the traffic noise after construction to see how we did.
Questions???