TXDOT 2019 TRAFFIC NOISE POLICY

New Noise Policy and Implementation Guidance Requirements
Ch-Ch-Ch-Changes!

2011:
- Guidelines for Analysis and Abatement of Roadway Traffic Noise
- Environmental Handbook

2019:
- Noise Policy
- Traffic Noise Policy Implementation Guidance

Streamlined - Requirements Only
Addresses requirements outlined in 23 CFR 772 that must be specified by the state DOT and approved by FHWA

User-friendly
Guidance, how-to instructions & examples
Can be updated without formal FHWA approval

On Toolkit
FHWA Approved on December 31, 2018

Coming Soon to Noise Toolkit
Use the 2011 Noise Guidelines or the 2019 Noise Policy?

2019 Policy Goes into Effect December 31, 2019!!!!

Is project environmentally cleared?

YES

Does project require a Reevaluation for noise AND/OR a Noise Workshop?

YES

Reevaluation or workshop started on or after December 31, 2019

YES

NO

Noise analysis started on or after December 31, 2019

YES

NO

Stop. No action required.

NO

Use either 2011 Guidelines OR 2019 Noise Policy

Use 2019 Noise Policy
Use the 2011 Noise Guidelines or the 2019 Noise Policy?

2019 Policy Goes into Effect December 31, 2019!!!!

- Documentation must indicate which policy is being used.
  - New Recommended Text will be on the Noise Toolkit soon

- Use one policy consistently within an analysis, for all project noise workshops, and/or within a reevaluation.
  - Think of the analysis, noise workshop, and reevaluation as separate actions
  - Do not “pick and choose” policy requirements within those actions

- Policy changes alone are not a reevaluation trigger for noise!
  - Under no circumstances should you reanalyze an approved noise analysis after clearance to “get out” of building a proposed barrier.

- Exceptions will be considered on a case-by-case basis with the approval of ENV Division Director or designee.
What Changed?

Changes are summarized in a Memo dated February 6, 2019 (copy in Traffic Noise Toolkit)

- Clarification on analysis of certain land uses
- Validation of existing condition model
- Feasibility criteria
- Reasonableness criteria
- Cost averaging
- Absorptive treatments
- Timing
- Voting requirements

Diagram:

1. Determine Need for a Traffic Noise Analysis (Type I project)
2. Collect Data
3. Measure/Model Noise Levels
   - Existing Levels (Field Measurement, Model, Model Validation)
   - Predicted Levels (Model)
4. Determine Impact
   - IF Predicted levels exceed existing by more than 10 dB(A)
   - OR Predicted levels approach, equal, or exceed the NAC
5. Consider/Evaluate Abatement Measures
6. Traffic Noise Workshop(s)
A noise abatement measure is not acoustically feasible unless

the measure achieves a noise reduction of at least 5 dB(A) at greater than 50% of first-row impacted receptors

AND

benefits a minimum of two impacted receptors.
Feasibility

Must benefit at least 2 impacted receptors

No barrier analysis for a single receiver (residence, restaurant)
Reasonableness Factors

- **Noise reduction design goal**
  - at least a 7 dB(A) reduction for at least one benefited receptor

- **Cost reasonableness**
  - Standard Barrier Cost
  - Alternate Barrier Cost (optional)

- **Solicitation of Viewpoints**
2011
• Less than 1,388 square feet per benefited receptor
• ($18 square foot/$25k per benefiter)

2019
• Less than 1,500 square feet per benefited receptor
• ($35 square foot/$52.5k per benefiter)
Cost Reasonableness – Standard Barrier Cost

- **Square footage for reasonableness**

**Proposed Abatement**

Noise barriers would be feasible and reasonable for the following impacted receptors, and therefore, are proposed for incorporation into the project (Table 3).

**R12 through R15** - These receivers represent 20 residences in The Oaks subdivision with backyards that face the roadway. Eighteen of the first-row receptors have predicted traffic noise impacts. Based on preliminary calculations, a noise barrier approximately 1,920 feet in length and 10 feet in height would reduce noise levels by at least 5 dB(A) for 14 benefited receptors and meet the noise reduction design goal of 7 dB(A) for two of those receptors. With a total area of abatement of 19,200 square feet or 1,378 square feet per benefited receptor, the barrier would also be cost reasonable.

**Table 3. Noise Barrier Proposal (preliminary)**

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Representative Receivers</th>
<th>Total # Benefited</th>
<th>Length (feet)</th>
<th>Height (feet)</th>
<th>Total Sq. Ft.</th>
<th>Sq. Ft. per Benefited Receptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R12 through R15</td>
<td>14</td>
<td>1,920</td>
<td>10</td>
<td>19,200</td>
<td>1,378</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Any subsequent project design changes may require a reevaluation of this preliminary noise barrier proposal. The final decision to construct the proposed noise barrier will not be made until completion of the project design, utility evaluation, and polling of all benefited and adjacent property owners and residents.
If unusual construction is required, this cost can be accounted for with an alternate cost method.

Not cost reasonable if the Alternate Barrier Cost is greater than two times the Standard Barrier Cost (currently $205k per benefiting receptor)
Cost Reasonablness – Alternate Barrier Cost

Alternate Barrier Cost Assessment Worksheet

Before utilizing the following worksheet, be certain that the barrier being proposed meets the acoustic feasibility and reasonableness criteria in the FHWA-approved TxDOT Noise Policy.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Name and Location of barrier</th>
</tr>
</thead>
</table>

Module 1: Standard Barrier Cost Assessment

<table>
<thead>
<tr>
<th>Total Length of Proposed Barrier (ft)</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Height of Proposed Barrier (ft)</td>
<td>12</td>
</tr>
<tr>
<td>Benefited Receivers</td>
<td>10</td>
</tr>
<tr>
<td>Standard Barrier Cost Total</td>
<td>$420,000</td>
</tr>
<tr>
<td>Cost Per Benefited Receiver</td>
<td>$12,000</td>
</tr>
</tbody>
</table>

Current FHWA-approved cost: $35

Current FHWA-approved square footage per benefited receiver: $52,500

BARRIER IS COST REASONABLE. PROCEED WITH ALTERNATE COST ASSESSMENT

Module 2: Alternate Barrier Cost Assessment

Standard Barrier Cost Total (from Module 1): $420,000

Estimated costs of additional NOW (including easements) needed to construct the THIS noise barrier: $0

Estimated costs for NOW clearing for permanent placement and construction access to THIS noise barrier: $0

Estimated costs of utility adjustment barrier: $0

Estimated costs of additional design elements directly associated with THIS noise barrier (describe below): $0

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated costs of Alternate Barrier Cost</td>
<td>$1,170,000</td>
</tr>
<tr>
<td>Benefited Receivers</td>
<td>10</td>
</tr>
<tr>
<td>Project Total Per Benefited Receiver</td>
<td>$117,000</td>
</tr>
</tbody>
</table>

Current FHWA-approved Alternate Barrier Cost Per Benefitted Receiver Cannot Exceed: $305,000

BARRIER IS NOT COST REASONABLE. PROJECT EXCEEDS FHWA-APPROVED ALTERNATE BARRIER COST.

Optional Method!
Cost Reasonableness – Alternate Barrier Cost

### Alternate Barrier Cost Assessment Worksheet

Before utilizing the following worksheet, be certain that the barrier being proposed meets the acoustic feasibility and reasonableness criteria in the FHWA-approved TxDOT Noise Policy

#### Module 1: Standard Barrier Cost Assessment

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<td>Square Footage Per Benefiter</td>
<td>1200</td>
</tr>
<tr>
<td>Cost Per Benefited Receiver</td>
<td>$42,000</td>
</tr>
<tr>
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<td>$35</td>
</tr>
<tr>
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<td>1500</td>
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<tr>
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**BARRIER IS COST REASONABLE. PROCEED WITH ALTERNATE COST ASSESSMENT**
Cost Reasonableness – Alternate Barrier Cost

Module 2: Alternate Barrier Cost Assessment

<table>
<thead>
<tr>
<th>Standard Barrier Cost Total (from Module 1)</th>
<th>$420,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated costs of any <strong>additional ROW</strong> (including easements) needed to construct the <strong>THIS</strong> noise barrier.</td>
<td>$0</td>
</tr>
<tr>
<td>Estimated costs for <strong>ROW clearing</strong> for permanent placement and construction access to <strong>THIS</strong> noise barrier.</td>
<td>$0</td>
</tr>
<tr>
<td>Estimated costs of <strong>utility adjustments</strong> directly associated with construction of <strong>THIS</strong> noise barrier.</td>
<td><strong>$750,000</strong></td>
</tr>
<tr>
<td>Estimated costs of <strong>additional design elements</strong> necessary to accommodate unusual topographic features due to the construction of this barrier.</td>
<td>$0</td>
</tr>
<tr>
<td>Estimated costs of <strong>drainage features</strong> directly associated with construction of <strong>THIS</strong> noise barrier.</td>
<td>$0</td>
</tr>
<tr>
<td>Estimated costs of <strong>additional design elements</strong> directly associated with <strong>THIS</strong> noise barrier (describe below)</td>
<td>$0</td>
</tr>
</tbody>
</table>

*Describe issues*

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**BARRIER IS NOT COST REASONABLE. PROJECT EXCEEDS FHWA-APPROVED ALTERNATE BARRIER COST.**
Reasonableness - Cost Averaging

- Cost averaging is a method to
  - leverage more abatement for a corridor by using very cost-reasonable barriers (i.e. low square footage per benefited receptor values) to share the “extra” allowance with barriers that are not otherwise cost reasonable.

- Usually considered on corridor projects where:
  - there are large numbers of impacted receptors
  - there are several noise barriers proposed with many benefited receptors, but
  - There are also areas where barriers that meet acoustic reduction requirements are not cost reasonable.

- Contact an ENV noise SME to discuss and request a copy of the methodology
2019 Traffic Noise Policy:

- Can use cost averaging IF
  - No single Common Noise Environment (CNE) exceeds **two** times the cost reasonableness criterion, AND
  - Collectively, all CNEs being averaged do not exceed the cost reasonableness criteria
- Optional, still at the discretion of the district

**Optional Method!**
Reasonable – Solicitation of Viewpoints

Noise Workshops

- Must conduct at least one informative “noise workshop”

Who can vote?

- Send ballots to:
  - all benefited receptors
  - non-benefited receptors that border or are directly adjacent to a proposed abatement measure
- Both property owners and non-owner residents are eligible to vote
Reasonable – Solicitation of Viewpoints

-3.5

-4.1

-5.0

-4.5

-3.7

-2.3

-5.4

-6.3

-7.8

-6.3

-5.2

-4.6

PROPOSED NOISE BARRIER

2019 Traffic Noise Policy

Sept 2019
Reasonable – Solicitation of Viewpoints

PROPOSED NOISE BARRIER

-3.5
-4.1
-5.0
-4.5
-3.7
-5.4
-6.3
-7.8
-6.3
-5.2
-4.6

-2.3
Weighted Ballot

- One vote allocated per residential receptor (i.e. each house or apartment unit)

- 10% of vote to resident or renter (0.1 vote)
- 90% of vote to owner (0.9 vote)

- If owner-occupied, response counts as 1 vote

Tallying Votes

- Clarification: Failure to respond does not mean a “yes” or a “no” vote.
- Approval of a noise barrier based on majority of votes RECEIVED
Reasonable – Solicitation of Viewpoints (continued)

Low Response Rate

- Recommend additional rounds of voting to achieve a response from a majority of receptors
- If less than a 25% response rate after two rounds of voting, then decision made after required consultation with ENV SMEs and TxDOT management

Re-voting

- Once a decision has been made to build or not build, re-voting is only considered when:
  - An error in original noise workshop voting process
  - A substantial change to a proposed abatement since the workshop
  - An approved barrier has not been constructed within five years of a noise workshop, due to project delays
## Noise Abatement Criteria

<table>
<thead>
<tr>
<th>Activity Category</th>
<th>FHWA (dB(A) Leq)</th>
<th>Description of Land Use Activity Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>57 (exterior)</td>
<td>Lands on which serenity and quiet are of extra-ordinary 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 (exterior)</td>
<td>Residential</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>67 (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><strong>D</strong></td>
<td>52 (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 (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>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>Undeveloped lands that are not permitted</td>
</tr>
</tbody>
</table>
Category B Receptors - Residential

Single-family residential (houses)
- Default placement of receiver in model = backyard outdoor activity area

Multifamily residential (apartments, condos)
- Count each unit within line-of-sight of the roadway as an individual receptor
- Model receivers at outdoor activity areas = patios and multi-story balconies
  - If no patio/balcony, use an exterior common gathering area (pool, gazebo, playground) to determine impacts and acoustic reduction
    - For cost reasonableness calculation, # benefiters equivalent to # of units within line-of-sight blocked by barrier
  - If no patio/balcony AND no common gathering area = do not analyze
Category C Land Uses

Parks, schools, churches (exterior)

2011:
- For cost reasonableness:
  
  Equivalent # residences =
  
  Land area divided by representative receptor single family residential lot size development within study area

2019:
- Clarification: model receivers at actual areas of frequent outdoor human activity to determine impacts and acoustic reduction levels for barriers (examples: picnic table, gazebo, playground, trailhead, bleachers)
- For cost reasonableness: equivalent # benefited receptors = approx. impacted land area divided by area of average residential lot size
Category D Receptors - Interior

- Category D (interior) = Certain land use facilities listed in Category C with no exterior activity areas
  - Examples: auditorium, hospital, church, library, school
  - Must apply an interior reduction factor to predicted noise levels
- Interior analysis only done after exhausting all outdoor analysis options
- Receiver placement = interior area of frequent human activity where conversations are held
- For cost reasonableness, each establishment in a Category D area is equivalent to one receptor
Category E Receptors - Restaurants

- Modeled locations must be representative of areas of frequent external activity at the receptor.
- For a restaurant, an outdoor dining area is an appropriate exterior activity area.
- In determining cost reasonableness for restaurants and offices, each establishment is equivalent to one receptor.
- Hotels with outdoor activity areas will be evaluated in a manner similar to multifamily residences.
Absorptive Treatments

- When the width between two noise barriers is less than 10 times the barrier height the incorporation of sound absorptive treatments shall be considered to reduce acoustic reflections
When Parallel Noise Barriers Would Not Degrade Benefit

<<< depends on distance >>>

<<< Width:Height ≥ 10:1 >>>
When Noise Barriers May Be Less Effective
When Noise Barriers May Be Less Effective
When Noise Barriers May Be Less Effective

- parallel barriers

consider absorptive treatment when width:height $\leq 10:1$
What is Existing Model Validation?

- Required to verify the accuracy of noise model used to predict existing noise levels for the project
  - Also used to confirm that traffic noise is the dominant noise source
- Compares field-measured noise levels to predicted noise levels from a validation model run that uses traffic inputs collected at the same time as the field measurement.

Validation demonstrates that you have prepared a GOOD MODEL that can predict existing noise levels that are reasonably accurate.

Therefore, the existing model can be updated to include the proposed design with a higher degree of confidence.
Existing Model Validation

Select Validation Site(s)

Collect Field Measurements

Coordinate with District Noise Specialist or ENV Subject Matter Expert

Minimum 15-minute measurement period

Sound Level Measurement dB(A) Leq(h)

Traffic Information
- Count number and types of vehicles
- Determine speed

Input Field-collected Traffic Data to Existing Condition Validation Model

Collect sound level measurements and traffic info simultaneously

Field-measured Sound Level

Model-calculated Sound Level

Is difference within (+/-) 3 dB(A)?

NO

Take additional measurements, adjust model, and/or document why not validated

YES

Existing model is Validated ✓

Use to predict existing noise (with TPP traffic) and update with future design and traffic to predict future noise
Requirements for Validation

- The existing noise model is validated if measured noise levels and predicted noise levels (from the model) are within +/-3 dB(A).

- If not within +/- 3 dB(A), then the model is not valid until additional measurements are made or until the analyst identifies the reason for the discrepancy and makes a correction within the model.

- New location projects and reevaluations do not usually require validation.

- Additional guidance on Validation:
  - Noise Policy Implementation Guidance
  - FHWA Noise Measurement Handbook (FHWA-HEP-18-065)
Traffic noise compliance is governed by sections of the National Environmental Policy Act (NEPA) that address the avoidance and mitigation of traffic noise impacts resulting from roadway projects and the Federal Aid Highway Act. This act mandates FHWA to develop and promulgate guidelines and standards for highway noise levels. Environmental practitioners can use these tools to prepare materials compliant with those regulations.

Questions? Contact the traffic noise specialist at (512) 416-3025.

- 2011 Guidelines
- 2019 Noise Policy
- TxDOT Noise Brochures
- FHWA Regulations and Guidance

**Memo summarizing changes & effective date**

**2019 Noise Policy**

**FHWA-Approved Cost Proposal Memo**

**Alternate Barrier Cost Assessment Worksheet**

**Coming Soon! Noise Policy Implementation Guidance**
Training

- **ENV125**  This training will introduce recent updates to TxDOT's Traffic Noise Analysis process, and provide a general overview of the Traffic Noise process concentrating on documentation and interpretation of TNM modeling results. Case studies and reasonable and feasible determinations will be discussed.

  **November 12, 2019 (Austin)**

- **ENV115**  Must have taken ENV125. The course will prepare staff to accomplish noise analysis utilizing the TNM 2.5 software and document highway traffic noise analyses for transportation improvement projects. Students should have some familiarity with GIS and CAD applications.

  **November 13-14, 2019 (Austin)**
Conclusion

- Summary of Big Changes:
  - 1 Validation Requirements
  - 2 New Feasible Criteria
  - 3 New Cost Reasonable Criteria
  - 4 Noise Workshop Voting Changes

- 2019 Policy Goes into Effect December 31, 2019!!!!
Contact ENV Noise SMEs

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Meredith.Worthen@txdot.gov
Questions?