

New England NoiseCon-16: Revolution in Noise Control

June 13-15, 2016 | Providence, Rhode Island



Technical Approaches to Developing Policy: Use of the FHWA Traffic Noise Model to Identify Noise Screening Parameters

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- Overview
- Technical Approach
- Results
- Applicability
- Recommendations and Conclusions

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FHWA amended 23 CFR 772 in 2010

- Eliminated use of the FHWA TNM Lookup Tables
- States had to develop new policies
- Many states wanted screening procedures
- A few states developed qualitative screening procedures

FHWA proposed new screening procedure

- Based on TNM 2.5 acoustics
- Excel based
- Under development by US DOT Volpe Center

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TNM Lookup Table

- One infinite roadway (12' wide) at flat grade
- User enters speed, volumes and mix
- Soft or hard ground

New screening tool uses the following basic setup

- Two infinite roadways with one roadway in each direction
- Roadway grade conditions ranging from flat to 7%
- Speed options ranging from 35-55 mph in 5 mph increments
- User enters volumes and mix

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FHWA Project Types

- Type I – require noise analysis
- Type II – optional retrofit program
- Type III – does not require analysis

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Type I Projects

- Projects that require a noise study when receiving FHWA approval or funding include:
 - (1) The construction of a highway on new location; or,
 - (2) The physical alteration of an existing highway where there is either:
 - (i) Substantial Horizontal Alteration. A project that halves the distance between the traffic noise source and the closest receptor between the existing condition to the future build condition; or,
 - (ii) Substantial Vertical Alteration. A project that removes shielding therefore exposing the line-of-sight between the receptor and the traffic noise source. This is done by either altering the vertical alignment of the highway or by altering the topography between the highway traffic noise source and the receptor; or,
 - (3) The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a HOV lane, High-Occupancy Toll (HOT) lane, bus lane, or truck climbing lane; or,
 - (4) The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane; or,
 - (5) The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or,
 - (6) Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or,
 - (7) The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza.

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Technical Approach

- Developed models in TNM 2.5 replicating screening tool parameters

Establish a Degree of Conservatism with respect to the FHWA Noise Abatement Criteria

- 5 dB(A) more conservative approach
- 3 dB(A) more aggressive approach

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Limited consideration to three land use categories

Land Use Activity Category	Leq(h)	Description of Land Use Activity Category
B	67 (exterior)	Residential
C	67 (exterior)	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.
E	72 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A – D or F.

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Traffic

- Based on national average HPMS data
- Vehicle mix based on proportion of vehicle class by VMT and functional class
- Assumed a worst traffic hour of 10% of ADT
- Used the Rural mix since it had a higher percentage of MT/HT

TNM Vehicle Class	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
Urban	93%	3%	3%	1%	-
Rural	89%	5%	4%	1%	1%

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Case study parameters

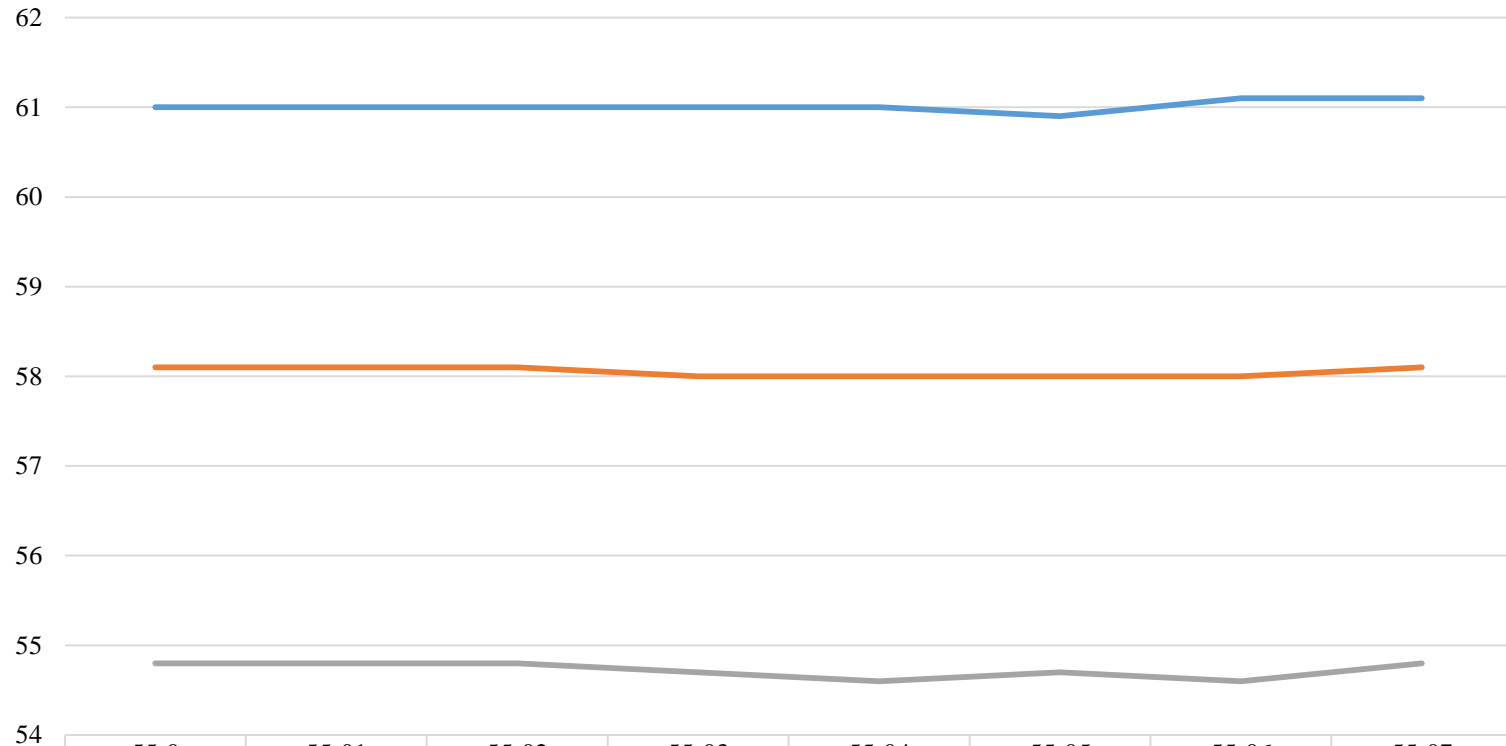
- The TNM cases developed for this project utilized the following assumptions
 - Two parallel, 12' wide abutting TNM roadways 10,000' long
 - Seven TNM receivers at zero elevation and aligned perpendicular to the center point of the roadways.
 - Offsets of 25', 50', 100', 150', 200', 300', 400', and 500' from the nearest edge of pavement
 - Default ground type: hard ground
 - Speed conditions: 35 mph, 40 mph, 45 mph, 50 mph, and 55 mph
 - Roadway grade: 0%-7% in 1% increments
 - Traffic: ADT of 500, 1,000, 1,500, 3,000, and 3,500

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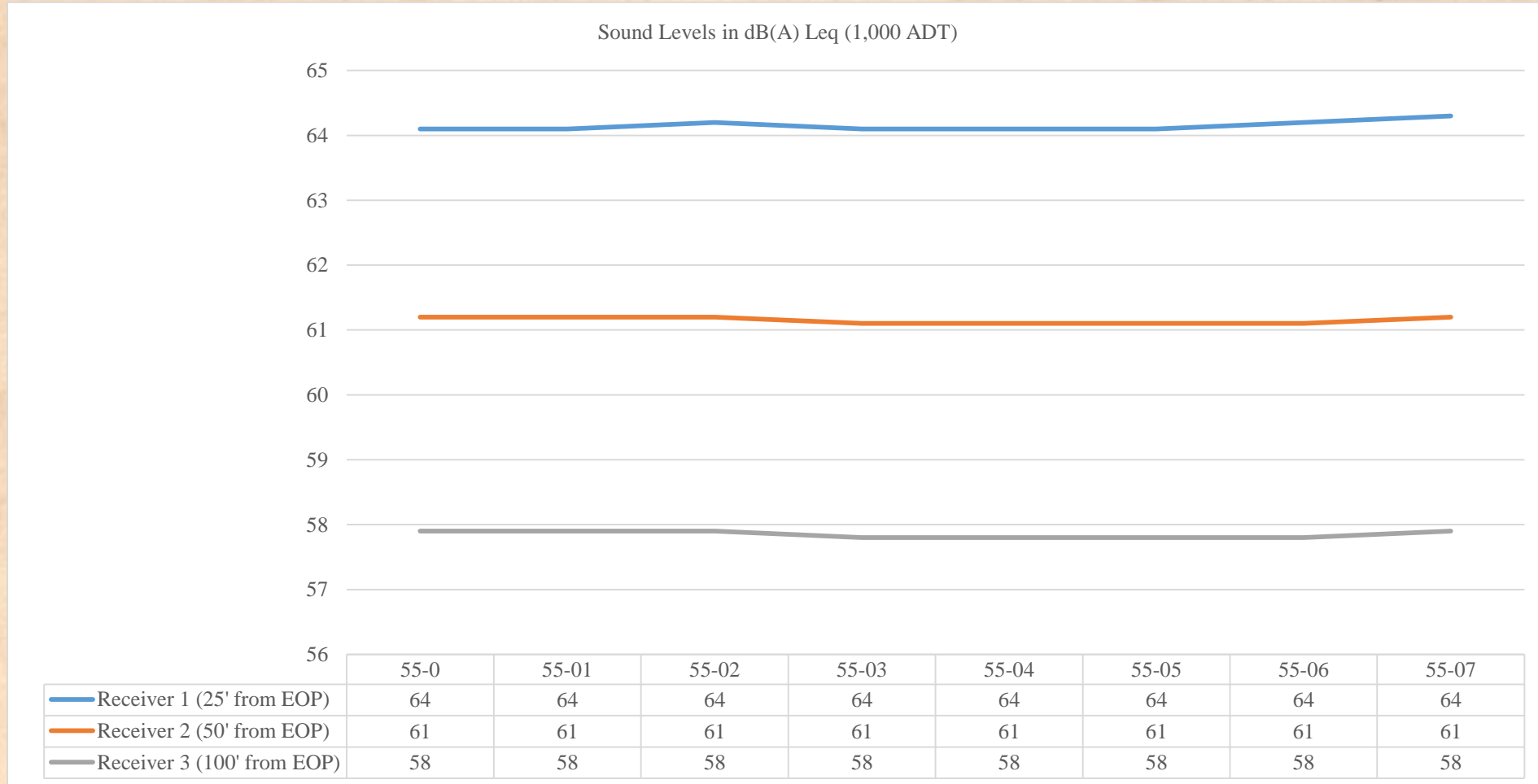
Sound Levels in dB(A) Leq (500 ADT)



	55-0	55-01	55-02	55-03	55-04	55-05	55-06	55-07
Receiver 1 (25' from EOP)	61	61	61	61	61	61	61	61
Receiver 2 (50' from EOP)	58	58	58	58	58	58	58	58
Receiver 3 (100' from EOP)	55	55	55	55	55	55	55	55

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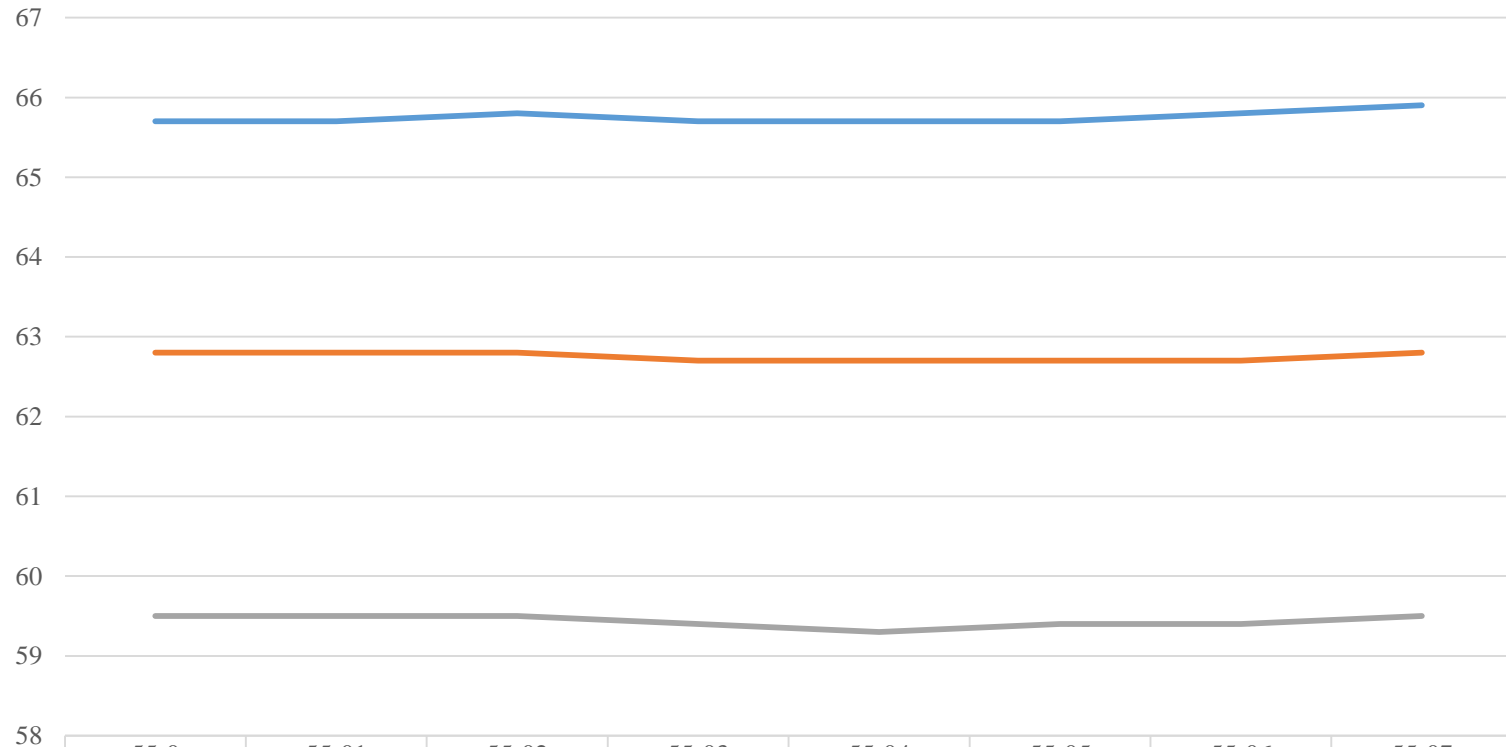


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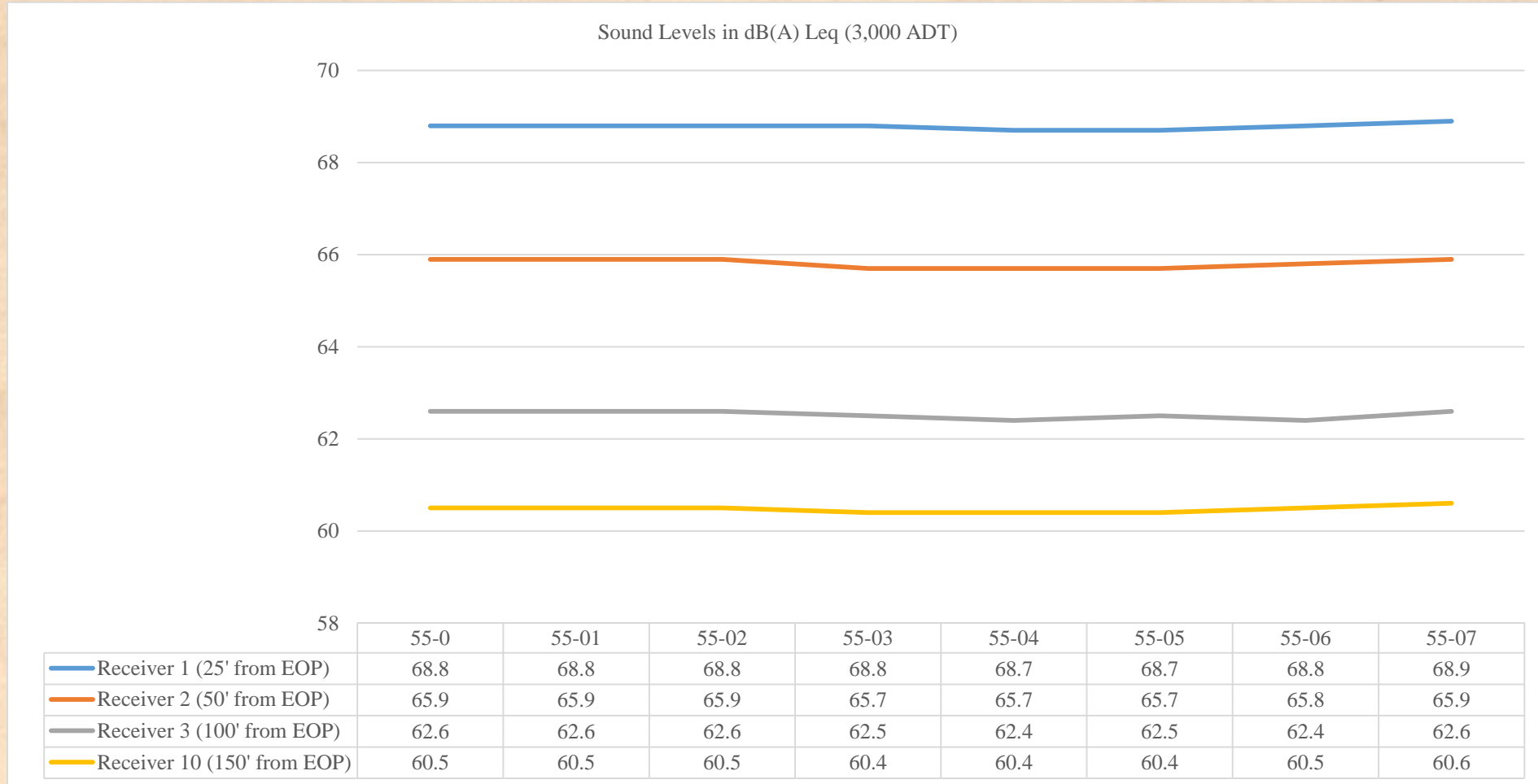
Sound Levels in dB(A) Leq (1500 ADT)



	55-0	55-01	55-02	55-03	55-04	55-05	55-06	55-07
Receiver 1 (25' from EOP)	66	66	66	66	66	66	66	66
Receiver 2 (50' from EOP)	63	63	63	63	63	63	63	63
Receiver 3 (100' from EOP)	60	60	60	59	59	59	59	60

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Results Summary for 5 dB(A) DoC

ADT	Receiver Distance	Maximum Speed/grade Condition
500	25' and greater	55 mph/7% grade
1,000	25'	40 mph/6% grade
1,000	50' and greater	55 mph/7% grade
1,500	25'	35 mph/3% grade
1,500	50'	45 mph/7% grade
1,500	100' and greater	55 mph/7% grade
3,000	150' and greater	55 mph/7% grade

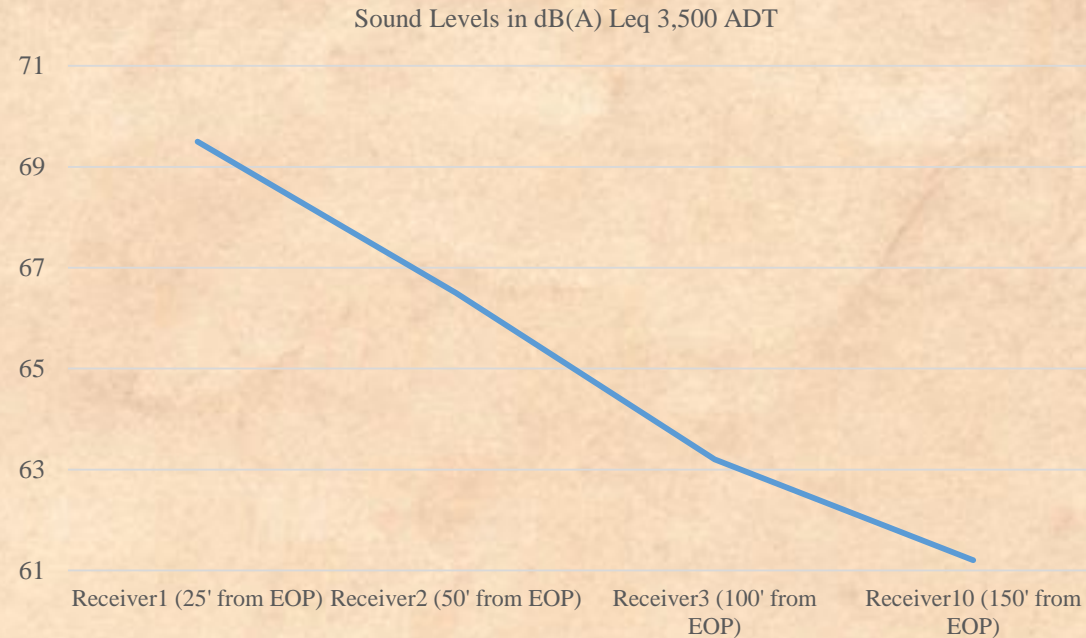
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Result for 3 dB(A) DoC

- Limited to 3,500 ADT/55 mph/7% grade



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Applicability

- Most useful on Type I projects that are not add lane projects
- Limited to low ADT roadways
- Could allow states to exempt some Type I projects from any study

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Recommendations and Conclusions

- For categories B&C: Exempt projects with an ADT of 3,500 or less; with receptors 100' or more from the nearest travel lane and with speed grade combinations up to 55 mph and 7% grade
- For Category E: Exempt projects with an ADT of 3,500 or less; with receptors 50' or more from the nearest travel lane and with speed grade combinations up to 55 mph and 7% grade
- For noise screening: Projects with an ADT of 3,500 or less that fall outside the parameters of this programmatic agreement could be eligible for a noise screening using the FHWA noise screening tool and the provisions of the SHA procedure manual.

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