



Traffic Noise Practitioners Summit

October 21-22, 2015

Baltimore, Maryland



U.S. Department
of Transportation

**Federal Highway
Administration**



Summit Objectives

- ▶ Facilitate peer exchange
- ▶ Define a “Noise Roadmap” for the future
 - ▶ What are the takeaways from the summit?
 - ▶ Where do the FHWA noise program and traffic noise research go from here?





Organizers

- ▶ Mark Ferroni, FHWA Noise Program Manager
- ▶ Rob Effinger, AASHTO
- ▶ Bowlby & Associates, Inc. (AASHTO Contractor)
 - ▶ Bill Bowlby, Darlene Reiter, Rennie Williamson
- ▶ Summit Advisory Group





Summit Advisory Group Developed the Agenda

- ▶ Noel Alcala, Ohio DOT
- ▶ Mariano Berrios, Florida DOT
- ▶ Cora Helm, Montana DOT
- ▶ Carole Newvine, Oregon DOT
- ▶ Danielle Shellenberger, Pennsylvania DOT
- ▶ Greg Smith, North Carolina DOT



Topics – Day 1

- ▶ 23 CFR 772 Issues and Concerns
 - ▶ 1. Type I Project Definitions
 - ▶ 2. Land Use Activity Categories and Evaluation Methodologies
 - ▶ 3. Noise Screening Procedures
 - ▶ 4. Cost Effectiveness Reasonableness Criteria
 - ▶ 5. Consideration of Viewpoints of Owners and Residents
- ▶ 6. TNM 3.0 Status and Implementation Plans



Topics – Day 2

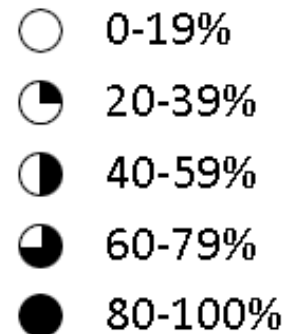
- ▶ 7. Miscellaneous Traffic Noise Policy, Procedure and Program Topics
- ▶ 8. Traffic Noise Modeling: Best Practices for Modeling and Review of Models
- ▶ 9. Design-Build Projects
- ▶ 10. Construction Noise and Vibration and Pre-Construction Evaluation
- ▶ 11. Noise Barrier Materials, Design and Costs
- ▶ 12. Enhancing and Improving Technology Transfer, Training and Recruiting
- ▶ Shaping the Noise Roadmap



Shaping the Noise Roadmap – Post-Summit Survey

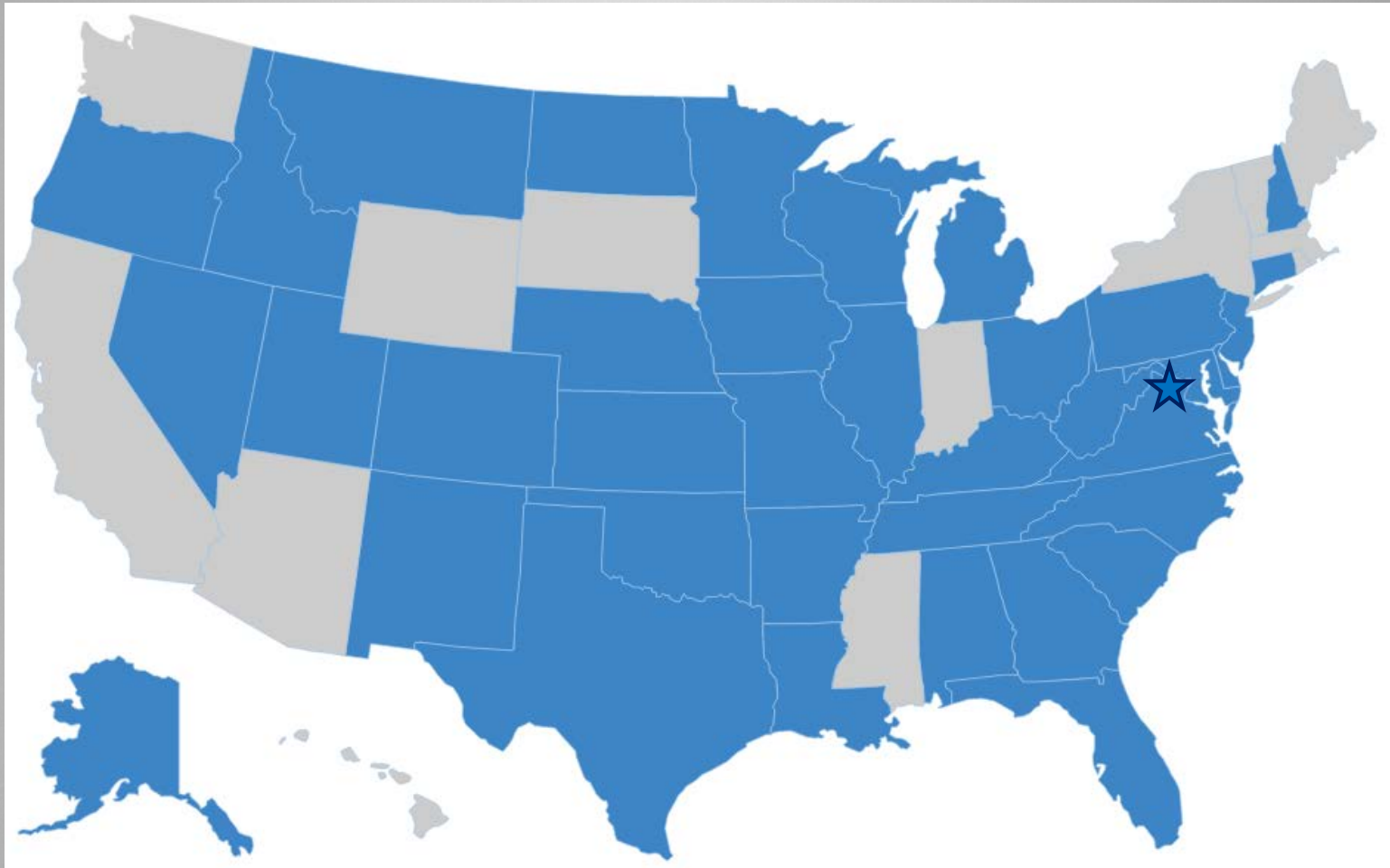
- ▶ Developed list of subjects of interest for each topic
- ▶ For each subject, asked about needs for:
 - ▶ Technical assistance or guidance
 - ▶ Research
 - ▶ A change in the noise regulation
- ▶ Sought comments and recommendations
- ▶ Compiled results in White Paper/Roadmap

Legend - % of
"yes" responses





41 Practitioners from 37 States & DC





23 CFR 772: Type I Project Definitions

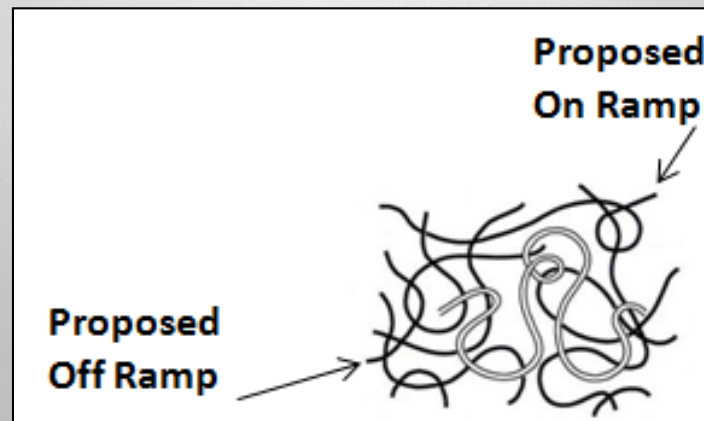
- ▶ Facilitator: Carole Newvine, Oregon DOT
- ▶ Participants:
 - ▶ Carole Newvine, Oregon DOT
 - ▶ Mariano Berrios, Florida DOT
 - ▶ Tom Hanf, Michigan DOT
 - ▶ Greg Smith, North Carolina DOT





Type 1 Definition Issues

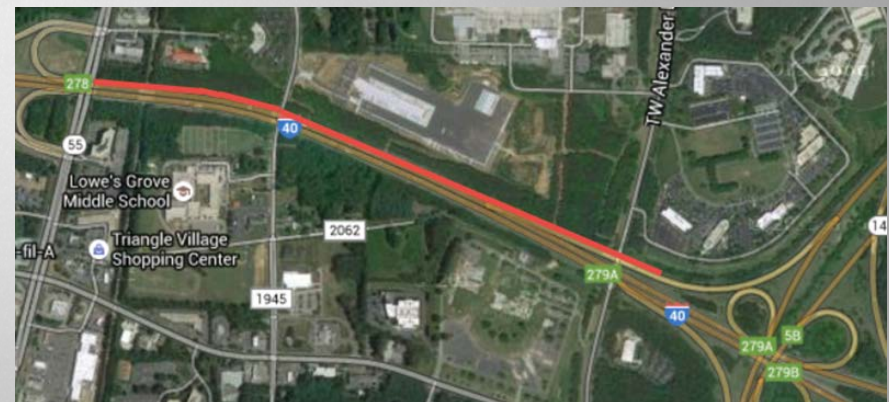
- ▶ Substantial vertical alteration
- ▶ Adding an auxiliary lane, except as a turn lane
- ▶ Adding/relocating interchange lanes or ramps to complete an existing partial interchange
- ▶ Restriping to add a through-traffic lane or auxiliary lane
- ▶ Adding a new - or substantial alteration of - a weigh station, rest stop, ride-share lot or toll plaza





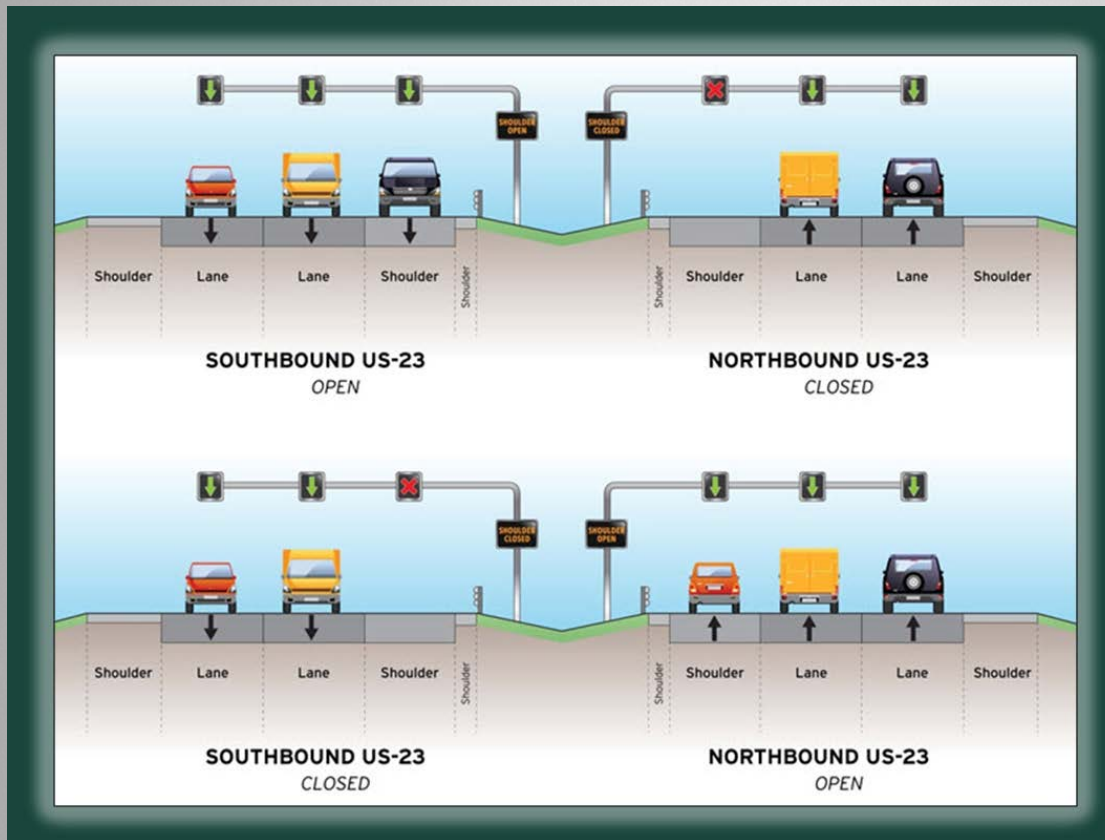
North Carolina DOT - Auxiliary Lanes on Safety-Related Projects

- ▶ Safety improvement project with auxiliary lane and right-turn lane
- ▶ 4,500-ft lane between two interchange ramps and ending in turn lane, proposed for safer weaving





Michigan DOT - Shoulders and Managed-Use Lanes




















Florida DOT Type I Matrix

Type 1		<u>Not</u> Type 1 (No Noise Study Required)
14	Auxiliary lanes on freeways and expressways connecting two or more interchanges (continuous lanes <i>longer than</i> 2500 feet from gore to gore).	Auxiliary lanes on freeways and expressways connecting two <i>closely spaced</i> interchanges (<i>less than</i> 2500 feet from gore to gore) <i>to accommodate weaving traffic</i> .
15		Turn lanes at intersections associated with arterial highways
16		Bicycle and Pedestrian paths
17		Safety activities (23 USC 402)
18		Landscaping



Roadmap for Type I Project Definitions

23 CFR 772: Type I Project Definitions	Technical Assistance	Research	Regulation Change
1. Auxiliary lanes (please note FHWA FAQ C.2)	 74%	 22%	 22%
2. Shoulder use and managed-use lanes	 58%	 27%	 8%
3. Park-and-Ride lots & rest areas	 46%	 4%	 31%
4. Substantial vertical alteration	 54%	 35%	 4%
5. Transit-only or multimodal projects (FTA, FRA)	 58%	 15%	 8%



Two General Roadmap Items for Much of 23 CFR 772

- ▶ Guidance is currently spread over several resources – 23 CFR 772, Guidance document and Noise Policy FAQs on web site
 - ▶ Consolidate into a single document and/or
 - ▶ Make guidance consistent among these resources
- ▶ Need a better mechanism of notifying SHAs of new policy interpretations, guidance and FAQs



23 CFR 772: Land Use Activity Categories and Evaluation Methodologies

- ▶ Facilitator: Greg Smith, North Carolina DOT
- ▶ Participants:
 - ▶ Greg Smith, North Carolina DOT
 - ▶ Danielle Shellenberger, Pennsylvania DOT
 - ▶ Cora Helm, Montana DOT





Activity Category Items of Interest

- ▶ Category A
 - ▶ Updated FHWA Noise Policy FAQ
 - ▶ Wisconsin DOT: a national cemetery was determined not to be Category A – case for “extraordinary” serenity was not established
- ▶ Cemeteries
 - ▶ Minnesota DOT guidance
 - ▶ Tennessee DOT’s qualitative definition for frequent human use
- ▶ Are these Category B?
 - ▶ Prisons, jails, nursing homes, assisted living facilities, and North Dakota’s oil field “man-camps”



A closer look at a Playground using a Single location

APPLICABLE CRITERIA ASSOCIATED WITH ACTIVITY CATEGORY C		BASE	Category C Exterior Uses Represented by a Single Location on the Property
Exterior design year L_{eq} noise level equal to or exceeding 66dBA with the Build condition or design year exterior Build condition L_{eq} 10 dBA or greater than existing exterior L_{eq} noise level.		Single Family Residence	Playground
A	Average Event Attendance of Outside Use Area		
B	Average Time Used by Each Person Per Event (hours)		
C	Average Number of Events per Event Day		
D	Capacity of Site		
E	Average Use Factor		
G	Hours Available Per Day	15*	1
H	Persons Using Per Day	2.48*	150
I	Person-Hours Per Day	37.2*	150
J	Days Per Year Used	365*	300
K	Person-Hours Used Per Year = IxJ	13578*	45000
L	Equivalent Residential Units (ERU) = Row K Value divided by 13578	1	3





Montana DOT – Seasonal Adjustments for Usage



Seasonal
multiplier

Month	Average Hours Of Sunlight	Month	Average Hours of Sunlight
January	9.00	July	15.50
February	10.33	August	14.25
March	12.00	September	12.50
April	13.67	October	10.83
May	15.25	November	9.25
June	16.00	December	8.50

Season	Hours	Seasonal Multiplier
Year-round	147.08	None
Jun-Jul-Aug	45.75	0.31
Sept-June	101.33	0.69
Apr-Oct	98.00	0.67


















Benefited Receptor Equivalents
 $16 \times 0.67 = 10.7 \sim 11$



Roadmap for Activity Categories and Evaluation Methodologies

23 CFR 772: Land Use Activity Categories and Evaluation Methodologies

	Technical Assistance /Guidance	Research	Regulation Change
1. Reclassification/Reconsideration of land uses listed Table 1 in 23 CFR 772.	 42%	 21%	 36%
2. Identification and classification of land uses not listed in 23 CFR 772.	 46%	 12%	 19%
3. Active versus passive use areas and frequent human use (e.g., trails, cemeteries)	 73%	 32%	 21%
4. Category A definition (please note FAQ D.2)	 35%	 8%	 8%
5. Determining equivalent receptors for non-residential land uses (Including obtaining usage data)	 46%	 31%	 12%



23 CFR 772: Noise Screening Procedures



- ▶ Facilitator: Michele Fikel, Idaho Transportation Department
- ▶ Participants:
 - ▶ Mark Ferroni, FHWA
 - ▶ Daniel Burgin, Kentucky Transportation Cabinet
 - ▶ Cora Helm, Montana DOT
 - ▶ Discussant: Mariano Berrios, Florida DOT

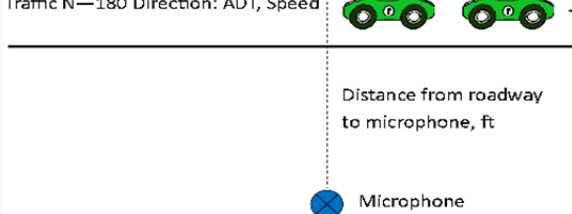


Montana DOT – The Case for a Screening Procedure

- ▶ Long distances and high costs to travel for measurements
- ▶ Limited personnel for travel and extra analysis
- ▶ What value is added by measurements and model validation when conclusions are foregone?



FHWA/Volpe Center – TNM 3.0 Low Volume Tool



Lane
Opposing Lane

Characteristics

Average --

0 --

Pavement Type
Grade (%)

Average --

0 --

Traffic

-- --

0 -- ADT

Lane Average Speed (mph)
Average Daily Traffic (# Vehicles)

-- --

0 -- ADT

0 -- %

0 -- %

0 -- %

Cars (% of Total ADT Volume)
Medium Trucks (% of Total ADT Volume)
Heavy Trucks (% of Total ADT Volume)

0 -- %

0 -- %

0 -- %

Receiver Distance from Roadway (ft) --

Calculate Noise (LAeq, 1 hour)

Lane
Opposing Lane

Noise (LAeq, 1 hour)

-- dBA

Total Noise (LAeq, 1 hour)

Noise (LAeq, 1 hour)

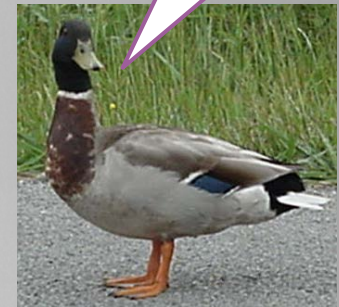
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-- dBA



KYTC's 2015 Update to its Noise Analysis and Abatement Policy

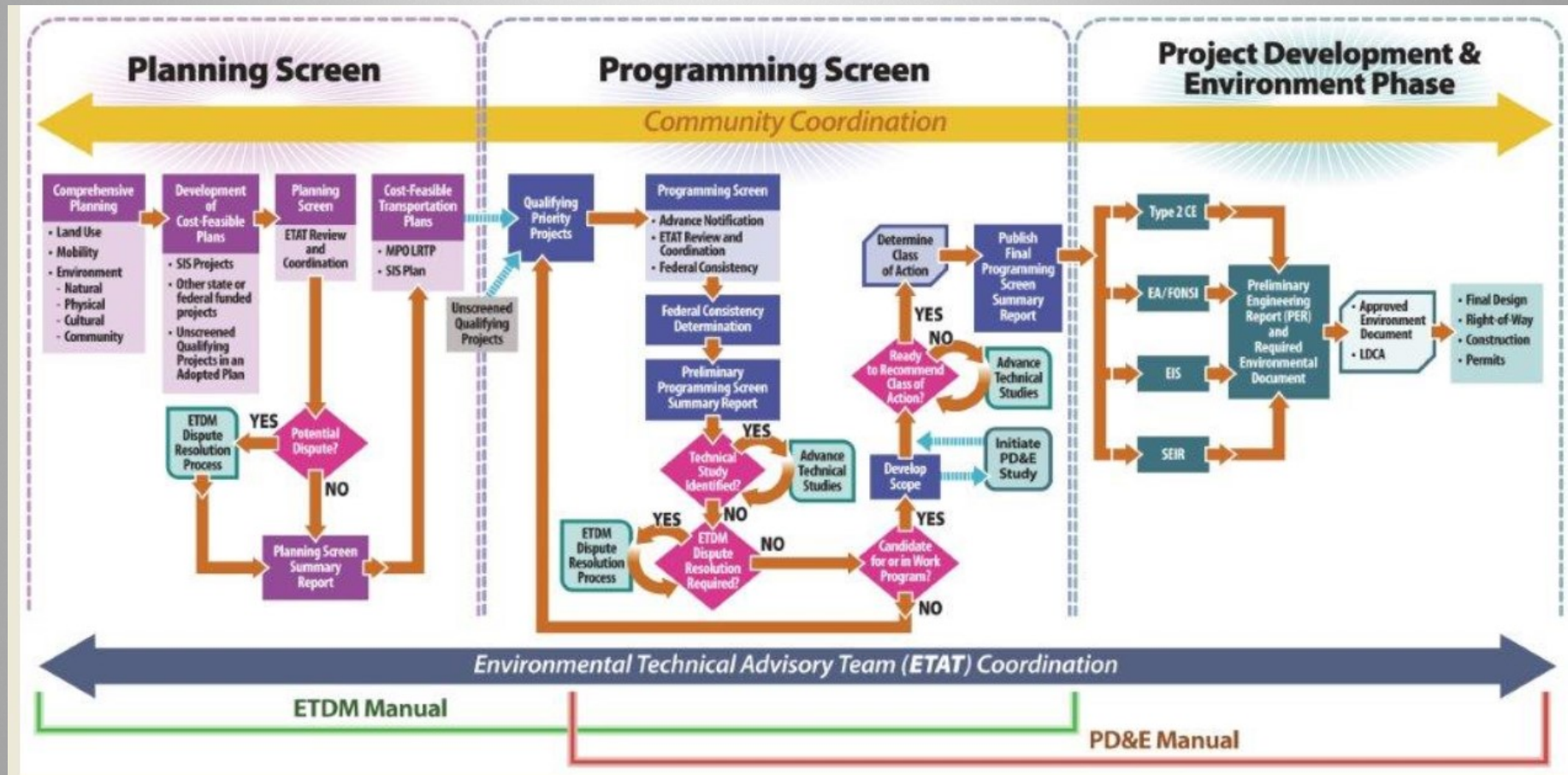
- ▶ Used FHWA's NAFRAT tool to assess possible policy changes



- ▶ Noise reduction design goal is more practical to apply to only front-row benefited receptors
- ▶ Feasibility requirement set at 5 dB for *at a minimum of three* impacted receptors – a form of screening for isolated impacts















Florida DOT Screening Offers Means of Addressing Noise Early





Roadmap for Noise Screening Procedures

23 CFR 772: Noise Screening Procedures	Technical Assistance /Guidance	Research	Regulation Change
1. Acceptable methods for screening for impacts on traffic noise studies, including isolated receptors and unlimited access roads	 88%	 42%	 28%
2. Methods to minimize abatement evaluation (barrier analysis) for isolated impacted receptors	 81%	 40%	 28%
3. Consistency in screening applicability and methodologies	 54%	 23%	 8%
4. FHWA screening tools – validation against TNM, accuracy, application guidance, including low-volume roads	 68%	 29%	 8%



23 CFR 772: Cost Effectiveness Reasonableness Criteria

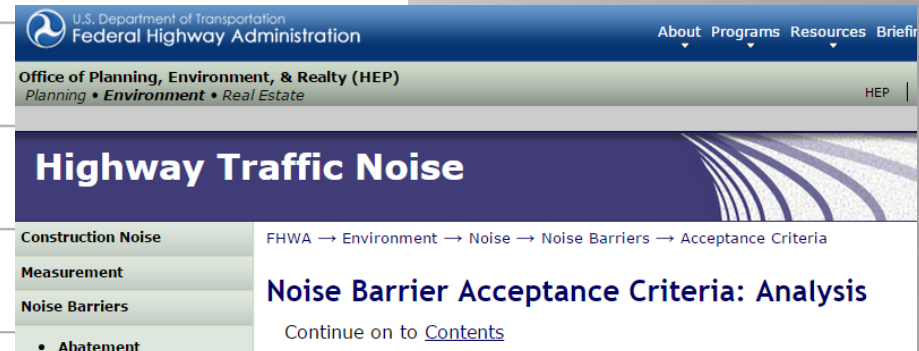
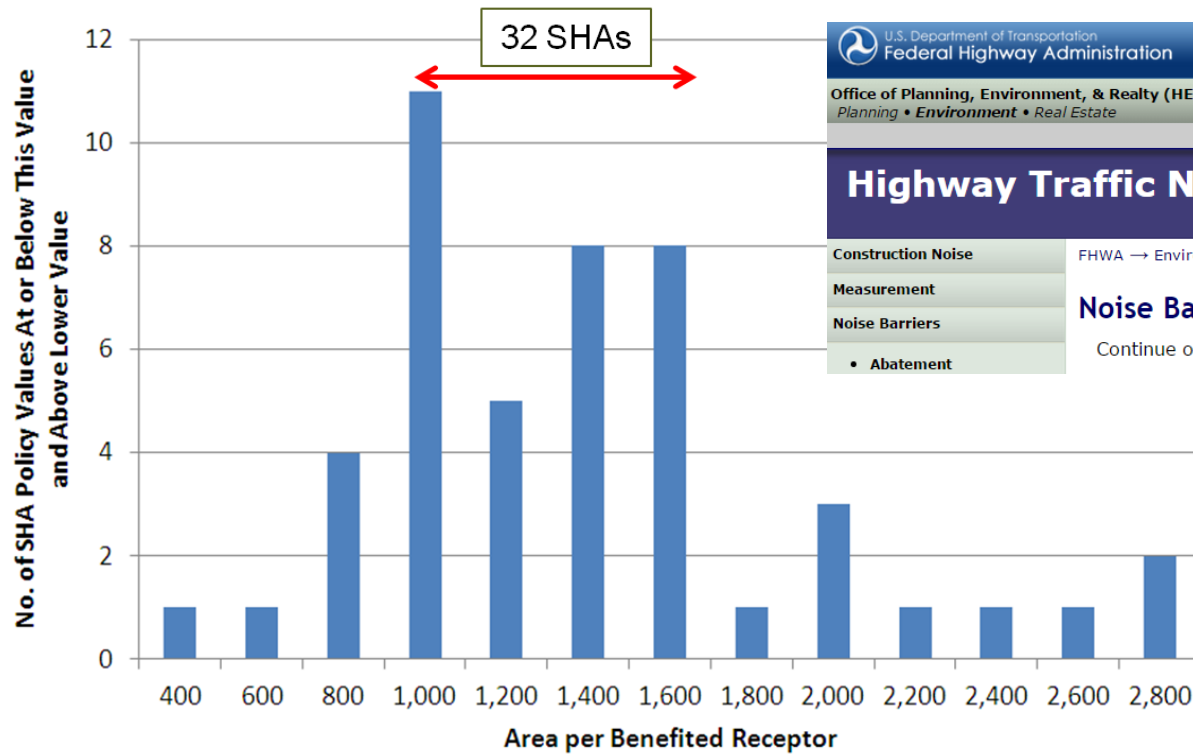
- ▶ Facilitator: Jon Evans, New Hampshire DOT
- ▶ Participants:
 - ▶ Bill Bowlby, Bowlby & Associates (FHWA research)
 - ▶ Jon Evans, New Hampshire DOT
 - ▶ Jim Ozment, Tennessee DOT
 - ▶ Jim Ponticello, Virginia DOT
 - ▶ Amber Phillips, Georgia DOT





FHWA Research on 23 CFR 772: Streamlining, Analysis & Outreach

Normalized Area Per Benefited Residence



■ Researchers: RSG, Bowlby & Associates, and Environmental Acoustics



New Hampshire's Variable Effectiveness Criteria



- ▶ Base Effectiveness Criteria (EC) = 1,500 s.f. / benefited receptor
- ▶ Date of Development: decrease Base EC using % of benefiting receptors permitted for development one year after policy implementation

Properties permitted for development after DATE	Adjustment factor subtracted from base EC
1-25%	100 s.f.
26-50%	200 s.f.
51-75%	300 s.f.
76-100%	400 s.f.

- ▶ Noise Compatible Planning: increase Base EC by 200 s.f.



Tennessee DOT's Area-Based Criterion with Allowances

Allowable Area per Benefited Residence =

	Base Allowance	_____	sf
+	Previous Type I Widening Allowance	_____	sf
+	Design Year Noise Levels Allowance	_____	sf
	+ Noise Level Increase Allowance	_____	sf
+	Noise Compatible Planning Allowance	_____	sf
Total			_____ sf

- ▶ Base allowance is a function of before/after existing road



WFR Worksheet



- ▶ Documents rationale behind mitigation and becomes part of permanent project file
- ▶ Completed for each impacted area that warrants abatement consideration
- ▶ Finalized prior to completion of final noise abatement design report for FHWA approval

Reasonableness	
1 Surface Area (Square foot)-Benefit Factors	
a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²)	42,656 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	11
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	50
d. Total number of benefited receptors.	61
e. Surface Area per benefited receptor unit. (ft ² /BR)	699 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	Yes
Decision	
Is the Noise Barrier(s) WARRANTED?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Is the Noise Barrier(s) FEASIBLE?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2 Is the Noise Barrier(s) REASONABLE?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Additional Reasons for Decision: _____	
c. Average height of the proposed noise barrier. (ft)	13 ft



GDOT's 2016 Policy Changes





















- ▶ Clearer guidance on feasibility and reasonableness goals and inclusion of more detailed examples:
 - ▶ Lowers risk of differing interpretations of goal of reducing impacts
 - ▶ Reduces noise wall modeling differences
- ▶ Updated cost estimates and unit cost based on actual costs over past 5 yrs
- ▶ Building permits not considered current after three years



Roadmap for Cost Effectiveness

23 CFR 772: Cost Effectiveness Reasonableness Criteria

	Technical Assistance /Guidance	Research	Regulation Change
1. Costs to include/not include in the barrier unit cost for cost-reasonableness	 58%	 35%	 8%
2. Obtaining and analyzing total barrier cost and unit cost data	 38%	 31%	 4%
3. Accounting for cost changes due to inflation or other market factors	 31%	 27%	 8%
4. Misinterpretation of “noise reduction design goal” as a design goal rather than a minimum threshold for reasonableness	 19%	 0%	 15%
5. Application of noise reduction design goal to impacted receptors instead of benefited receptors	 38%	 15%	 19%
6. Benefits/disbenefits of using area per benefited receptor vs. cost per benefited receptor	 42%	 31%	 4%



23 CFR 772: Consideration of Viewpoints of Owners/Residents

- ▶ Facilitator: Jay Waldschmidt, Wisconsin DOT
- ▶ Participants:
 - ▶ Bill Bowlby, Bowlby & Associates (FHWA research)
 - ▶ Jay Waldschmidt, Wisconsin DOT
 - ▶ Marilyn Jordahl-Larson, Minnesota DOT
 - ▶ Carole Newvine, Oregon DOT
 - ▶ Discussants: Greg Smith, NC, and Tom Hanf, MI





FHWA Research: Consideration of Viewpoints in 23 CFR 772

- ▶ Different bases for decisions used by SHAs:
 - ▶ In favor of - or opposed to - barrier
 - ▶ % of votes received or % of all possible votes
- ▶ Some weight votes by owner-occupant or renter
- ▶ Others include “extra” weighting, such as:
 - ▶ First-row benefited receptors
 - ▶ Impacted benefited receptors
 - ▶ Predicted noise reduction (1 state)



Wisconsin DOT's Process

- ▶ One vote each for owner-occupants, renters and off-site owners
- ▶ Simple majority of returned ballots in favor
- ▶ Additional outreach if $< 50\%$ response rate
- ▶ Desirable to hold Public Involvement Meeting (PIM) and voting no more than two years before project letting
- ▶ Owners/renters *across road* invited to attend PIM, but cannot vote
- ▶ Comments gathered on color and texture





Oregon DOT Voting



- ▶ If response < 50%, non-respondents polled second time
- ▶ Even if final response < 50%, majority of returned votes rules
- ▶ Single-family property: owner and renter each get 1 vote
- ▶ Multi-unit rental complexes: property owner gets one vote and renters get one *collective* vote
- ▶ Condominiums: unit owner-occupants and off-site owners get one vote; renters get one *collective* vote
- ▶ Mobile home parks: property owner gets one vote and each resident gets one vote



MnDOT's Noise Barrier Audit & Noise Policy Review Process

- ▶ Goal of increased transparency of noise barrier policy decision making
- ▶ Policy Advisory Committee (6 legislators and 2 citizens) voted on 2015 draft, then public comment, then FHWA
- ▶ Retained more points for owner-residents, then non-resident owners, then renters
- ▶ Retained doubling of voting points for abutting properties
- ▶ Changed from "> 50% of possible voting points *against*" to "> 50% of points cast *in favor*"
- ▶ No wall if < 25% of possible votes cast after two attempts


















North Carolina DOT Voting Process Controversy in Charlotte

- ▶ 2004: reasonable if majority of *all possible votes in favor*
- ▶ 2011: reasonable unless majority of *all possible votes are opposed* (non-votes = "yes")
- ▶ Many recently-proposed barriers "passed" in part because of low return rates, despite public opposition to blocking views of downtown
 - ▶ Vacant rental properties excluded from voting
- ▶ Wall design changes required re-voting and, after extensive outreach, downtown walls were defeated
- ▶ NCDOT had to re-ballot 1,500 owners and tenants on other projects for consistent level of outreach



Roadmap for Consideration of Viewpoints of Owners and Residents

23 CFR 772: Consideration of Viewpoints of Owners and Residents	Technical Assistance /Guidance	Research	Regulation Change
1. Required or desired minimum response rates for reasonableness	 58%	 8%	 12%
2. Amount of required effort to get responses	 65%	 12%	 12%
3. Weighting of owner and tenant votes, including single family residences, condos, apartments, and mobile homes	 65%	 8%	 19%
4. Voting procedures for special-use residential facilities (e.g., assisted living, prisons, dorms)	 58%	 12%	 4%
5. Considering viewpoints or votes of non-impacted and/or non-benefitted first-row residents	 50%	 12%	 27%















TNM 3.0 Status and Implementation Plans

- ▶ Briefing and Q&A led by Mark Ferroni
- ▶ Status and schedule: beta-testing, development, validation, release
- ▶ Outreach: webinars, brochures and web workshops
- ▶ Training
 - ▶ User's Guides - stand-alone and extensions
 - ▶ In-depth training (expected 3rd party)
- ▶ Soundplan and CadnaA will need to pass FHWA Consistency Test Suite requirements





Roadmap for TNM 3.0 Implementation

TNM 3.0 Status and Implementation Plans – FHWA Briefing and Q&A	Technical Assistance /Guidance	Research	Regulation Change
1. Self-taught training modules	 69%	 16%	 0%
2. Training in use of 3rd party versions of TNM	 54%	 8%	 4%
3. Improvements over TNM 2.5; unchanged features; features no longer included	 50%	 12%	 0%
4. Expected duration of phase-in before required use; is there a phase-in plan?	 68%	 19%	 4%



Miscellaneous Traffic Noise Policy, Procedure and Program Topics

- ▶ Briefing and Q&A led by:
Mark Ferroni, FHWA
with Mary Ann Rondinella, FHWA



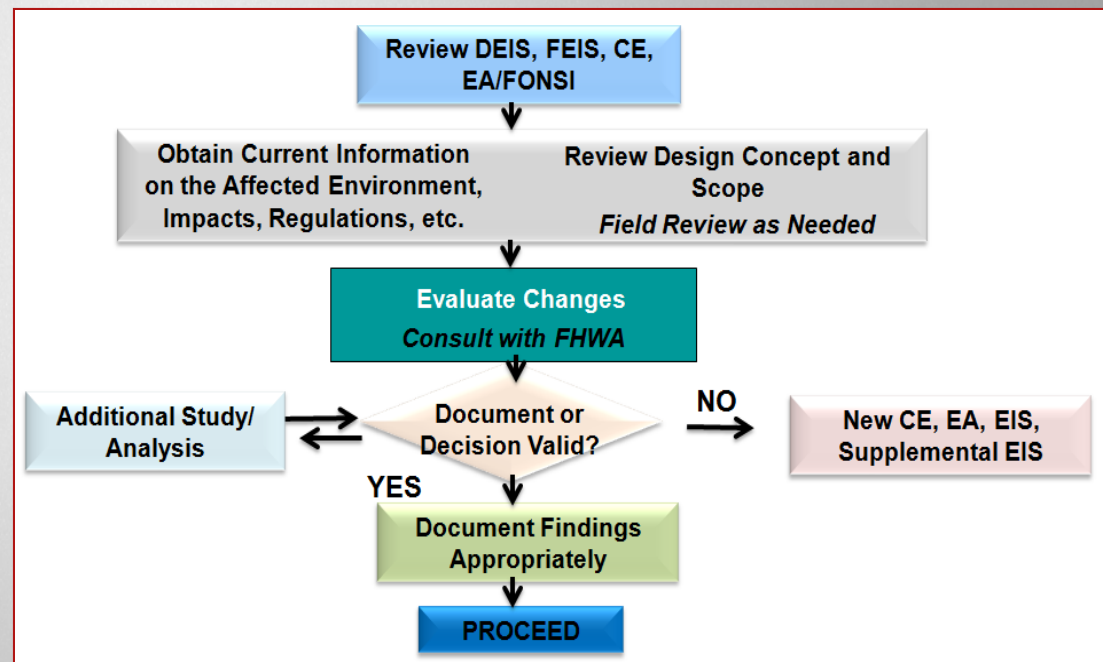
FHWA Program Updates

- ▶ Updated Noise Policy FAQs on FHWA web site
 - ▶ Transit-only projects – if FTA is lead and no Fed-aid highway funds, use FTA Manual
 - ▶ Auxiliary lanes – 2,500 ft for Type I
 - ▶ Soliciting viewpoints – non-votes do not count
- ▶ Environmental Justice/Title VI – HUD challenges
- ▶ Noise Barrier Inventory – spring 2016
- ▶ Quieter pavements – continue to be addressed
- ▶ Updates to noise policies – Division & HQ review
- ▶ New projects with existing noise barriers



Re-Evaluation Process













- ▶ The process by which SHAs consult with FHWA to determine if NEPA documents and decisions remain valid as project development proceeds
- ▶ Guidance: "23 CFR 772 Final Rule and NEPA Re-evaluations"
- ▶ FHWA Resource Center: "FAQs about NEPA Re-evaluations"





Roadmap for Miscellaneous Traffic Noise Topics

Miscellaneous Traffic Noise Policy, Procedure and Program Topics – FHWA Briefing and Q&A

	Technical Assistance /Guidance	Research	Regulation Change
1. Existing barriers on new Type I projects (e.g., analysis, funding) (please note current FHWA guidance)	 42%	 4%	 12%
2. How to consider HUD-financed properties that are impacted by a proposed Type I project	 58%	 35%	 31%
3. Quieter pavements (research; new REMELs; as abatement measures; for impact avoidance, etc.)	 46%	 50%	 12%
4. Rumble strips (stripes)	 69%	 58%	 12%



Traffic Noise Modeling: Best Practices for Modeling and Review of Models

- ▶ Facilitator: Tom Hanf, Michigan DOT
- ▶ Participants:
 - ▶ Mark Ferroni, FHWA
 - ▶ Josh Kozlowski, Virginia DOT
 - ▶ Jim Ozment, Tennessee DOT
 - ▶ Mariano Berrios, Florida DOT
 - ▶ Carole Newvine, Oregon DOT





FHWA Research into State DOT “Best Practices”

- ▶ TNM object input
 - ▶ Sources of quality topographic and geospatial data
 - ▶ Guidance for development of traffic data
 - ▶ Recommendations for additional FHWA TNM output tables
- ▶ Noise barrier design optimization
- ▶ TNM Quality Assurance (QA) review



VDOT's ENTRADA Import / Worst Noise Hour Worksheet

	EXISTING			NO-BUILD		
2013-09						
HOURS	EB or NB Med Trks	EB or NB Hvy Trks	WB or SB Med Trks	EB or NB Hourly Un- interrupted Speed (mph)	WB or SB Hourly Un- interrupted Speed (mph)	FFS Speed (two way) (mph)
6:00	5.3%	10.7%	5.3%	60.0	65.6	66.5
7:00	5.3%	10.7%	5.3%	60.0	60.0	66.5
8:00	5.3%	10.7%	5.3%	60.0	60.1	66.5

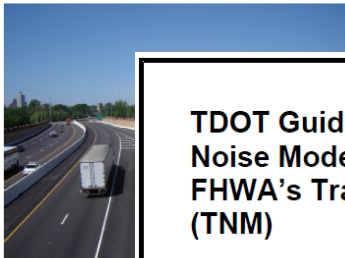
	Existing			
2013-09	EB or NB			
HOURS	Autos	Med	Heavy	Auto
6:00	1594	101	202	590
7:00	1815	115	230	102
8:00	1662	106	211	976
9:00	1172	74	149	104

				Loudest Hour (200 ft.)		
2013-09	EB or NB	WB or SB	200 ft			
HOURS	Leq	Leq	Combined	NB	SB	Combined
6:00	67.0	62.7	68.4	7:00	14:00	14:00
7:00	67.6	65.1	69.6			
8:00	67.2	64.9	69.2			
9:00	65.7	65.2	68.5			
10:00	65.4	65.1	68.3			
11:00	65.7	65.5	68.6			
12:00	66.5	66.6	69.6			
13:00	66.9	66.5	69.7			
14:00	67.1	67.4	70.3			



TDOT's TNM Modeling Guidance and QA/QC Modeling Checklist

Procedures for Highway Traffic Noise Abatement



TDOT Guidelines for Noise Modeling Using FHWA's Traffic Noise Model (TNM)



July 2011

April 2010



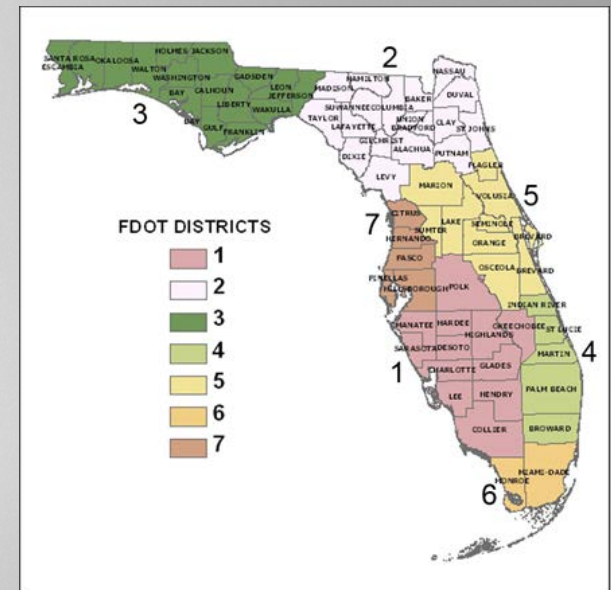
TNM Modeler	Geoff Pratt
Date QC/QC Completed	3/3/2015
TNM Reviewer	Rennie Williamson
Date QC/QA Completed	3/12/2015

TNM Run	4 lane AM		
Input	Task	Complete?	Notes
Setup	Run Information	<input checked="" type="checkbox"/>	says "09-02"; should it be "14-21"
	General	<input checked="" type="checkbox"/>	
Roadways	Roadway names assigned	<input checked="" type="checkbox"/>	
	Traffic and Speeds on all Roadways	<input checked="" type="checkbox"/>	
	Widths of All Roadways per Guidance	<input type="checkbox"/>	"WB Mack Hatcher Ext Outside Lane" and "WB Mack Hatcher Ext Inside Lane" set at 12'
	Points tied to stationing if available	<input checked="" type="checkbox"/>	
	Elevations appear to be correct	<input checked="" type="checkbox"/>	
	Traffic Flow Control Devices Modeled <ul style="list-style-type: none"> Traffic Signals Stop Signs On-Ramps 	<input checked="" type="checkbox"/>	"SB Hillsboro STA 79 - 64": Veh Affected should be 50



FDOT's Traffic Noise Modeling Practitioners Handbook

- ▶ Traffic data: standard form and scope language
- ▶ Model input guidance, including noise barrier optimization and development of recommendations
- ▶ Public involvement: general and barrier-specific
- ▶ Noise study documentation





Oregon Noise Study QC and Report Review Checklist

- ▶ Existing acoustic environment, including noise measurements and model validation
- ▶ Traffic noise analysis, including predicted sound levels, analysis summary and sound level contours for undeveloped land
- ▶ Noise abatement measures, including a *Noise Evaluation and Recommendation* form for each abatement measure considered

Noise Abatement Measures

- ☐ Number of equivalent-unit impacts mitigated
- ☐ Predicted noise levels without mitigation for each receiver
- ☐ Predicted noise levels with mitigation for each receiver
- ☐ Noise level reductions due to mitigation for each receiver
- ☐ Percent of first-row receivers achieving 5 dB or more reduction
- ☐ Total number of benefited receivers/units



Roadmap for Traffic Noise Modeling

Traffic Noise Modeling: Best Practices for Modeling and Modeling Input and Review of Models

Technical
Assistance
/Guidance

Research

Regulation
Change

1. Best practices for TNM modeling and/or reviewing TNM modeling



69%



15%



0%

2. Model validation requirement, including when a screening procedure identifies a potential impact



58%



23%



12%

3. Noise study process for Local Programs Projects (adequacy of studies, qualifications of those doing/reviewing studies)



46%



12%



4%

4. Determination of worst noise hour traffic volumes



62%



31%



8%

5. Addressing planned future projects within the project limits of a current noise study



62%



23%



4%



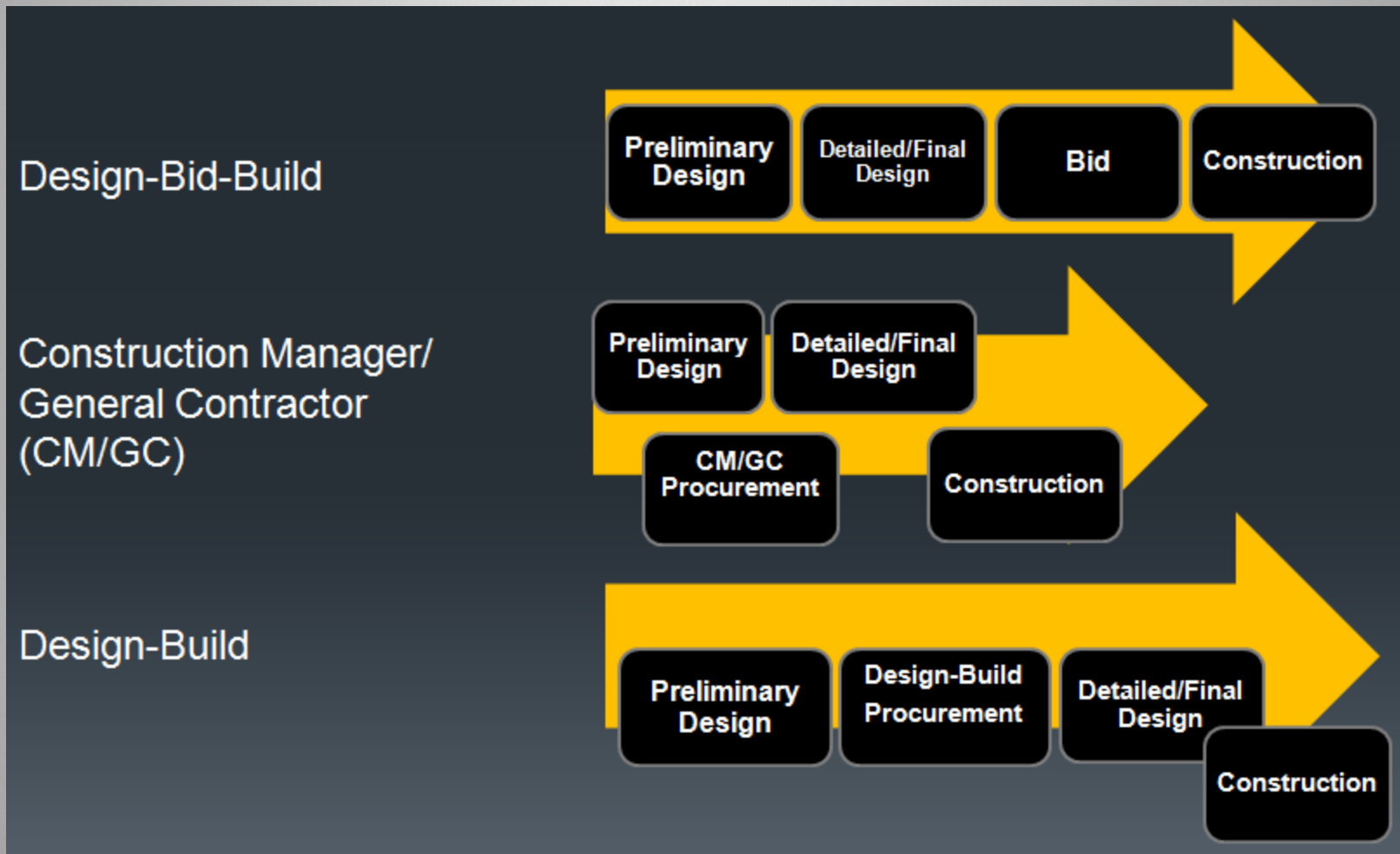
Design-Build Projects

- ▶ Facilitator: Mariano Berrios, Florida DOT
- ▶ Participants:
 - ▶ Darren O'Neill, Delaware DOT
 - ▶ Amber Phillips, Georgia DOT
 - ▶ Mariano Berrios, Florida DOT
 - ▶ Noel Alcala, Ohio DOT
 - ▶ Discussant: Greg Smith, North Carolina DOT





Delaware DOT: Alternative Project Delivery Methods





Georgia DOT: Design-Build & Noise – “A Delicate Balance”

- ▶ Challenges include:
 - ▶ Differing interpretations of GDOT Noise Policy
 - ▶ Trying to fit D-B projects into traditional Design-Bid-Build mold
 - ▶ Timing of public outreach and construction
- ▶ Updated Noise Policy to “close interpretation loopholes, and assure that all policies, design, procedures, etc., do not conflict”



Florida DOT Challenges with D-B and Public Private Partnerships

- ▶ Accurately defining noise requirements in RFP
- ▶ Dealing with “inevitable” design changes that require iterative noise barrier analyses
- ▶ Tendency to evaluate designs that eliminate or modify recommended noise barriers
- ▶ Any additional noise barrier analysis is done by FDOT, as D-B team cannot perform environmental re-evaluation
- ▶ Project noise analyst needs to be involved from procurement through design



Ohio DOT: Lessons Learned on Design-Build Projects

- ▶ Design changes cause delays and contracting issues and reduce flexibility
- ▶ A fast-track schedule means less review time reducing potential to identify and address issues
- ▶ Need a system of checks and balances
- ▶ Retain ability to make minor changes without incurring major additional costs or granting time extensions
- ▶ Look at risk and decide if D-B is appropriate














North Carolina DOT: 80% of noise walls being built on D-B projects

- ▶ Owner/resident viewpoints are solicited before the D-B RFP
- ▶ D-B contract contains minimal noise criteria
 - ▶ Contractor uses DOT's design
 - ▶ Any design change must result in no net loss in noise reduction benefits
- ▶ While design revisions can be frequent, current 10-day review period for plan revisions is too short



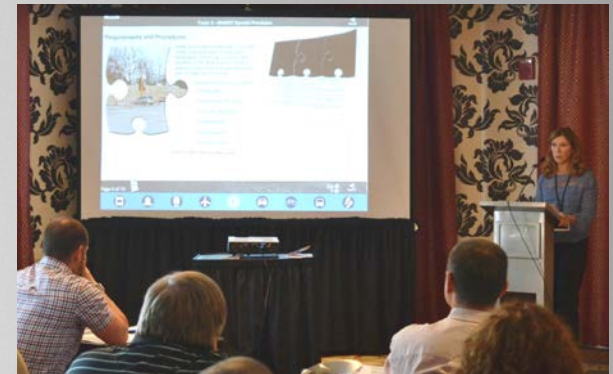
Roadmap for Design-Build Projects

Design/Build Projects	Technical Assistance /Guidance	Research	Regulation Change
1. Meeting/changing D/B project noise abatement commitments per 23 CFR 772.13(i)	 58%	 15%	 12%
2. Noise analysis process during re-evaluations for D/B projects	 60%	 8%	 8%
3. Cost-sharing mechanisms for noise barriers removed during the D/B process	 42%	 15%	 4%



Construction Noise and Vibration and Pre-Construction Evaluation

- ▶ Facilitator: Cora Helm, Montana DOT
- ▶ Participants:
 - ▶ Cora Helm, Montana DOT
 - ▶ Marilyn Jordahl-Larson, Minnesota DOT
 - ▶ Darlene Reiter, Bowlby & Associates (Caltrans manual)
 - ▶ Discussant: Mariano Berrios, Florida DOT





Montana DOT: Construction Noise/Vibration and Wildlife



- ▶ Three-part approach of avoidance, minimization and mitigation
- ▶ Challenges in analysis, assessment, monitoring and mitigation for threatened & endangered species
- ▶ Issues with US Fish and Wildlife Service (USFWS)
 - ▶ Inappropriate timing restrictions
 - ▶ Noise criteria based on studies in much different environments and on different species





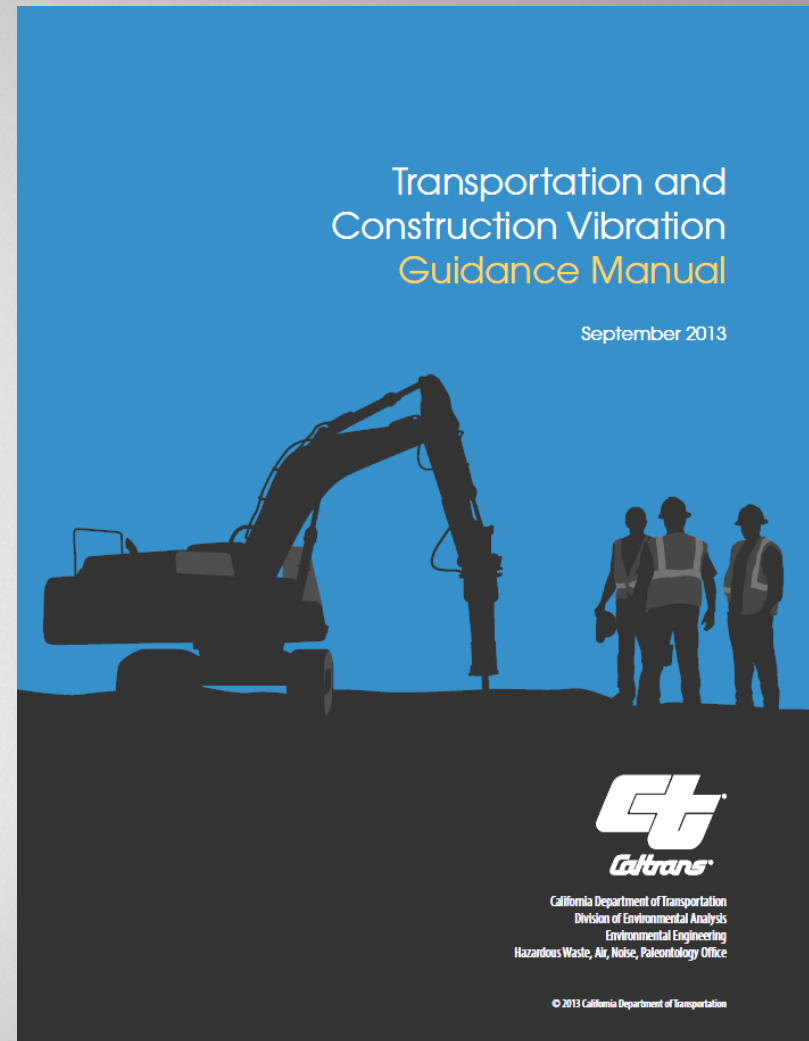
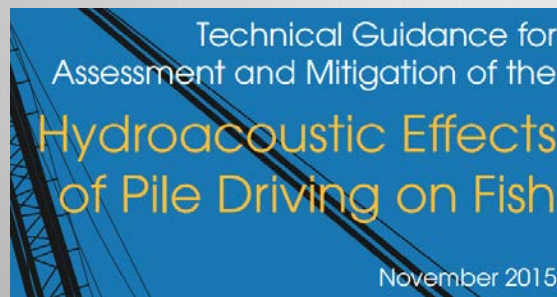
Other SHAs' Wildlife Challenges

- ▶ SHAs include Idaho, Utah, Alaska and Florida
 - ▶ Wildlife is not addressed in 23 CFR 772
 - ▶ Issues similar to Montana with USFWS including mitigation and hydroacoustical monitoring
 - ▶ A call for “better science”
- ▶ Alaska - many construction projects in marine environments
 - ▶ Ongoing FHWA-sponsored research to monitor sound to improve “best available science”
 - ▶ May need a programmatic agreement on underwater sound generated by pile driving



Caltrans Vibration Guidance Manual

- ▶ Developed over almost two decades, based on early work by Rudy Hendriks
- ▶ Additional publications due out on effects of traffic and road construction noise on birds and bats
- ▶ Plus:

















Minnesota DOT Night Construction Special Provision & Online Training

- ▶ Special Provision (SP) 1803:
 - ▶ Typical prohibited activities, requirements and procedures
 - ▶ Mitigation measures
- ▶ Training covers night construction noise impacts and the SP





Roadmap for Construction Noise and Vibration

Construction Noise and Vibration and Pre-Construction Evaluation	Technical Assistance /Guidance	Research	Regulation Change
1. Coordination with sister federal agencies regarding wildlife (e.g., F&WS) during project development	 72%	 42%	 15%
2. Assessment procedures for aquatic and terrestrial wildlife	 65%	 58%	 20%
3. (human-related) Construction noise criteria, analysis methods, and mitigation techniques	 62%	 36%	 8%
4. (human-related) Construction vibration criteria, analysis methods, and mitigation techniques	 50%	 31%	 8%



Noise Barrier Materials, Design and Costs

- ▶ Facilitator: Noel Alcala,
Ohio DOT
- ▶ Participants:
 - ▶ Noel Alcala, Ohio DOT
 - ▶ Rose Waldman,
Colorado DOT
 - ▶ Jay Waldschmidt,
Wisconsin DOT





Ohio DOT Experiences

- ▶ Survey residents and local government on materials and aesthetics
- ▶ Educate management on benefits of different systems
- ▶ Use review and approval process for new products involving Offices of Environmental Services, Structures, and Material Management
- ▶ Require fully erected control panel during construction (Noise Barrier Spec NBS-1-09)
- ▶ Inspect frequently during construction





Wisconsin DOT: Noise Wall Pre-Approval Requirements

- ▶ Certified third-party test reports on: flame and smoke indexes; sound transmission loss; NRC; salt scaling resistance; accelerated weathering; and corrosion resistance
- ▶ Third-party certification of compliance for metal and wooden barrier panels, components and treatments
- ▶ Structural and foundation designs in compliance with AASHTO's Guide Specifications (now in Section 15 of AASHTO's *LRFD Bridge Design Specifications*)















Noise Wall Material Guidelines Revision

- ▶ Adding more objectivity for determining if a material can be added to approved products list
- ▶ Utilizing study team for noise, materials, and roadway design, plus resident engineer and bridge engineer
- ▶ Assessing:
 - ▶ Objective guidelines (e.g., Noise Reduction Coefficient, sound transmission, freeze-thaw testing)
 - ▶ Subjective guidelines (e.g., resistant to impact, graffiti, absorptive surface durability)
 - ▶ Req'ts such as structural, durability and aesthetics



Roadmap for Noise Barrier Materials, Design and Costs

Noise Barrier Materials, Design and Costs	Technical Assistance /Guidance	Research	Regulation Change
1. Maintenance or replacement of existing noise barriers due to age or damage	 54%	 38%	 12%
2. Material costs vs. bid/installed costs	 31%	 31%	 0%
3. Cost variations by type of material	 42%	 48%	 0%
4. Barrier design and testing specifications, including sound-absorbing barriers	 46%	 31%	 4%



Enhancing and Improving Technology Transfer, Training and Recruiting

- ▶ Facilitator: Danielle Shellenberger,
Pennsylvania DOT
- ▶ Participants:
 - ▶ Danielle Shellenberger,
Pennsylvania DOT
 - ▶ Carole Newvine, Oregon DOT
 - ▶ Discussant: Jay Waldschmidt,
Wisconsin DOT





AASHTO Highway Traffic Noise Work Group

- ▶ 26 member SHAs under AASHTO's Standing Committee on the Environment (SCOPE) Subcommittee on Environmental Process
- ▶ Purpose: provide a forum to address noise issues and exchange information
 - ▶ Peer exchange
 - ▶ Process improvements
 - ▶ Research topics
 - ▶ Regulation review



Oregon DOT's Experience in Recruiting

- ▶ Difficulty hiring qualified staff
- ▶ Need potential candidates to have transportation air and noise experience
- ▶ Difficult to sell state employment to consultants
- ▶ Small pool of local qualified individuals
- ▶ Hire for air quality or noise; train for the other



Ideas

- ▶ Add a 4th regional chair to the AASHTO Noise Work Group
- ▶ Utilize AASHTO's National Transportation Product Evaluation Program (NTPEP)
- ▶ More webinars (AASHTO, TRB, NHI's *Real Solutions*)
- ▶ Open recruiting to majors in Atmospheric Science and Environmental Health (National Environmental Health Association)



Roadmap for Tech Transfer, etc.

Enhancing and Improving Technology Transfer, including Training and Recruiting Needs	Technical Assistance /Guidance	Research	Regulation Change
1. Making practitioners aware of new/revised FAQs and other guidance	<input checked="" type="radio"/> 76%	<input type="radio"/> 17%	<input type="radio"/> 0%
2. Central library/repository for questions and answers that have been posed to the AASHTO Noise Work Group and for noise literature, research reports, etc.	<input checked="" type="radio"/> 76%	<input type="radio"/> 4%	<input type="radio"/> 4%
3. SHA noise policy links on CEE and/or FHWA website	<input type="radio"/> 58%	<input type="radio"/> 4%	<input type="radio"/> 0%
4. Holding periodic webinars on noise topics of interest	<input checked="" type="radio"/> 81%	<input type="radio"/> 0%	<input type="radio"/> 0%
5. Using regional subgroups within AASHTO's Noise Work Group for identifying issues and bringing them to FHWA	<input checked="" type="radio"/> 69%	<input type="radio"/> 8%	<input type="radio"/> 0%
6. Training and qualifications of those who do noise studies (e.g., consultants)	<input checked="" type="radio"/> 62%	<input type="radio"/> 15%	<input type="radio"/> 8%
7. Training on how to review noise studies done by others (e.g., for SHA staff)	<input checked="" type="radio"/> 69%	<input type="radio"/> 12%	<input type="radio"/> 4%
8. Training for FHWA Division Office staff on noise policy issues	<input checked="" type="radio"/> 69%	<input type="radio"/> 8%	<input type="radio"/> 4%
9. Recruitment ideas, including desired/required education and background	<input type="radio"/> 54%	<input type="radio"/> 15%	<input type="radio"/> 4%



Summarizing Noise Roadmap by Type of Need
























Top Noise Needs – Technical Assistance or Guidance

Subject	Technical Assistance/ Guidance	Research	Regulation Change
Screening: Acceptable methods for screening for impacts on traffic noise studies, including isolated receptors and unlimited access roads	● 88%	◐ 42%	◐ 28%
Screening: Methods to minimize abatement evaluation (barrier analysis) for isolated impacted receptors	● 81%	◐ 40%	◐ 28%
Tech transfer: Holding periodic webinars on noise topics of interest	● 81%	○ 0%	○ 0%
Tech transfer: Making practitioners aware of new/revised FAQs and other guidance	◐ 76%	○ 17%	○ 0%
Tech transfer: Central library/repository for questions and answers that have been posed to the AASHTO Noise Work Group and for noise literature, research reports, etc.	◐ 76%	○ 4%	○ 4%
Type I: Auxiliary lanes (please note FHWA FAQ C.2)	◐ 74%	◐ 22%	◐ 22%
Screening: Active versus passive use areas and frequent human use (e.g., trails, cemeteries)	◐ 73%	◐ 32%	◐ 21%



Top Noise Needs – Research

Subject	Technical Assistance/ Guidance	Research	Regulation Change
Misc. FHWA: Rumble strips (stripes)	 69%	 58%	 12%
Construction: Assessment procedures for aquatic and terrestrial wildlife	 65%	 58%	 20%
Misc. FHWA: Quieter pavements (research; new REMELs; as abatement measures; for impact avoidance, etc.)	 46%	 50%	 12%
Barriers: Cost variations by type of material	 42%	 48%	 0%
Screening: Acceptable methods for screening for impacts on traffic noise studies, including isolated receptors and unlimited access roads	 88%	 42%	 28%
Construction: Coordination with sister federal agencies regarding wildlife (e.g., F&WS) during project development	 72%	 42%	 15%
Screening: Methods to minimize abatement evaluation (barrier analysis) for isolated impacted receptors	 81%	 40%	 28%



Top Noise Needs – Regulatory Change

Subject	Technical Assistance/ Guidance	Research	Regulation Change
Land use: Reclassification/Reconsideration of land uses listed in Table 1 in 23 CFR 772	42%	21%	36%
Type I: Park-and-Ride lots & rest areas	46%	4%	31%
Misc. FHWA: HUD's push to have HUD-financed properties bought out if impacted by proposed Type I project	58%	35%	31%
Screening: Acceptable methods for screening for impacts on traffic noise studies, including isolated receptors and unlimited access roads	88%	42%	28%
Screening: Methods to minimize abatement evaluation (barrier analysis) for isolated impacted receptors	81%	40%	28%
Viewpoints: Considering viewpoints or votes of non-impacted and/or non-benefitted first-row residents	50%	12%	27%
Type I: Auxiliary lanes (please note FHWA FAQ C.2)	74%	22%	22%
Land use: Active versus passive use areas and frequent human use (e.g., trails, cemeteries)	73%	32%	21%
Construction: Assessment procedures for aquatic and terrestrial wildlife	65%	58%	20%



Concluding Comments


- ▶ Nearly 80% of delegates found summit to be “extremely valuable”
 - ▶ “There really is no substitution for face-to-face peer exchange...”
- ▶ Nearly 90% said a similar summit should be held every year or two years
- ▶ Outside travel funding is a necessity
- ▶ Going forward, put more emphasis on roundtable discussions





Want more information?

► <http://environment.transportation.org>



Center for Environmental Excellence by AASHTO
One Stop Source of Environmental Information for Transportation

Environmental Topics ▲

Disciplines ▼

The Center

Noise

Planning & Environment Linkages

Project Delivery/Streamlining **NEW**

Section 4(f)/Section 6(f)

Conference & Workshop Materials

2015 Traffic Noise Practitioners Summit

Overview

On October 21-22, the Center for Environmental Excellence by the American Association of State Highway and Transportation Officials (AASHTO) hosted a Traffic Noise Practitioners Summit in Baltimore, Maryland. This event brought together noise practitioners from 38 states throughout the country, as well as staff from AASHTO and FHWA, to discuss emerging topics of interest in the field and define a roadmap for the future of noise programs and research.

The presentations from the meeting are provided below.

Agenda

Summit Introduction

White Paper *(coming soon)*

Webinar *(coming soon)*

Day 1 Presentations

Session 1 - 23 CFR 772: Type I Project Definitions

Session 2 - 23 CFR 772: Land Use Activity Categories and Evaluation Methodologies



Acknowledgements



U.S. Department
of Transportation

**Federal Highway
Administration**



Center for
Environmental
Excellence

AMERICAN ASSOCIATION
OF STATE HIGHWAY AND
TRANSPORTATION OFFICIALS

AASHTO

- ▶ Summit Advisory Group
- ▶ Summit presenters, discussants and delegates



Questions?

You can still submit questions through the Questions pane in your attendee control panel.

