



## NHI Real Solutions Seminar Series

Topic Area:

### **Solving Old Traffic Noise Ills: Tennessee DOT's Type II Noise Abatement Program**

Presented by: **Bill Bowlby**, Bowlby & Associates, Inc., with "panelists" **Jim Ozment**, Tennessee DOT, and **Darlene Reiter**, Bowlby & Associates, Inc.

March 20, 2008





■ Bill Bowlby

■ Jim Ozment

■ Darlene  
Reiter

■ Doug  
Delaney,  
TDOT



# But, first, a word from our sponsor...

- NHI Course 142051, Highway Traffic Noise
- Upcoming sessions
  - Nevada, Apr. 1-3 – public seats available
  - Alabama, Apr. 15-17
  - Alaska, May 13-15
- [www.nhi.fhwa.dot.gov](http://www.nhi.fhwa.dot.gov)

Quick Links for New and Updated NHI Training Courses:



[FHWA-NHI-380072 Advanced Work Zone Management and Design](#)

[FHWA-NHI-142051 Highway Traffic Noise](#)

[FHWA-NHI-130091 Underwater Bridge Inspection](#)

[FHWA-NHI-134065 Risk Management](#)

# Real Solutions Format

- Challenge encountered
- How was the challenge addressed?
- How was the challenge resolved?
- Lessons learned
- Question and answer opportunity

# Topics

- FHWA noise regulations and TDOT noise policy revisions
- Type II needs assessment
- Type II prioritization
- Type II program and pilot projects

# Background

- There was a need to address long-standing neighborhood concerns for noise barriers on existing highways
- New TDOT Commissioner and staff were committed to working with the public
- Ability to use Federal-aid funding (80% of total cost) was essential

# Our “Marching Orders”

- FHWA “Noise Standards,” 23 CFR 772
- TDOT Guidelines on Highway Traffic Noise Abatement, revised in 2006 as TDOT Policy on Traffic Noise Abatement

# 23 CFR 772 Project Categories: Type I Projects

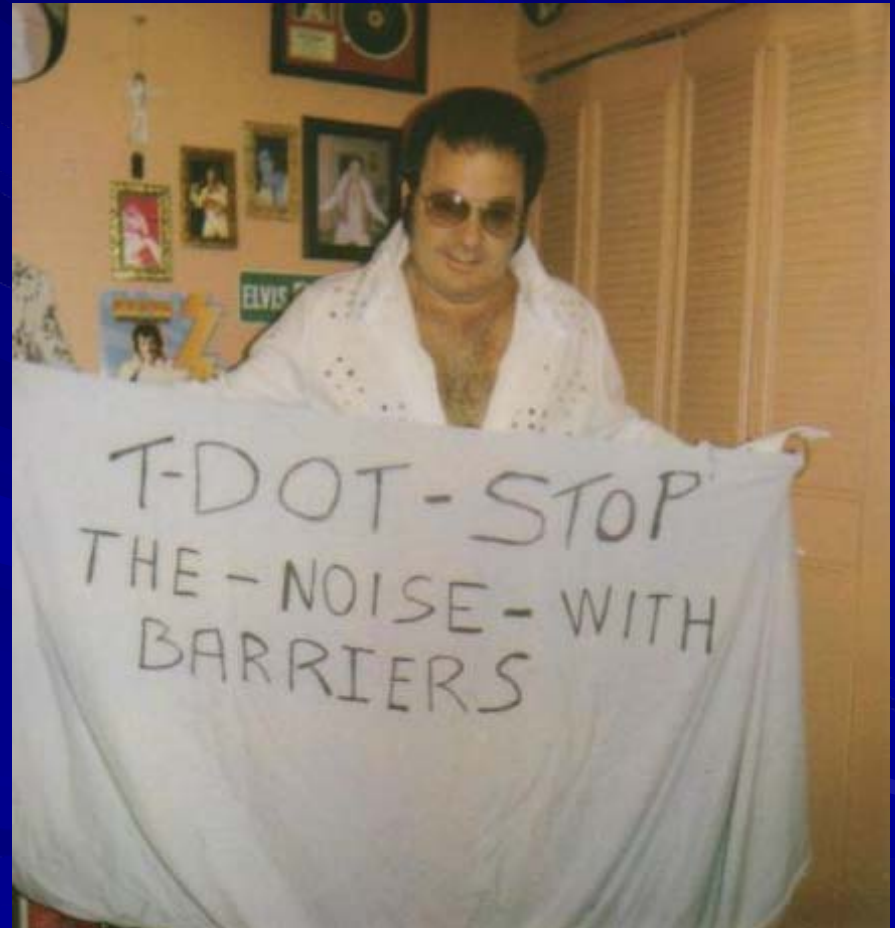
- Federal or Federal-aid highway project for:
  - Construction on new location
  - Major change to alignment, or addition of “through” lanes
- Noise analysis is required





# 23 CFR 772 Project Categories: Optional Type II Projects

- Federal or Federal-aid highway project *solely for noise abatement* on an existing highway



# To qualify for Federal-aid for a Type II project, a neighborhood must ...

- ...pre-date *initial* highway construction, and
- ...not have been previously studied for a Type I project where a barrier was found to not be feasible and reasonable

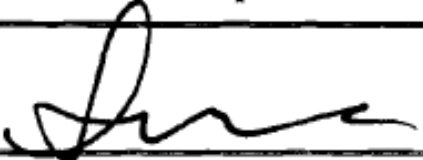
# Challenge: TDOT Noise Policy needed updating

## ■ How challenge was addressed:

- 2003 Bowlby & Associates' study reviewed TDOT's and others' policies, and recommended changes, including new "reasonableness" method

## ■ How challenge was resolved:

- Subsequent analysis, briefings, discussions and decision-making led to new policy

<b>TD↑T</b>  <b>DEPARTMENTAL POLICY</b> State of Tennessee <b>Department of Transportation</b>	<b>Policy Number : 520-01</b>
	<b>Effective Date:</b> September 16,2005
<b>Approved By:</b> 	<b>Supersedes:</b>
<b>SUBJECT: Policy on Highway Traffic Noise Abatement</b>	

RESPONSIBLE OFFICE: Environmental Division - Tennessee Department of Transportation

AUTHORITY: This policy is authorized under the powers granted the Commissioner of the Department of Transportation in T.C.A. 4-3-2303 Et. Seq.

This policy also complies with the requirements of Federal Highway Administration (FHWA) guidance for the identification of highway traffic noise impacts contained in 23 CFR Part 772 "Procedures for Abatement of Highway Traffic Noise and Construction Noise."

# Policy Changes

- Abatement not reasonable for uses constructed after date of policy adoption
- TDOT will undertake public education effort



# Policy Change: New Cost-Reasonableness Method

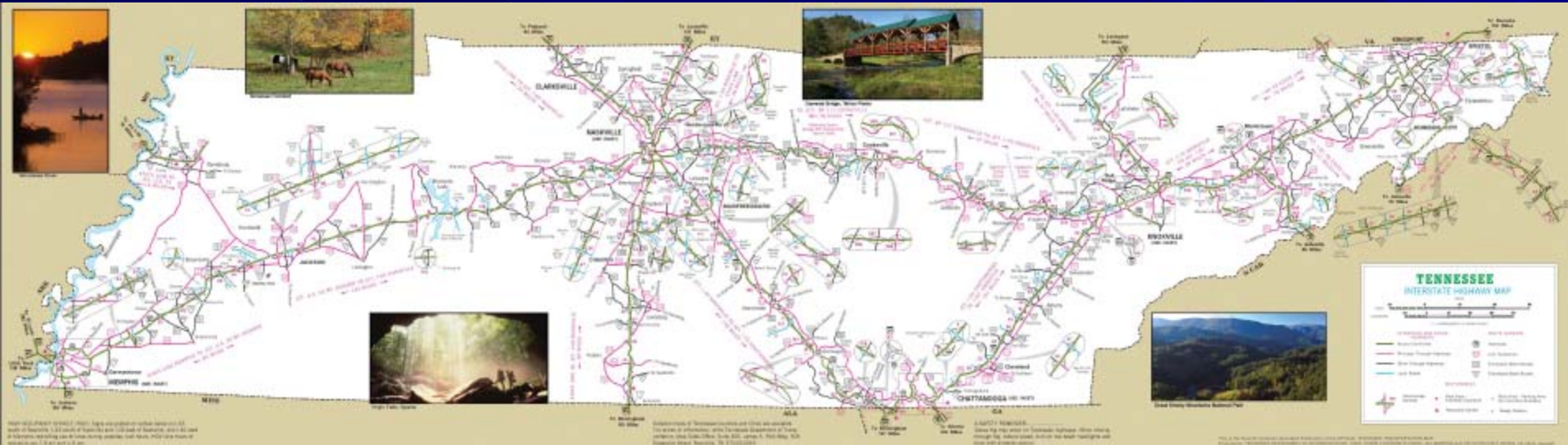
## *Resulting Ranges of Allowable Costs per Benefitted Residence*

<i>Development Date</i>	<i>Full Range of Allowable Costs</i>	<i>Typical Cost Range</i>
Pre-date Highway or New Alignment	\$30,000 - \$42,000	\$30,000 - \$34,000
Post-date Highway	\$15,000 - \$27,000	\$15,000 - \$19,000

# Phases of TDOT Type II Program Development and Implementation

- Statewide Type II Noise Barrier Needs Assessment Study
- Type II Noise Barrier Prioritization Study
- Type II Noise Barrier Program, starting with Pilot Projects

# Phase 1: Statewide Type II Noise Barrier Needs Assessment Study



- 2003-2004
- Goal: order-of-magnitude program cost
- Focus on limited-access highways

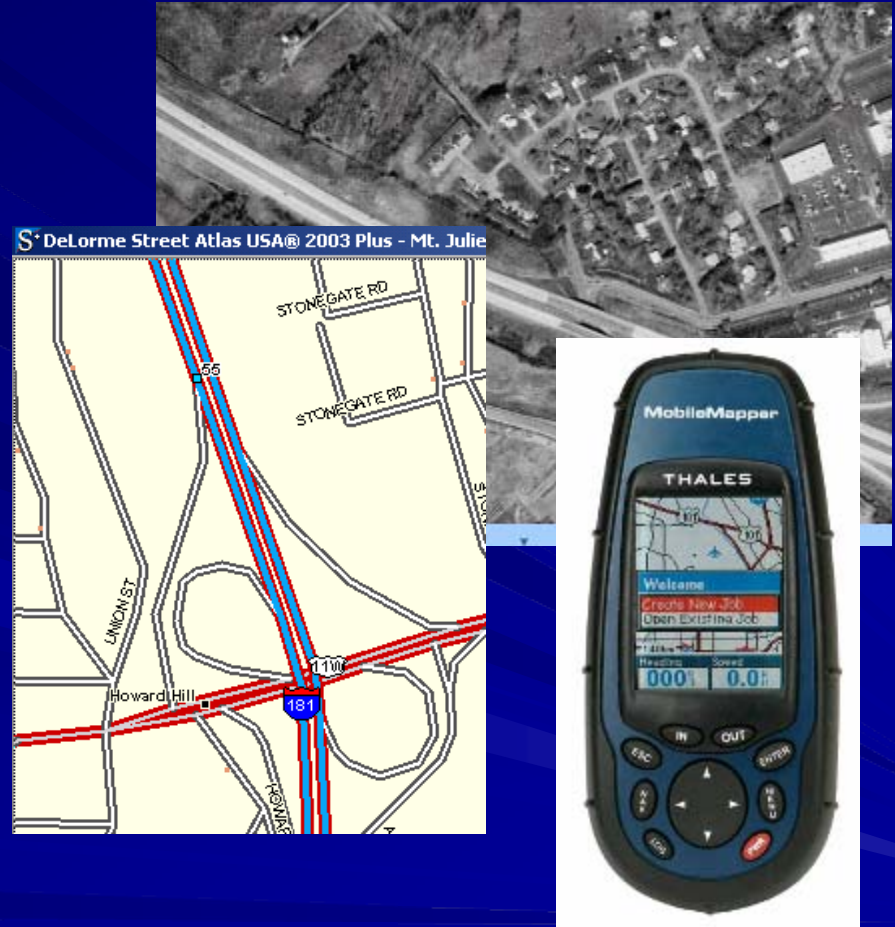


# Challenges for Statewide Needs Assessment

- Needed relatively simple, quick and inexpensive, yet accurate
- Had to identify previous Type I project areas where barriers were “not reasonable”
- Had to identify planned widenings that would require Type I studies (TIP, Long Range Plan)

# How Challenges Were Addressed

- Locate residential development along roads sections
  - Electronic mapping
  - Web-based aerial photos
  - “Windshield” field review with GPS



# How Challenges Were Addressed

- Residential development date analysis: Did any of the development predate initial highway construction?

Tennessee Property Data - Parcel Detail - Netscape

File Edit View Go Bookmarks Tools Window Help

http://170.142.31.248/ParcelDetail3.asp

County Number: 094 County Name: WILLIAMSON

**Property Owner and Maili**

Jan 1 Owner:  
BOWLBY WILLIAM  
ETUX PATRICIA W  
6403 WATERFORD DR  
BRENTWOOD , TN 37027

<b>Heat and A/C:</b>	07 - HEAT & COOLING SPLIT
<b>Bath Tile:</b>	04 - FLOOR-1/2 WALL
<b>Shape:</b>	01 - RECTANGULAR DESIGN
<b>Act Yr Built:</b>	1988

**Property Location**

Address: WATERFORD DR 6403

# How Challenges Were Addressed

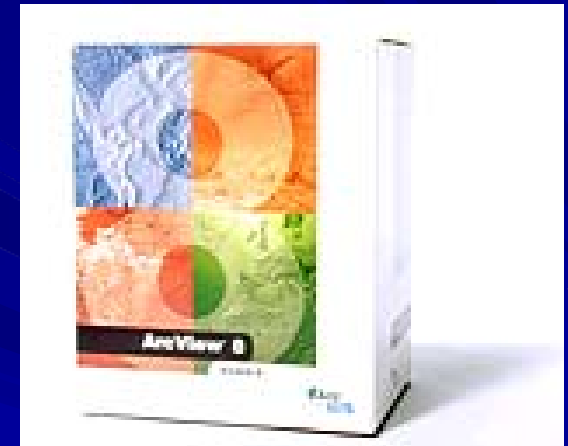
- Simplified FHWA TNM (Traffic Noise Model) modeling and simplifying assumptions
  - Is the residential area impacted?
  - Is a barrier acoustically feasible?
  - Would barrier cost be “reasonable”?

# Challenge: Keeping track of everything

- During the study
  - Easy documentation and reference
  - Performing “what if...” analyses
- After the study
  - Answering queries from citizens, legislators, and internal management
- How challenge was addressed and resolved
  - Developed prototype TDOT Traffic Noise Program Management GIS

# Prototype TDOT Traffic Noise Program Management GIS

- Data implemented in ArcView<sup>©</sup> 8.0, with the ESRI ArcGIS StreetMap USA<sup>©</sup> 8.3 component
- Linked to Excel spreadsheet for recalculation analysis

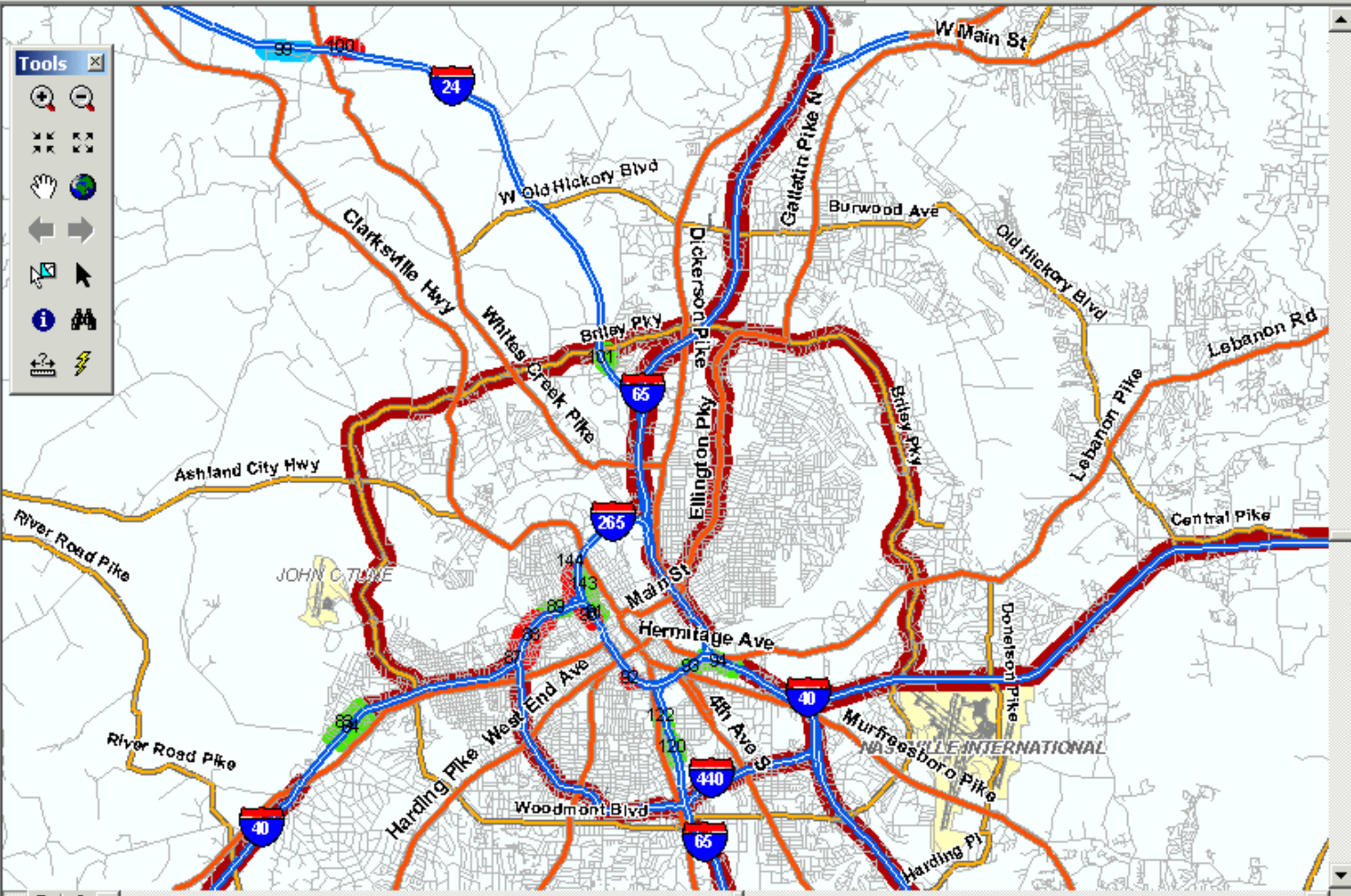


**New Data Frame**

- C:\Projects\03-18 TDC
  - cty00
    - <all other valu
    - COUNTY
    - Davidson

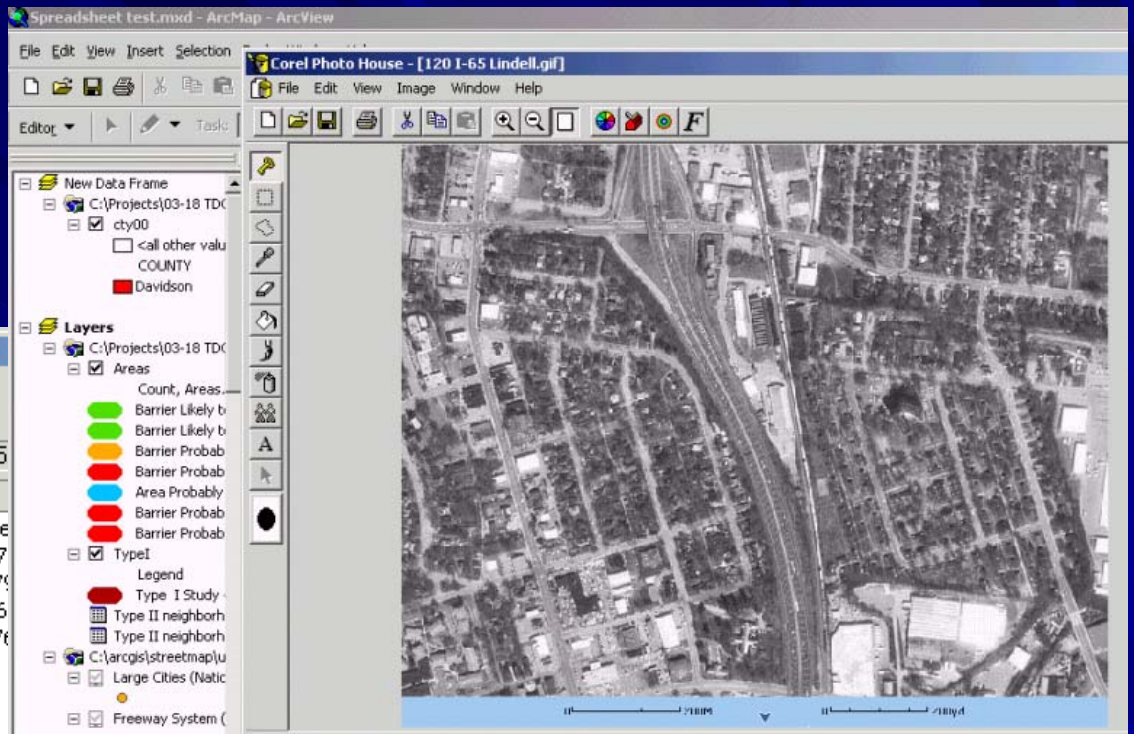
**Layers**

- C:\Projects\03-18 TDC
  - Areas
    - Count, Areas.
    - Barrier Likely b
    - Barrier Likely b
    - Barrier Probab
    - Barrier Probab
    - Area Probably
    - Barrier Probab
    - Barrier Probab
  - TypeI
    - Legend
    - Type I Study
    - Type II neighbor
    - Type II neighbor
  - C:\arcgis\streetmap\
    - Large Cities (Natic
    - Freeway System (
    - Major Rivers (Nati
    - Main Lakes (Natic



**Tools**

- Navigation tools: Zoom In, Zoom Out, Home, Previous View, Next View, Full Screen, Print, Measure, Identify, Data Review, Snapping, Undo, Redo, Copy, Paste, Erase, Select, Select All, Select None, Select by Attributes, Select by Location, Select by Value, Select by Color, Select by Size, Select by Shape, Select by Area, Select by Length, Select by Volume, Select by Weight, Select by Perimeter, Select by Area/Volume/Weight/Perimeter, Select by Color/Size/Shape/Area/Length/Volume/Weight/Perimeter, Select by Color/Size/Shape/Area/Length/Volume/Weight/Perimeter/Color/Size/Shape/Area/Length/Volume/Weight/Perimeter.



### Identify Results

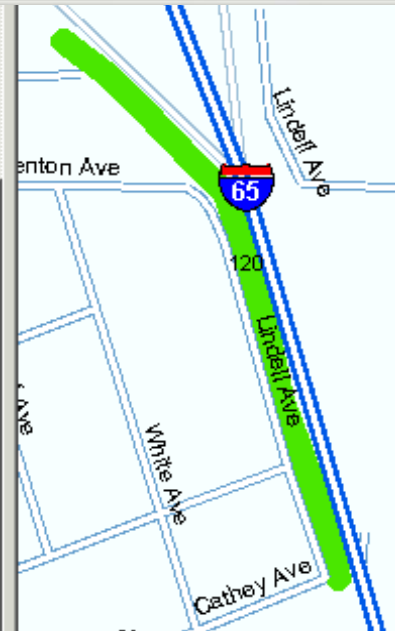
Layers: <Top-most layer>

#### Areas

Mixed

Location: {821523.104576 -113465}

Field	Value
Areas.HWY_CONSTR	1972, Lane
Areas.LAT_BEGIN	36.128027
Areas.LON_BEGIN	-86.773779
Areas.LAT_END	36.133886
Areas.LON_END	-86.776071
Areas.NO_1ST_ROW	28
Areas.DU_DENSITY	Dense
Areas.TYPE_DU	SF, MF
Areas.OTHER_CATB	No
Areas.INI_CONSTR	1972
Areas.INIT_LANES	2
Areas.WIDE_LANES	3
Areas.DIST_TO_CL	150
Areas.X_ST_BEGIN	Cathey
Areas.X_ST_END	Wedgewood
Areas.NOTES	
Areas.TYPE_I_DET	Yes
Areas.TIP	
Areas.IMPACTED	Yes
Areas.FEASIBLE	Yes
Areas.REASONABLE	Yes
Areas.LRP	2015
Areas.STAUS	Barrier Likely to be Reasonable and Feasible
Areas.Image	Photos\120 I-65 Lindell.gif
Area	120
Criterion	34000
FS Cost	20
ST Cost	50
Barr Ht	15
# Front Row	27
#2nd Row	15





# Statewide Needs Assessment Results

Analysis Areas (excluding Type I)	212
<i>minus TIP</i>	24
<i>minus Post-dated highway</i>	68
Pre-dated highway (eligible for consideration)	120
<i>minus Not impacted</i>	10
<i>minus Not feasible</i>	5
<i>minus Not reasonable</i>	69
<b>Qualified (impacted, feasible, reasonable)</b>	<b>36</b>

# Statewide Needs Assessment Results

- Total “order of magnitude” cost was \$32 million
- Many areas “on the bubble” (between \$34,000 and \$37,000 per benefitted residence)
- Many Long-Range Plan projects adjacent to eligible areas
- **TDOT’s Commissioner decided to initiate Type II Program**

# Phase 2: Type II Noise Barrier Prioritization Study

- 2004-2005

- Goals:

- Detailed analysis to identify and help decide on program scheduling for qualified areas
- Development of a Public Response Plan

# Challenge: What criteria should be considered in deciding which projects to fund first?

- Did not want a ranking of areas
- Factors to consider
  - First-row sound level
  - Number of first-row impacts
  - Number of non-first-row benefits
  - Cost per benefitted residence
  - Size and cost of project

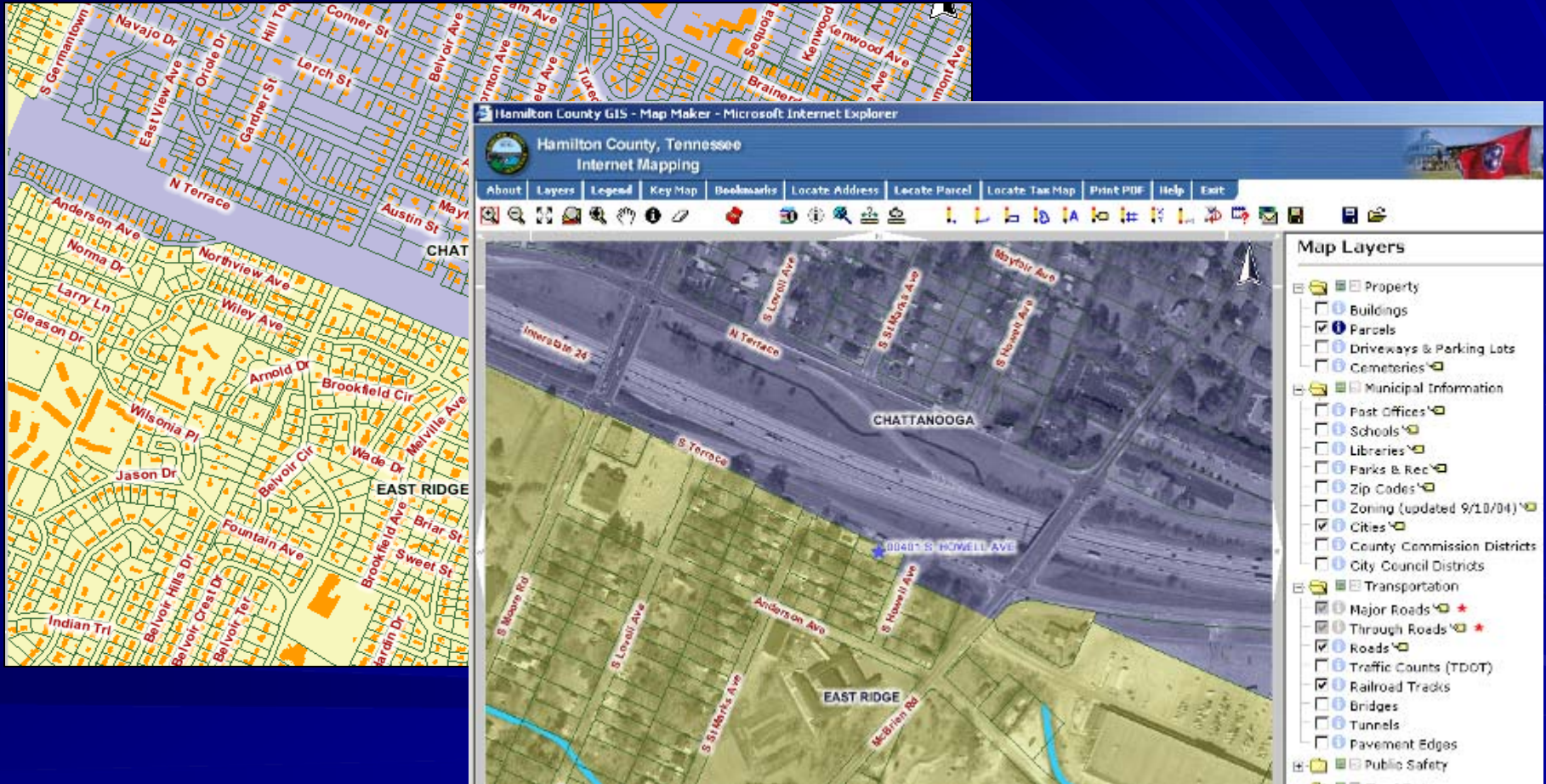
# Analysis Steps

- Residential development date verification (majority of residences in first two rows must pre-date initial road)
- Noise impact verification / noise measurements
- Site-specific TNM noise modeling
- Updating of TDOT Noise Management GIS

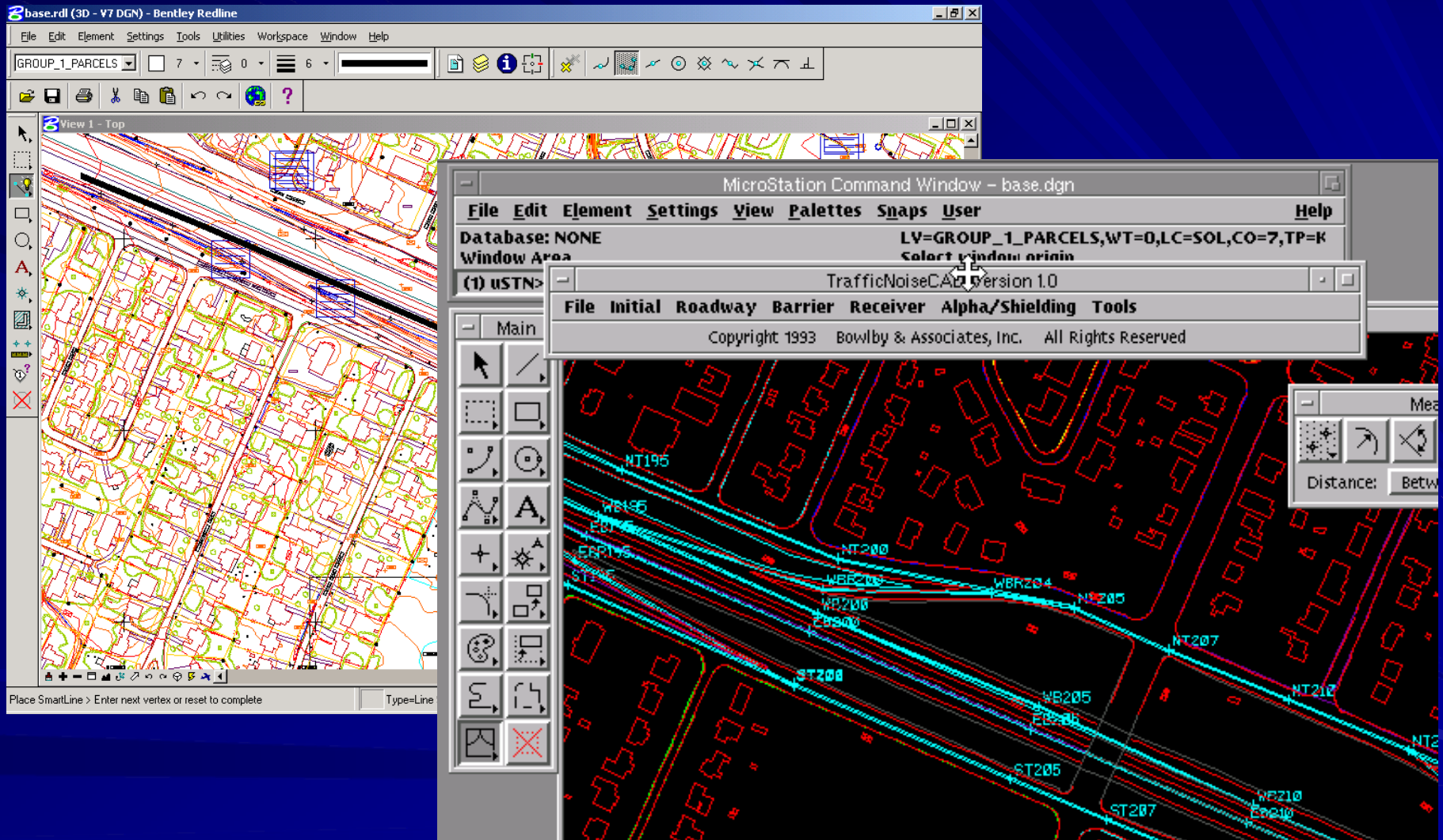
# Challenge: Obtaining residential construction date information

- Not all data bases online
- How challenge was addressed:
  - Used on-line resources where available
  - Repeated requests in some counties
- How challenge was resolved:
  - Most data were obtained
  - In one case, had to use old aerial photography and USGS maps

# Some On-line County GIS Systems Were Very Useful



# Using County GIS DXF Files for TNM





# Type II Prioritization Study Results

Analysis Areas	159
<i>minus Post-dated highway</i>	72
Pre-dated highway (eligible for consideration)	87
<i>minus Not feasible</i>	5
<i>minus Not eligible land use</i>	5
<i>minus Low density</i>	19
Areas where measurements conducted	58
<i>minus Not impacted</i>	14
Detailed TNM Modeling	44
<i>minus Not reasonable</i>	23
<b>Qualified (impacted, feasible, reasonable)</b>	<b>21</b>

# Challenge: Barrier programming

- Who should be involved in programming process (planning, design, project management)?
- Political issues – should projects be spread across the state's four regions?
- Future Type I projects – some Type II areas are planned to be widened in 10-15 years
- Uncertainties on projecting funding into the future

# Challenge: Barrier programming (con.)

- Combining adjacent areas for construction
  - Economies of scale
  - Minimize construction duration and lane closures
- Allocating funding – banking over several years (large projects require “banking “ funds for two or more years)
- Balancing projects’ phasing for a mix of planning & engineering, ROW & utilities, and construction
- Many factors are dynamic, such as widening schedules and funding

# How Challenges Were Addressed

- List of qualified Type II areas was not assigned a numerical order
- List is dynamic and is reviewed and updated periodically
- TDOT environmental division staff requested that a project manager be assigned to the Type II Program and all projects within the program

# How Challenges Were Resolved

- Selected “top 3” areas for pilot program
- Did not publish a single “list” of rankings
- Assigned an overall program manager (Ann Andrews)
- Will consider each of the issues when projects are being programmed

# Challenge: Need for uniform and consistent TDOT responses to abatement requests

- Hundreds of residential groupings along limited access roadway system, not including previously studied Type I areas
- Need to be prepared to respond quickly and uniformly to inquiries from the public and public officials

# How Challenge Was Addressed: Public Response Plan was developed

- Figures, tables and decision info for each residential area in binders and the GIS
- Set of standardized response letters tailored to specific situations, with supporting info attached:
  - Area not impacted
  - Residences post-date highway
  - Type I area
  - Barrier not feasible or reasonable

# Phase 3: Type II Program and Pilot Projects

For Immediate Release  
March 4, 2005



## **TDOT Announces New Noise Barrier Policy and Program** Program allows for new noise walls in established neighborhoods

Nashville, Tenn.—The Tennessee Department of Transportation (TDOT) today announced the details of a new noise barrier policy along with the details of a new Type II Noise Barrier Program that will provide noise walls for the first time in qualifying neighborhoods.

“This is an exciting new program that will allow for the construction of noise walls in qualifying, older neighborhoods that were established before high volume roadways were built,” said Governor Phil Bredesen. “This is something many people have requested in Tennessee’s urban areas and I believe it will help improve the quality of life for people living near high noise level roadways.”











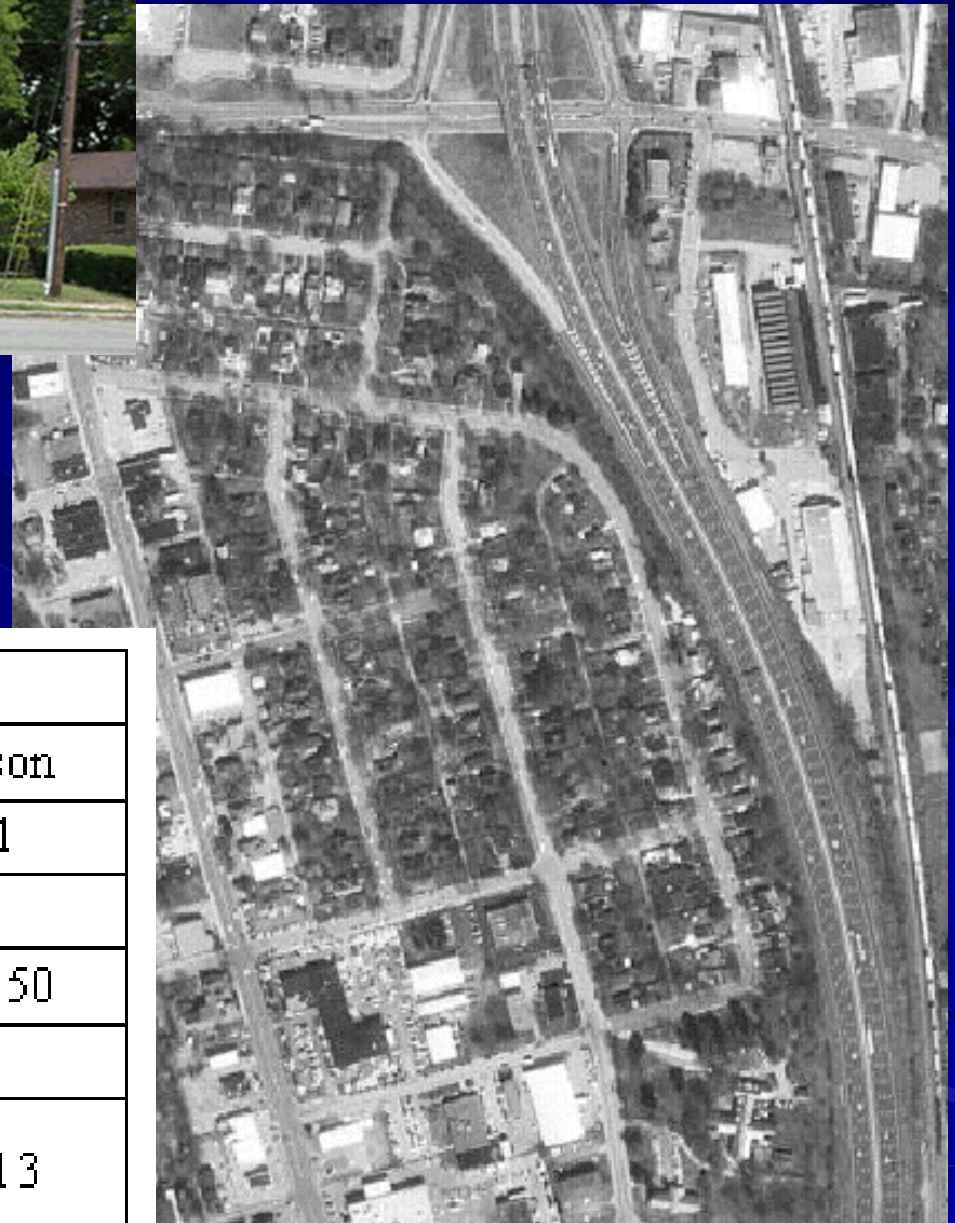
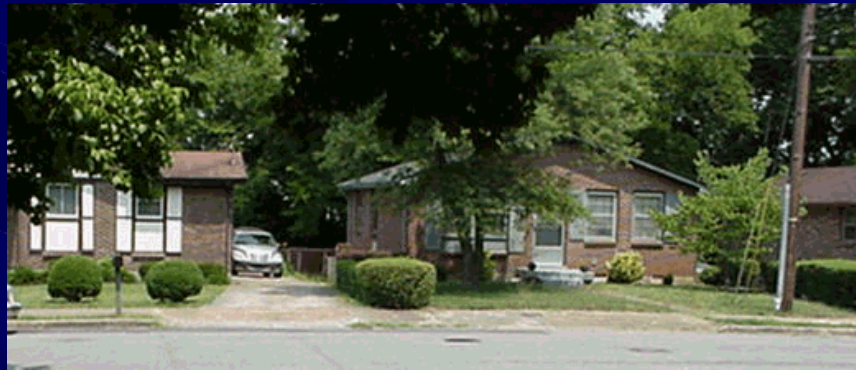




# Type II Pilot Program

- First Year Program funded at \$3 million for three pilot projects starting in 2005-2006
- Similar funding level anticipated for future years (total of \$25 million)





## I-65, “Woodland-in-Waverly”, Nashville

<i>Area</i>	<i>120</i>
County	Davidson
Barrier Length (ft)	2,631
Average Height (ft)	13
Cost	\$880,850
Benefitted Residences	83
Cost per Benefitted Residence	\$10,613
Reasonable?	Yes



# I-55 NB, Memphis



<i>Area</i>	<i>14</i>
County	Shelby
Barrier Length (ft)	4,600
Average Height (ft)	12
Cost	\$1,380,300
<u>Benefitted Residences</u>	185
Cost per <u>Benefitted Residence</u>	\$7,461
Reasonable?	Yes

# I-40, Sudekum Homes, Nashville

<i>Area</i>	<b>93</b>
County	Davidson
Barrier Length (ft)	2,613
Average Height (ft)	14
Cost	\$954,000
Benefitted Residences	90
Cost per Benefitted Residence	\$10,600
Reasonable?	Yes



# Challenge: Obtaining residents' opinions regarding a proposed barrier

- Differing demographics
- Differing levels of community proactiveness, priorities, and interests
- “Outsiders” attending meetings
- How challenge was addressed:  
Demographics of affected residences should be considered in developing a plan for obtaining residents' opinions

# How Challenge Was Resolved

- Regular community meetings worked well in one area where residents were highly involved in the project
- Mail-back surveys were used in two areas
  - Poor attendance at meeting in one area
  - Outsiders attending and voting in the other area
- A second mail-back survey was sent via certified mail in one area before deciding if the actual residents wanted the barrier

# First Pilot Area

## I-65 Type II Noise Barrier Woodland-in-Waverly Community

January 24, 2006



Doug Delaney, Director  
Environmental Division

Jim Ozment, Manager  
TDOT Hazmat, Air and Noise Sections

Darlene Reiter, Ph.D., P.E.  
Bowlby & Associates, Inc.



# Meetings in Neighbors' Houses at Several Stages in the Process

## Noise Barrier Location and Design

### • North End

- Wedgewood Avenue to Benton/Lindell Avenue
- STA 38+50 to STA 24+00 (1,450 feet)
- Barrier near right-of-way (ROW) and existing control access (c/a) fence
- Barrier heights 11 to 18 feet depending on location



## Noise Barrier Location and Design

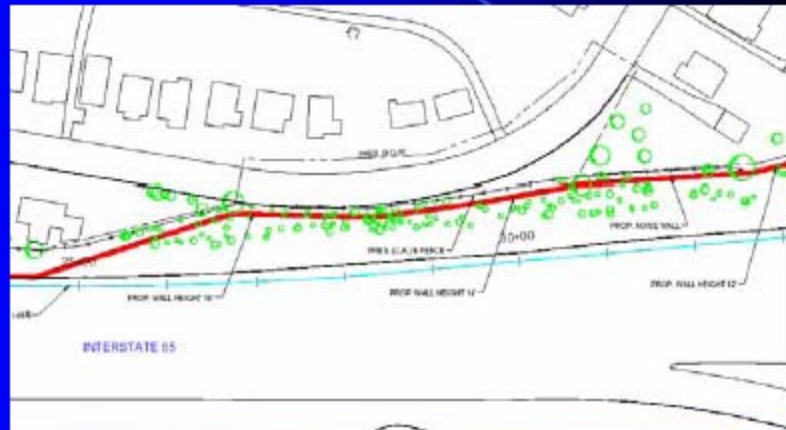
### • North End



# Proposed Barrier Explained to Residents with Figures...

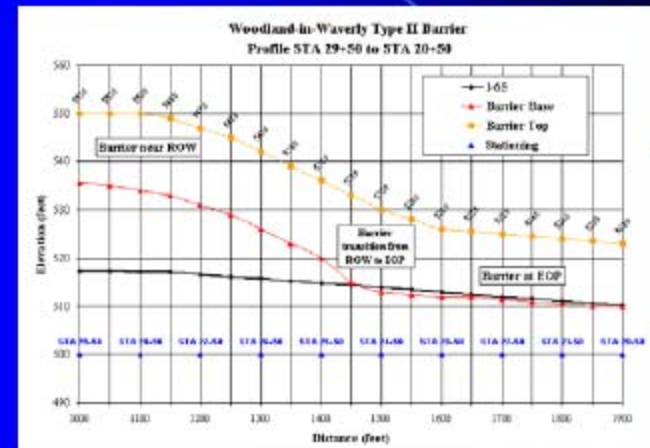
## Noise Barrier Location and Design

- North End (continued)



## Noise Barrier Location and Design

- North End Barrier Profile





# ... and Photos



## Noise Barrier Finishes



Ashlar  
Stone  
(I-40, I-65  
Nashville)

## Noise Barrier Finishes



Random Cut  
Stone

## Noise Barrier Finishes



V-Groove  
Pattern

## Noise Barrier Colors



Grey

Earth Tone

# Input Sought on Noise Barrier Finishes, Colors, and Other Concerns

## QUESTIONNAIRE

TDOT PUBLIC MEETING

I-65 Type II Noise Barrier, Woodland-in-Waverly Community

NASHVILLE

JANUARY 24<sup>TH</sup>, 2006

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

### AESTHETIC FINISH ON NOISE WALLS

#### PANEL FINISHES

- ✓ Walls may have the same or different finishes on the road ("public") side and on the neighborhood ("private") side.
- ✓ Neighborhood side finish will be based on questionnaire results and consultation with the State Historic Preservation Officer (SHPO) and Metro Historic officials.
- ✓ TDOT will determine road side finish.

#### COMMUNITY SIDE FINISHES (Mark 1<sup>st</sup> and 2<sup>nd</sup> preferences)

- \_\_\_\_\_ Ashlar Stone
- \_\_\_\_\_ Random Cut Stone
- \_\_\_\_\_ Block and Fractured Fin
- \_\_\_\_\_ Exposed Aggregate
- \_\_\_\_\_ V-Groove Pattern

#### COMMUNITY SIDE COLOR (Mark preference)\*

- \_\_\_\_\_ Grey
- \_\_\_\_\_ Earth Tone

\* For all finishes except exposed aggregate.

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



# Challenge: Avoiding tree removal

## Noise Barrier Screening

- Native vegetation where barrier is near ROW
- Will be incorporated into landscaping plans



## Tree/Vegetation Removal

- TDOT's policy is to avoid or minimize tree removal where possible
- An assessment was conducted to determine areas where tree removal can be avoided and/or minimized
- Tree removal can be avoided in some areas but not in others
- Area separated into four distinct zones with unique characteristics

# How Challenge Was Addressed: Extensive field review and investigation

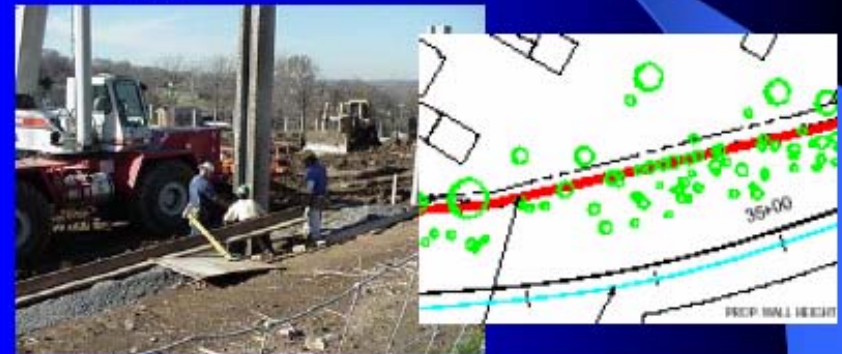
## Tree Zone #1

- North Section
  - STA 38+50 to STA 30+50
  - Barrier near ROW



## Tree Zone #1

- Two options for barrier construction
  - Clear slope and construct barrier from I-65
  - 30-foot haul road required within ROW to construct barrier



# How Challenge Was Resolved:

- Could not save all the trees
  - No easements could be obtained due to historic nature of area
- Others had to be left along with old control access fence



# Groundbreaking day arrives...



...with exhibits...





...press coverage...



# ...neighbors' remarks...



...and shovels



# The Finished Project





# Dedication Ceremony...A December 21<sup>st</sup> “Christmas Present”



# Very Happy Neighbors



# Countdown begins for the last panel...









It fits !!



# Nothing like a round of applause after a State DOT project



# Ongoing Type II Program

## ■ Pilots

- I-55, Memphis: rejected by neighbors
- I-40, Sudekum Homes: construction contract has been let

## ■ Anderson County

# Lessons Learned

- The process takes time, but it works
- Management/oversight: Very important to have an experienced project manager assigned to the Type II program
- Project development: Early and continual involvement of all affected staff is essential

# Lessons Learned (con.)

## ■ Programming

- Many factors affect what can be programmed and when
- Many of these factors are dynamic and require continual re-assessment of plans
- Staging of projects can help spread out the load

# Lessons Learned (con.)

## ■ Public Input

- Develop public involvement plan with consideration of demographics of affected residents
- Do not expect to be able to anticipate what the public wants

## ■ Public Response

- Clear and consistent responses to local officials, representatives and members of the public are important
- Engage the public the best you can, being honest with expectations
- Follow through on promises



# Lessons Learned (con.)

- Ongoing Communication
  - Use the Public Relations office often and effectively
  - Well-defined open communication system between residents and TDOT helped project proceed smoothly and eliminated issues during construction

# Summary and Conclusions

- TDOT was willing to address long-standing traffic noise problems along its highways
- Statewide needs assessment was critical for decision-makers
- Prototype Traffic Noise Management GIS was and is still very helpful
- Programming of projects is complex
- The first pilot project seems to be a success



Acknowledgments to Tennessee DOT and the Federal Highway Administration for funding, assistance, and support for all aspects of our work



# Questions?

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