

# OHIO DEPARTMENT OF TRANSPORTATION

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## Ohio Noise Research Update

**ADC40 2014 Summer Meeting**  
**Noel Alcala, OhioDOT**

**July 2014**

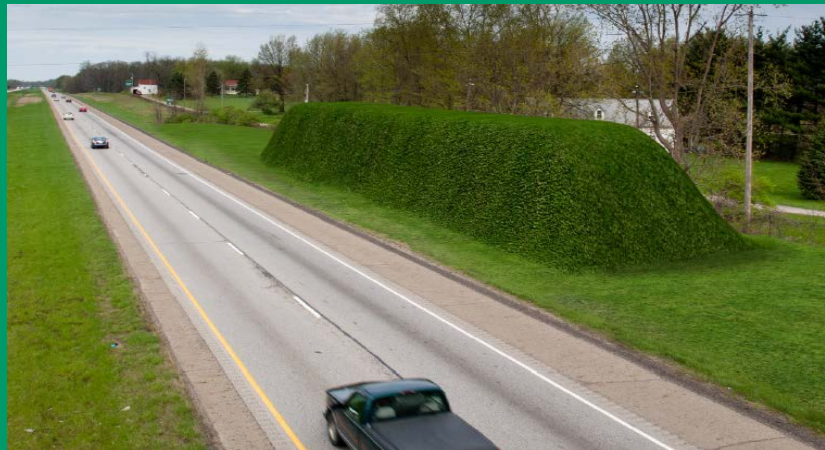
# Ohio Noise Research Update

- Recent, current, future research projects
- Internal items being piloted/researched by ODOT



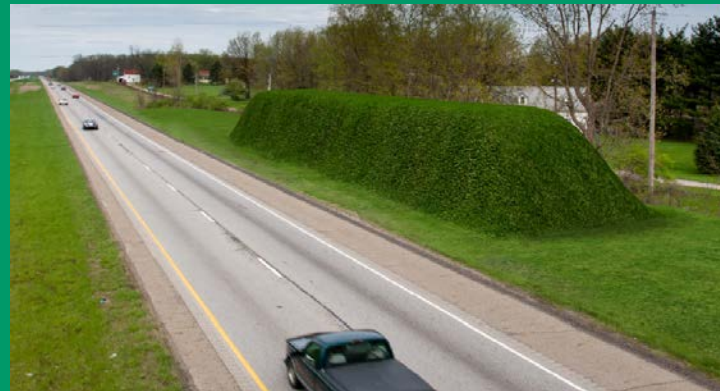
# Green Noise Wall Construction and Evaluation- Problem Statement

- Project began November 2010 and completed August 2011
- ODOT was charged with incorporating green alternatives in construction, design, and mitigation of impacts from roadway projects in accordance with ODOT's "Green" Initiative
- No options exist for a "green" noise wall at this time



# Green Noise Wall Construction and Evaluation-Objectives

- Phase 1- Conduct literature review and perform preliminary assessment of available Green Noise Wall (GNW) products and studies, past GNW experiences in other states.
- Phase 1- Recommend a product to be considered for further investigation; plant and soil studies, structural studies, TNM modeling, cost analysis of the recommended GNW
- Phase 2- actual construction, monitoring



# Green Noise Wall Construction and Evaluation- Findings

- ⦿ Deltalok “bag system” recommended as most viable-unique bag design that can sustain vegetation and protect the soil inside the bags from being eroded due to wind and/or rain.
- ⦿ Due to construction costs and irrigation requirements, Phase 2 did not move forward
- ⦿ Prototype Deltalok green noise wall constructed



# Comparison and Testing of Various Noise Wall Materials- Problem Statement

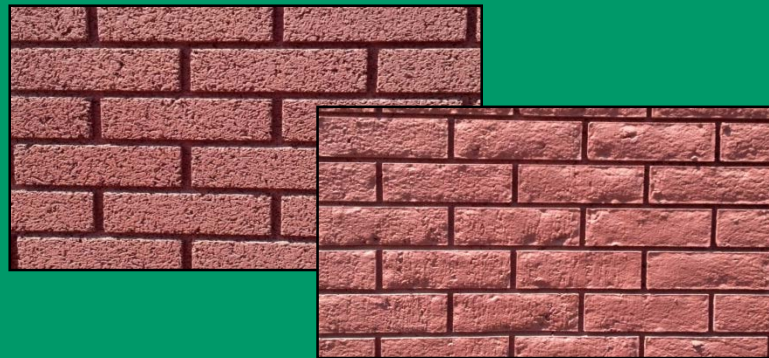
- Which wall type works best acoustically in the field? Comprehensive of the pros/cons of each material type of the following: hollow fiberglass walls, crum rubber-filled fiberglass walls, absorptive and reflective concrete walls, steel walls, and clear walls.
- Is there a discernable difference between sound absorptive concrete walls vs reflective concrete walls?
- An evaluation and analysis of a new, less expensive noise wall system (i.e.: acoustic fence fabric) is needed to potentially save money in noise wall construction and provide ODOT more viable noise wall choices.





# Comparison and Testing of Various Noise Wall Materials- Objectives

- ① Perform noise measurements on hollow fiberglass, rubber-filled fiberglass, abs/refl concrete , steel, and clear. Identify pros/cons, noise reduction, assoc costs, STC rating, etc.
- ② Perform noise measurements on sound absorptive concrete vs reflective concrete. Is there is a discernable difference at the receptor/wall and noise sensitive areas opposite the freeway?
- ③ Construct and field test the Acoustic Fence Fabric (AFF) system. How well does this system reduce noise? Determine actual noise reduction level. Provide recommendations on use.



# Comparison and Testing of Various Noise Wall Materials- Interim Findings

- Steel walls performing well
- Little difference between filled and non-filled fiberglass
- AFF system reduces noise less than conventional wall
- Clear walls did not have an added reduction than conventional walls
- Small sample size
- Began project July 2012
- Project nearing completion; report being finalized





# Acoustical Benefit Analysis of Earthen Berms- Problem Statement

- ⌚ There are currently two noise barrier material alternatives (concrete and fiberglass) that ODOT constructs.
- ⌚ ODOT would benefit from having another option for a noise barrier that can be constructed.
- ⌚ Limited field data and research about how much better earthen berms abate noise than do concrete noise walls and how much shorter earthen berms can be constructed in lieu of taller concrete noise walls resulting in equivalent noise reductions.



# Acoustical Benefit Analysis of Earthen Berms- Objectives

- ① Can a shorter earthen berm can be constructed in lieu of a concrete noise wall yielding the same noise reduction as a concrete wall?
- ① Is there another option for an ODOT noise barrier that can be constructed, other than concrete and fiberglass?
- ① Do earthen berms perform acoustically the same or better than conventional noise walls?
- ① What are the benefits of an earthen berm noise barrier?

# What are some of the benefits of an earthen berm noise barrier?

- ④ *Construction cost is potentially less expensive*
- ④ *An earthen berm absorbs air pollutants from vehicles.*
- ④ *Graffiti is a non-issue*
- ④ *There's no need to survey the public for color and texture*
- ④ *It's non-invasive to the earth. There's no drilling/augering. Construction is from the surface on up.*
- ④ *Material sourcing can be local or ultra local*
- ④ *Vegetation from the berm is a storage for carbon*
- ④ *A berm is more inclined to infiltrate stormwater rather than shed stormwater*
- ④ *Provides habitat for native plant and animal species*

# Acoustical Benefit Analysis of Earthen Berms

- 🕒 Kicked off July 2014- Acoustical Testing of Earthen Berms
- 🕒 Evaluation of 25-30 existing private berms statewide
- 🕒 Construct Earthen Berm Noise Barrier at 1:1 slopes or steeper (internal)





# Acoustical Benefit Analysis of Earthen Berms





# Use of Concrete Waterproofing Admixtures

- ① Crystalline Waterproofing admixtures  
(no exterior color/sealer on the posts)



# Color and Texture Approach

1. No color, same texture on both sides of panels.
2. No color, different texture on both sides of panels.
3. Same color, same texture on both sides of panels.
4. Same color, different textures on both sides of panels.
5. Different colors, different textures on both sides of panels.
6. Posts, panels, panel caps, post caps, icons



# Icon Sealing/Coating



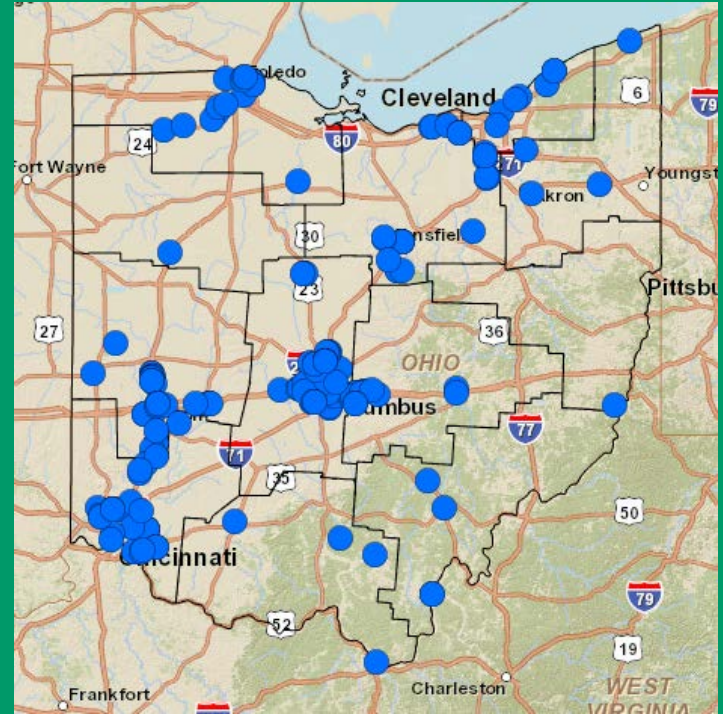
# Pre-Noise Wall Construction and Post-Noise Wall Construction Noise Readings

- 🕒 Isolated projects
- 🕒 Internal info
- 🕒 Compare to modeled reduction from noise wall



# Noise Measurement Database

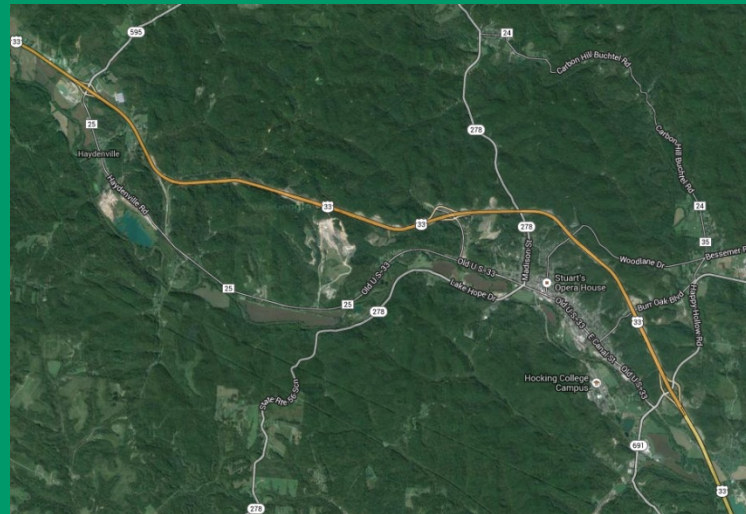
- Internal info
- Atmospheric conditions, pavement type, traffic, speed limit, distance from roadway
- Help us deal with future projects
- Help us address complaints and save time





# Pavement Noise Research Exercise

- Readings performed at the EOS and interior, next to new Longitudinally-tined concrete (LTC) and asphalt pavements
- LTC was louder than asphalt by 1.5 decibels at EOS, 0.7 decibels (interior)
- Interior Transverse-tined concrete (TTC) 2.2 decibels louder than LTC



# Possible Internal Future Research item

- 🕒 Research the noise level above an existing noise wall, the noise level at ground level in front of the wall (absorptive and reflective), the noise level with no wall at ground level



# Thank you! Questions?

## Contact Info

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