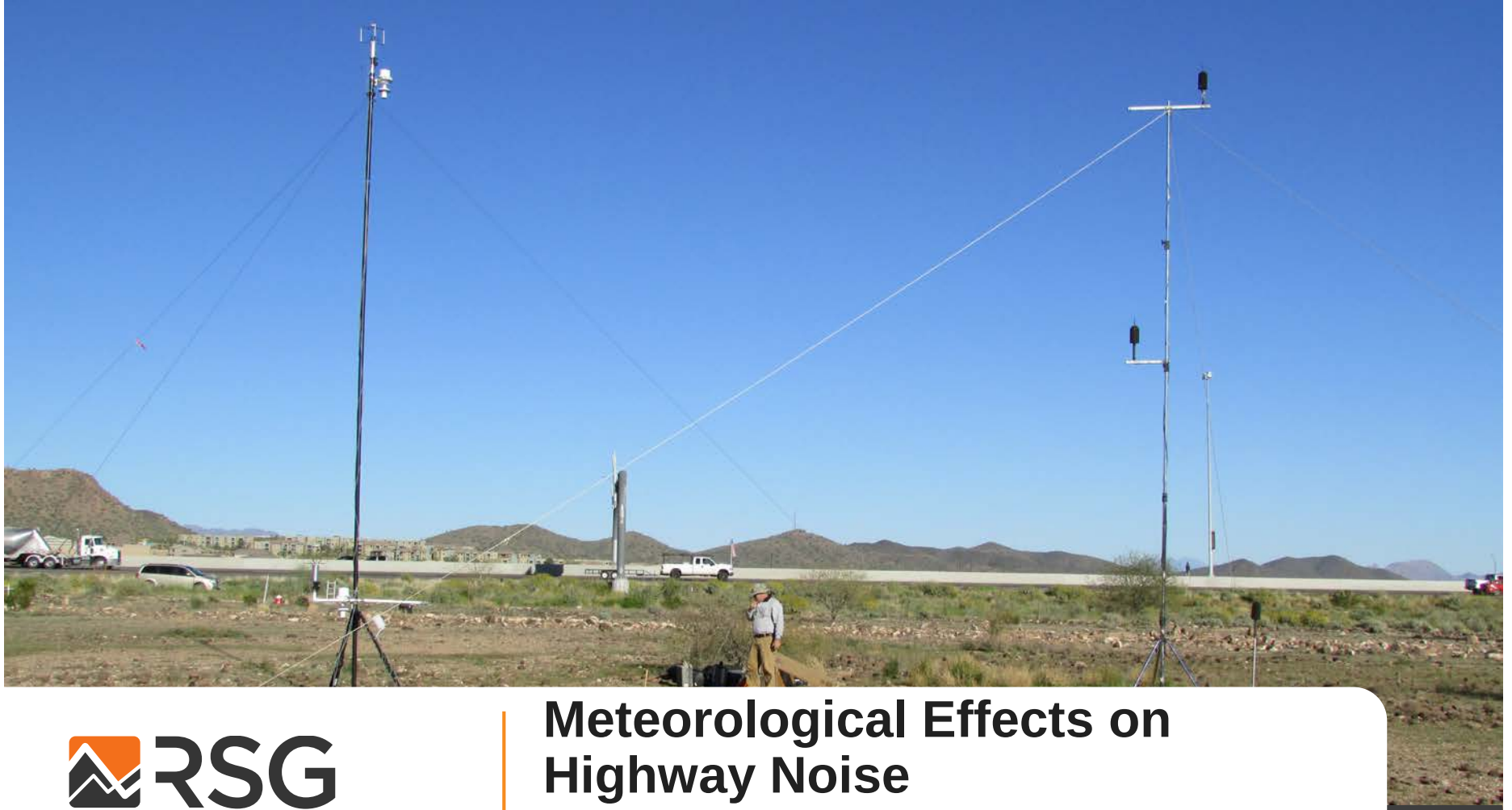

RSG
the science of insight

Meteorological Effects on Highway Noise

NCHRP Report 882

ADC 40 Summer Meeting

June 2018

wyle

VERA Renewables

Bowlby & Associates, Inc.

TNO

U.S. Department of Transportation Volpe

Task 8 – Conceptual models, tools, and guidance

Disclaimer

The opinions and conclusions expressed or implied in this presentation are those of the research team. They are not necessarily those of the Transportation Research Board, the National Academies, or the program sponsors.

NCHRP 25-52 Panel

- Thomas Hanf, Michigan DOT, Chair
- Mariano Berrios, Florida DOT
- Timothy Casey, HDR Engineering, Inc.
- Ahmed El-Aassar, PhD, P.E., Environmental Acoustics
- Cora Helm, Montana DOT
- Paul Kohler, Ch2M Hill, Inc.
- Carole Newvine, Oregon DOT
- Bruce Rymer, P.E., California DOT
- Ray Umscheid, Texas DOT

- Ann Hartell, TRB Program Manager
- Aileen Varela-Margolles, FHWA Liaison
- Gregory Smith, P.E., McCormick Taylor, Inc.
- Christine Gerencher, TRB Liaison

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- Ken Kaliski, P.E., INCE Bd. Cert.
- Eddie Duncan, INCE Bd. Cert.
- Ryan Haac
- Kevin Hathaway

Bowlby & Associates

- Darlene Reiter, PhD, P.E.
- Bill Bowlby, PhD, P.E.
- Rennie Williamson
- Geoffrey Pratt

Wyle

- Roger Wayson, PhD, P.E.
- John MacDonald

TNO

- Erik Salomons, PhD

Northeast Wind

- Jeff Snyder
- John Zimmerman

Volpe

- Aaron Hastings

Schedule

- Report 882
  - Q3 2018
- Public Outreach Tools
  - Brochure
    - available on TRB website
  - Interactive Tool
    - posted with report
- Webinar
  - Fall 2018

Public Outreach Materials - Brochure

WHY IS IT SO LOUD TODAY?

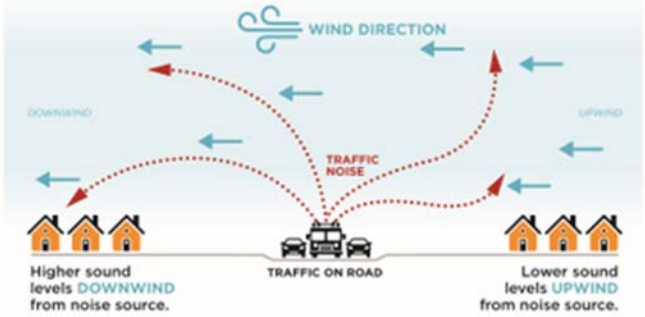
Understanding how weather affects traffic noise levels in your community.

[INSERT SHA LOGO]

Have you heard? You may have noticed that sound levels from highways or other sources are much louder or quieter during particular times of the day or year. Changes in weather conditions are often the cause of these higher or lower sound levels.

What happens when the wind changes?

Changing wind speeds above the ground cause sound waves to bend toward or away from the earth, a process called refraction. The change in the sound level depends on the differences in wind speeds above the ground and the wind direction. You might notice that sound levels are higher when the wind is blowing from the highway toward you (downwind) as illustrated below. Conversely, you might notice that sound levels are lower when the wind is blowing away from you and toward the highway (upwind).

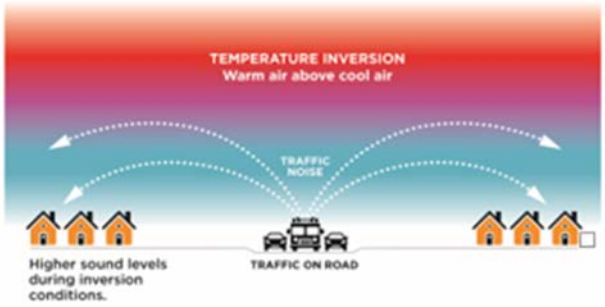


Public Outreach Materials - Brochure

What happens when the temperature changes?

The temperature of the air above the ground changes with height. When the air above the ground is cooler than the air near the ground, a temperature lapse occurs. Temperature lapses are common during the day. Lapses cause sound waves to bend away from the earth and reduce sound levels in nearby communities as illustrated below. You might notice that sound levels are lower during the day than at night even though there may be more traffic on the road.

Conversely, when the air above the ground is warmer than the air near the ground, a temperature inversion occurs. Temperature inversions are common at night when the weather is clear and winds are calm. Inversions cause sound waves to bend back toward the earth and increase sound levels as illustrated below. You might notice that sound levels are higher at night or in the early morning than during the day.



What are the effects my on community?

The effects on a particular community depend on the distance to highways and the frequency and duration of particular weather conditions. Weather patterns that change sound levels may be more common in certain areas.. Higher sound levels will be more common in areas where the wind typically blows from a highway toward a community (downwind) than in locations where the wind typically blows from a highway toward a community (downwind) from the community toward the highway (upwind). Higher sound levels will also be more common in areas where temperature inversions are common.

[Note: A SHA could customize this section to describe the types of weather conditions that are typical for the state.]

What if my neighborhood has a noise barrier?

Changes in weather conditions also affect how well a noise barrier performs. Temperature inversions and downwind conditions can increase sound levels in neighborhoods protected by a noise barrier. Temperature lapses and upwind conditions can further reduce sound levels in neighborhoods protected by a noise barrier. The changes in sound levels will depend on the specific wind and temperature conditions.

CONTACT US

Phone: [Telephone]

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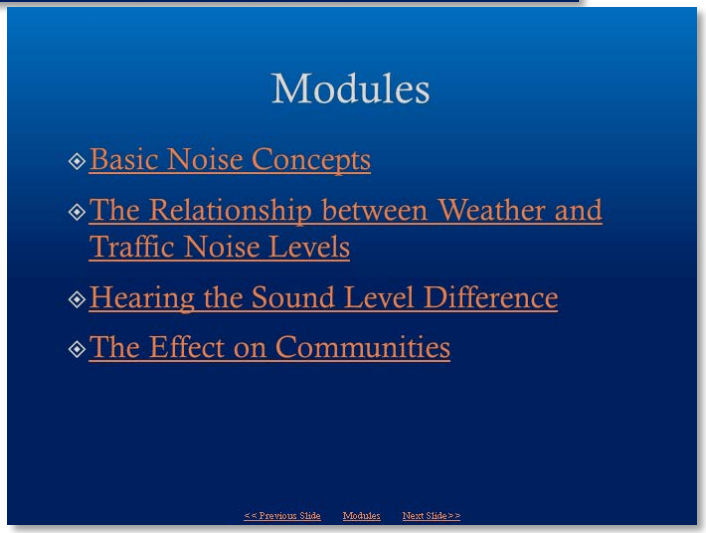
Web: [Web address]

[INSERT SHA LOGO]

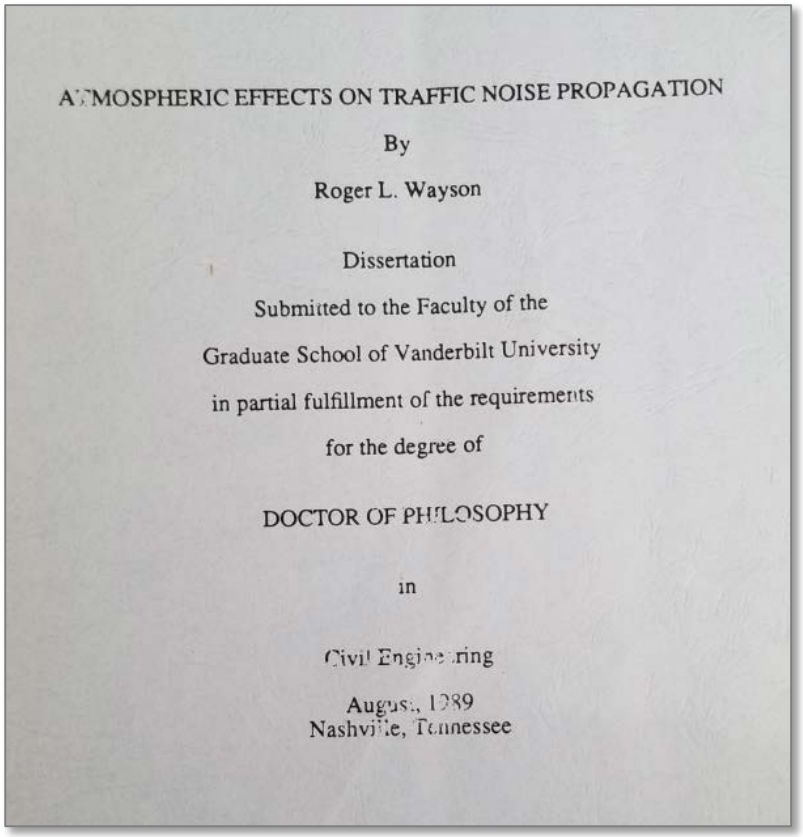
Public Outreach Materials – Interactive Tool

- Four modules
- Incorporates graphics from brochure
- Approximate time
  - 20 to 25 minutes
- Customizable



Public Outreach Materials – Interactive Tool

- Narrated by Roger Wayson



ATMOSPHERIC EFFECTS ON TRAFFIC NOISE PROPAGATION

By

Roger L. Wayson

Dissertation

Submitted to the Faculty of the

Graduate School of Vanderbilt University

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

in

Civil Engineering

August, 1989

Nashville, Tennessee