

Recreational Area Road Noise Research

- ❑ Two main topics

Motorcycle Noise



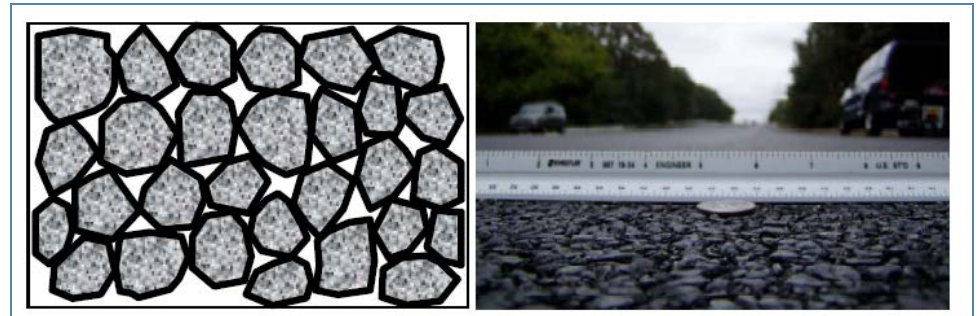
Quieter Pavements

(not intended to reduce motorcycle noise)

Guidance document

TNM implementation and demo

Rumble strip noise synthesis



Motorcycle Noise – motivation for study

- ❑ Can adversely impact people in the vicinity of highways, including visitors to recreational areas
- ❑ Lack of information available, particularly in terms of categories
- ❑ Need to understand how motorcycle noise is contributing to sound environment

“... few other factors contribute more to misunderstanding and prejudice against the motorcycling community than excessively noisy motorcycles ...”

– American Motorcyclist Association

Motorcycle Noise – categorized motorcycles

- 5 categories based on visible and audible similarities

Cruiser



Dual Purpose



Moped/Scooter



Sport



Touring

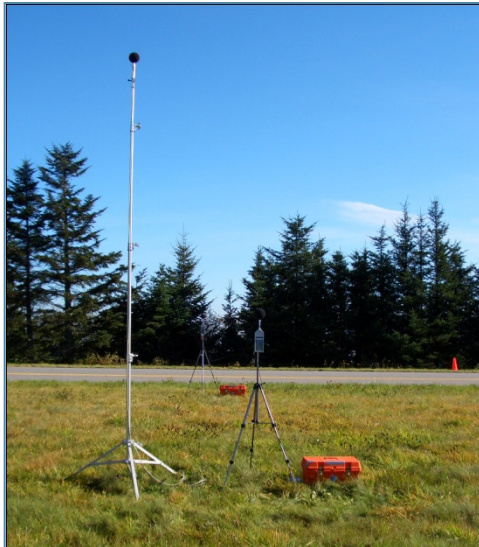
Motorcycle Noise – measurements

- ❑ Blue Ridge Parkway National Park chosen for data collection
 - Many motorcyclists use the road (385 passed by in 5-hour period)
 - Adjacent recreational locations (overlook, hiking trails, picnic areas, visitor centers, campgrounds)

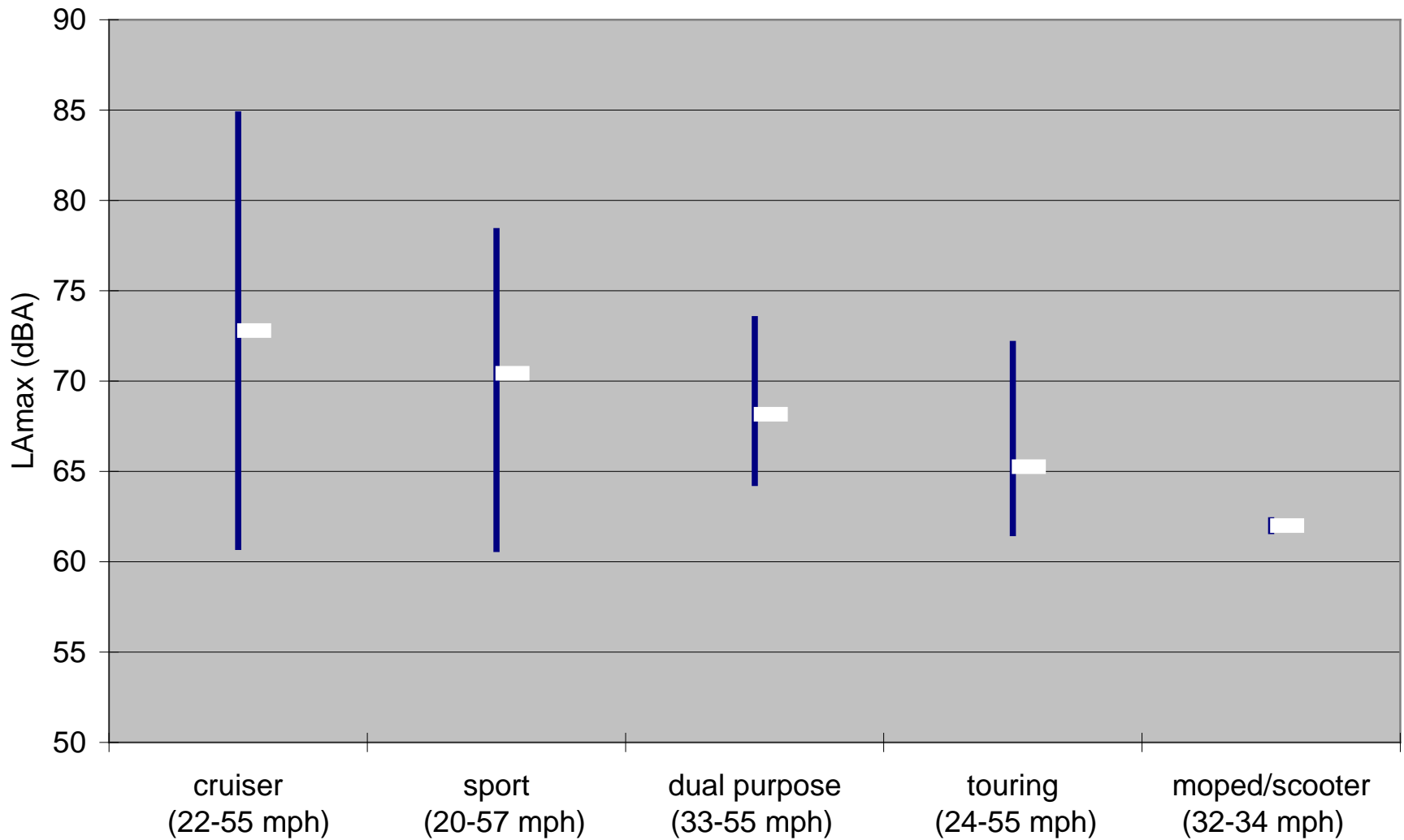


Motorcycle Noise – instrumentation

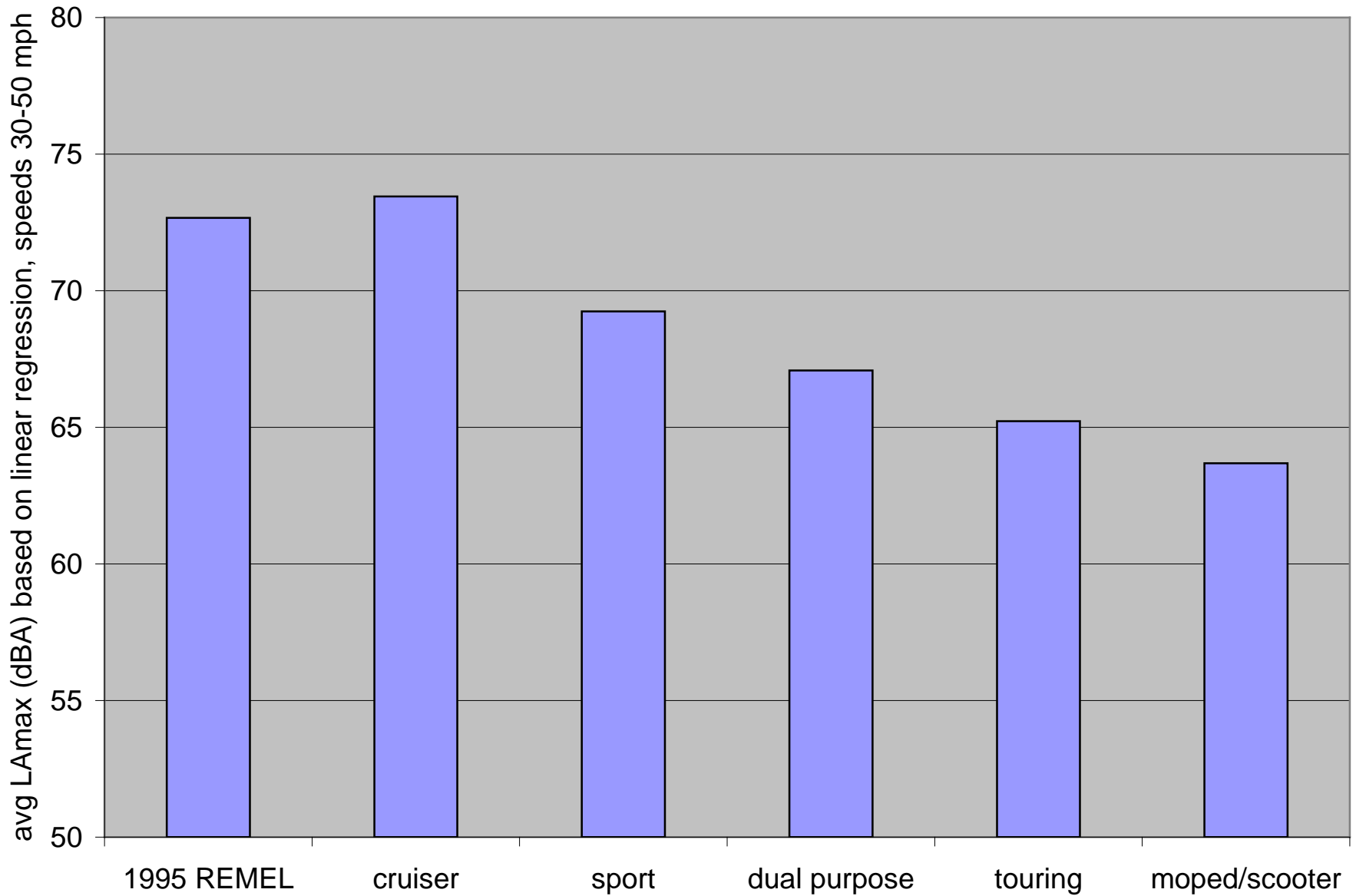
- ❑ Primary microphone position:
 - Distance from road = 50 ft, height = 5 ft
- ❑ Other instrumentation:
 - Vehicle pass-by log, meteorological sensors, radar gun, video cameras

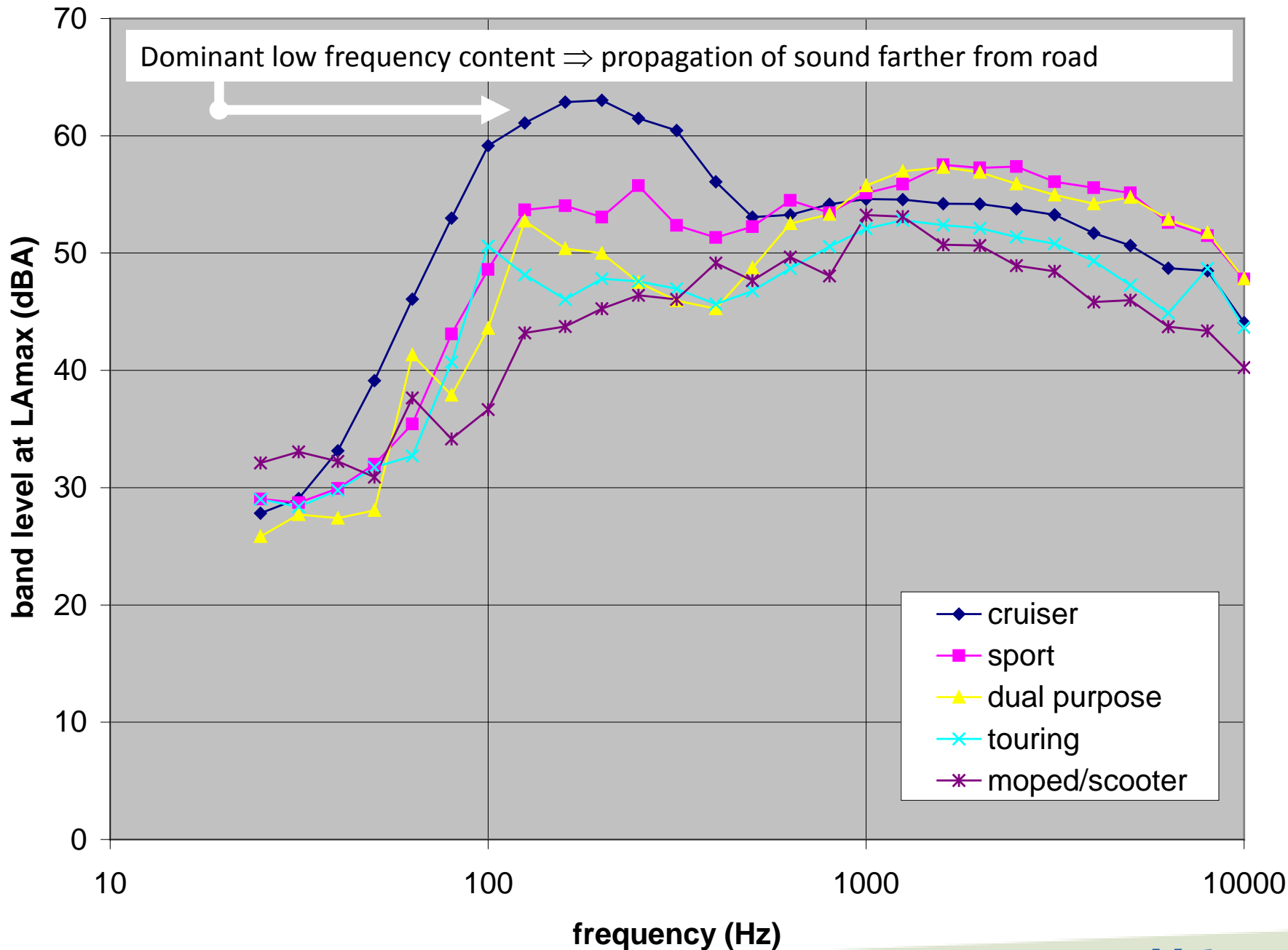


Average and range of sound levels for each motorcycle category
(speed ranges indicated)

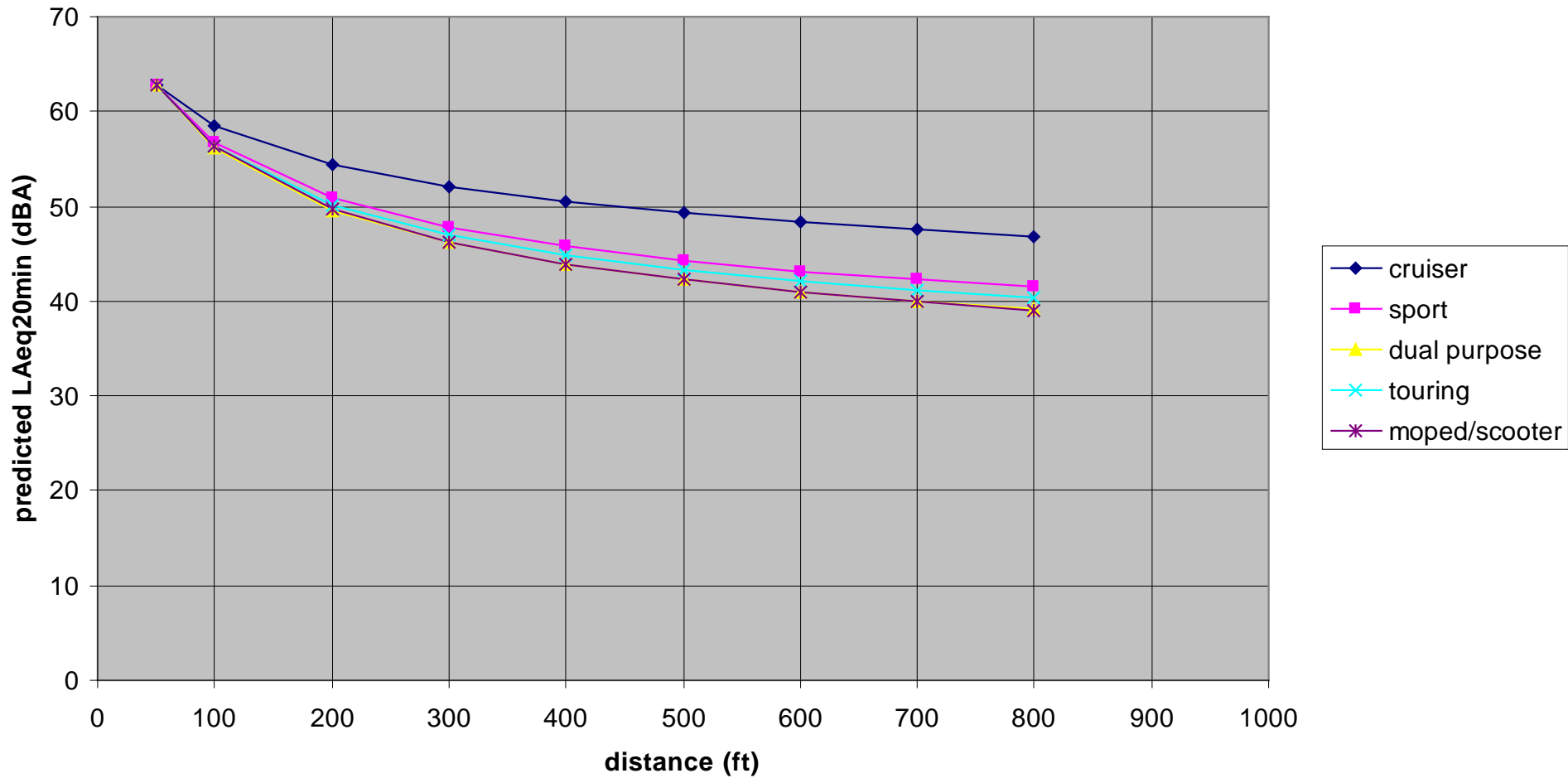


Broadband comparison of categories





Using TNM, predicted sound levels as a function of distance (normalized results so levels match at 50 ft)



Motorcycle Noise – conclusions

- ❑ Differences were found among 5 motorcycle categories

- ❑ Cruiser category on average the loudest
 - Exhibits dominant low-frequency content
 - Propagates the farthest

- ❑ Groups of motorcycles can be heard for a substantial amount of time, possibly interfering with recreation and communication

Quieter Pavement Guidance Document

- ❑ Provides guidance and better practice recommendations for selecting pavement surfaces to minimize tire-pavement noise
- ❑ Includes:
 - Basic principles that lead to quieter pavement

Quieter pavement technologies invoke one or more of these principles

Surface texture: small, flat, negative

Pavement porosity: high

Pavement stiffness: low

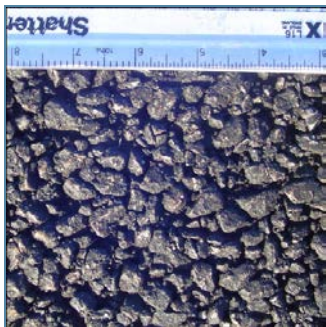


Quieter Pavement Guidance Document

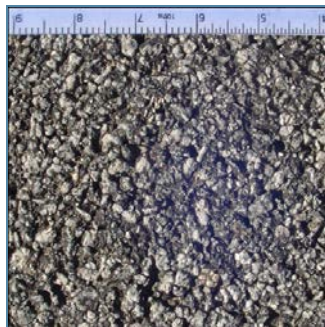
- ❑ Provides guidance and better practice recommendations for selecting pavement surfaces to minimize tire-pavement noise
- ❑ Includes:
 - Basic principles that lead to quieter pavement
 - Common quieter technologies for flexible and rigid pavements

Flexible pavement (asphalt)

PFC



OGAC



Rigid pavement (concrete)

drag



diamond ground



narrower joint design



Quieter Pavement Guidance Document

- ❑ Provides guidance and better practice recommendations for selecting pavement surfaces to minimize tire-pavement noise

- ❑ Includes:
 - Basic principles that lead to quieter pavement
 - Common quieter technologies for flexible and rigid pavements
 - Regional considerations
 - Descriptions of recent research
 - State DOT noise and pavement contacts

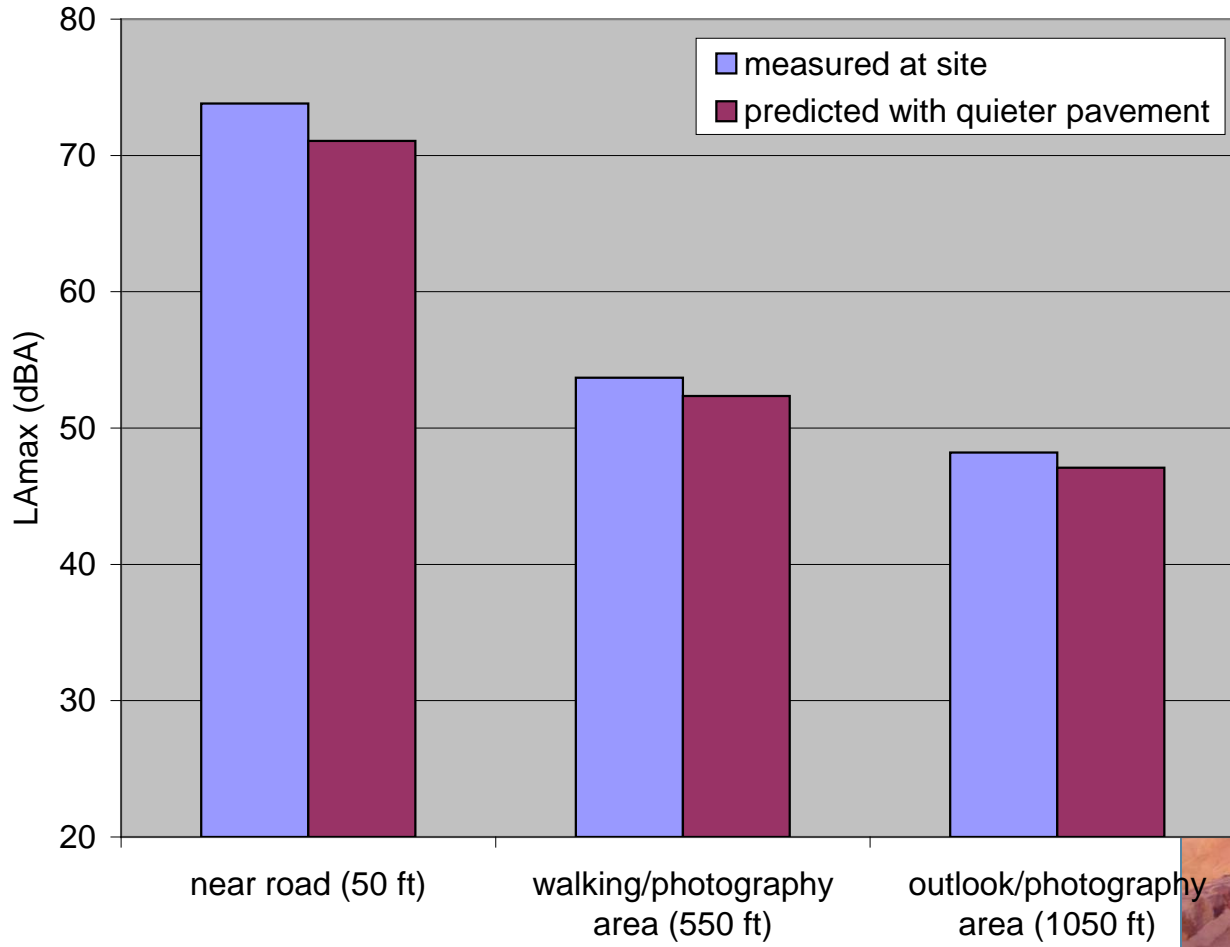
Quieter Pavement – TNM implementation and demonstration

- ❑ Demonstration in Death Valley National Park

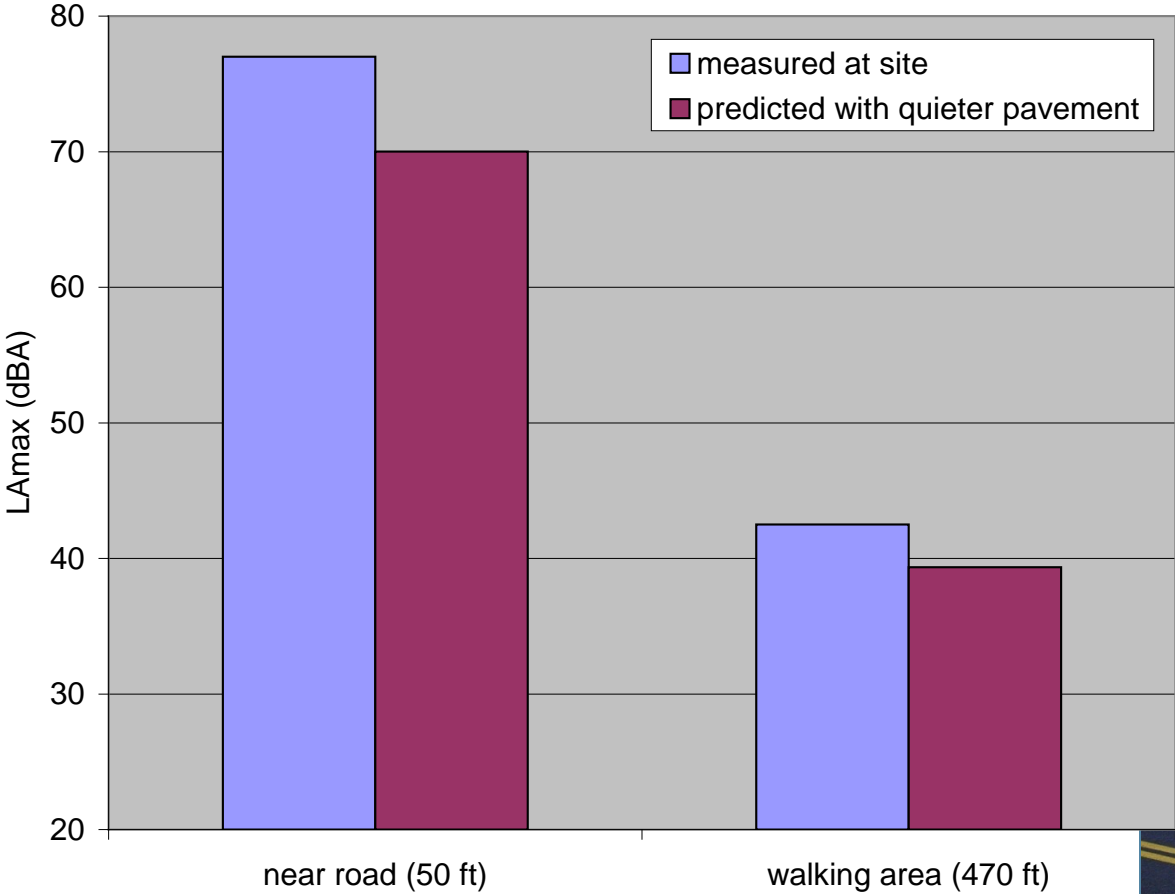
- ❑ Examined:
 - Existing tire-pavement noise levels at various locations
 - Existing vehicle pass-by noise levels at sensitive receiver locations
 - Predictions of noise levels with quieter pavement applied
 - Applied specific pavement effects using OBSI data



Zabriskie Point



Badwater



Rumble Strip Noise Synthesis

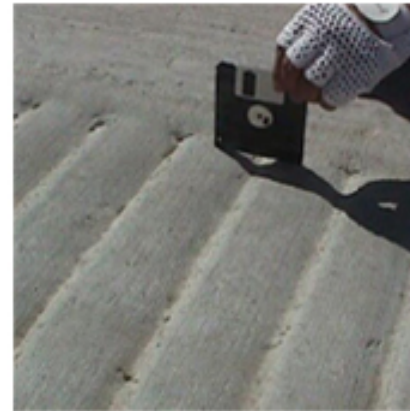
- ❑ Roadway departure warning indicators (rumble strips) can successfully decrease vehicle collisions or run-off-the-road crashes
- ❑ Basic types of rumble strips:



milled



rolled

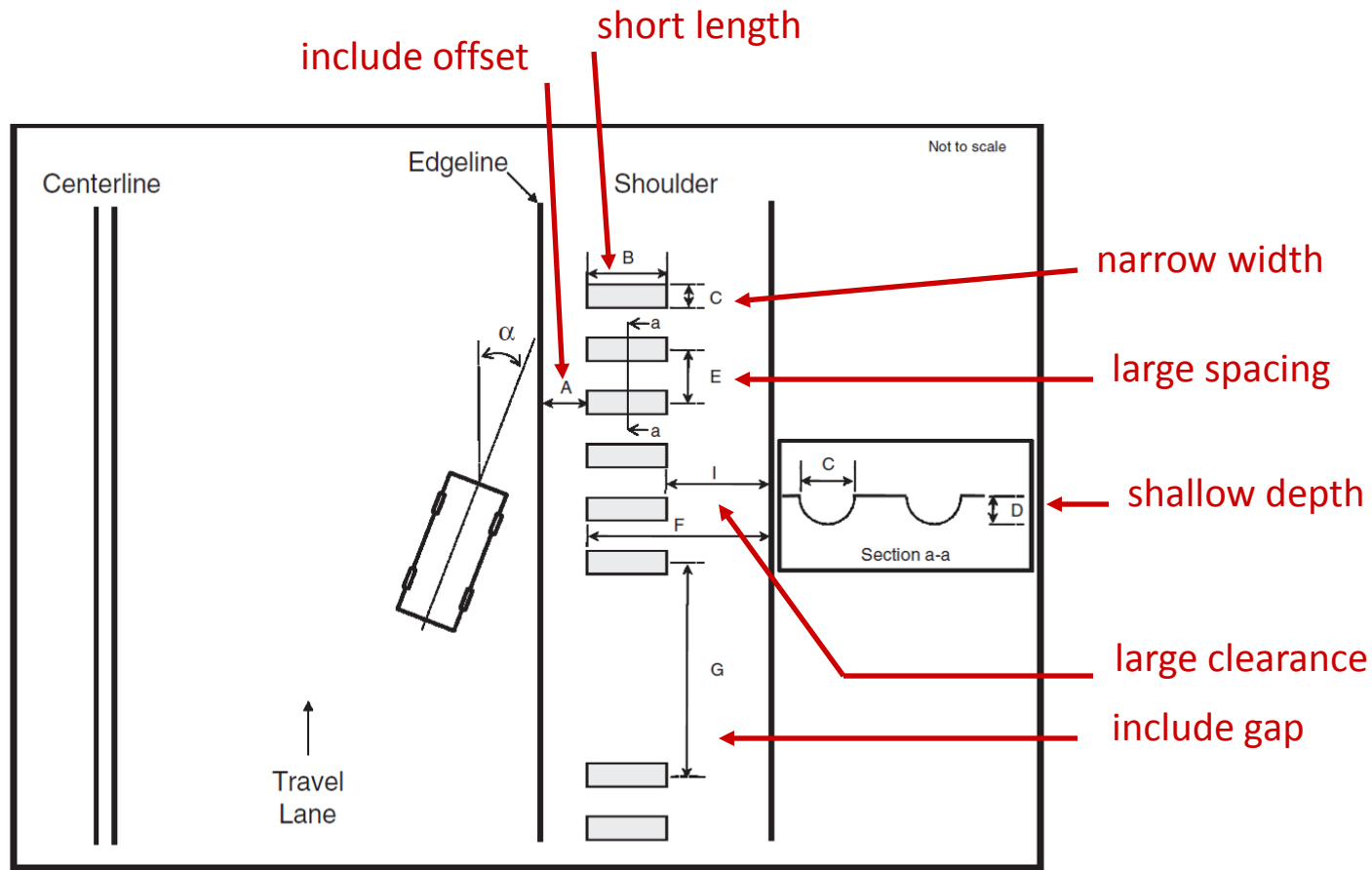


formed



raised

Rumble Strip Noise Synthesis – design elements to minimize noise and maximize safety



Quietest types ... traditional: rectangular milled, experimental: sinusoidal

Questions?

