

SEAUPG 2004 Conference - Baton Rouge Presented By Larry Scofield - Arizona DOT

Quiet Pavements: Arizona's Experience

November 17, 2004

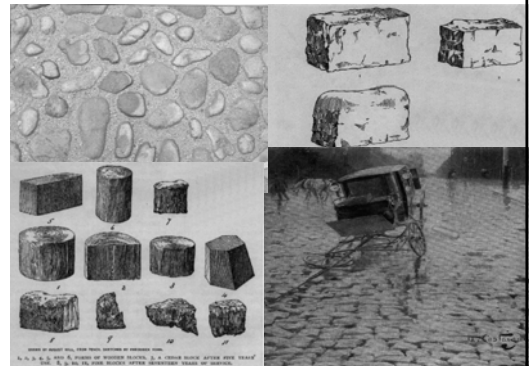
Begin With the End in Mind



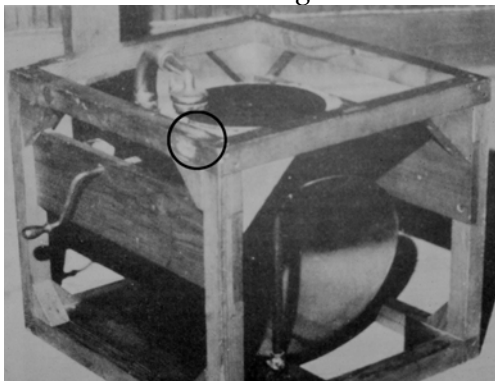
Six Messages

- ❖ Noise Problems Are Not New
- ❖ Understanding Noise
- ❖ Arizona is Unique
- ❖ Pavements Are Effective Noise Mitigation
- ❖ The Issue is What Happens to Pavements Over Time
- ❖ Let Your Ears Be Your Tools

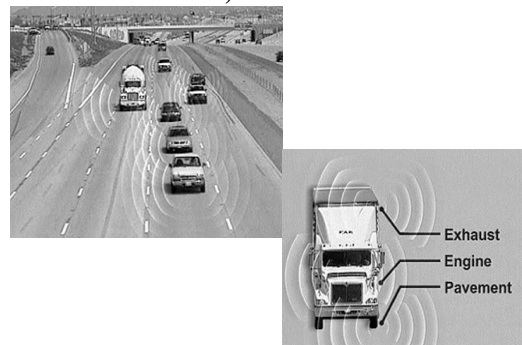
Noise Issues Are Not New



Understanding Noise?

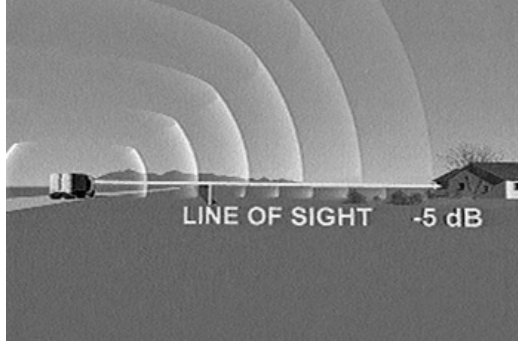


Noise Control: At the Source; Distance; Barriers



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Controlled Through Obstructions 1 dBA for each 2 ft of Wall Above



Ways of Measuring Sound



Wayside (Far Field)

Close Proximity (Near Field)

Sound Intensity (Near Field)



Arizona is Unique?



Arizona Facts

- ❖ Arizona has doubled its population every 20 years since 1900
- ❖ Phoenix is arguably the 5th largest US city
- ❖ Between 1985 –2007 nearly 150 miles of new freeways will have been built in the valley
- ❖ Drivers travel 67 million miles each day in the Phoenix Metropolitan area

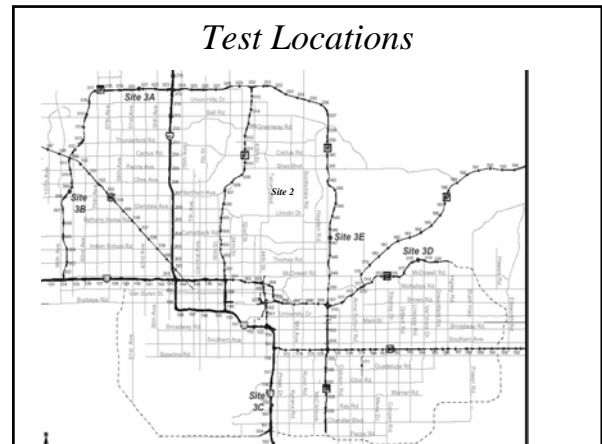
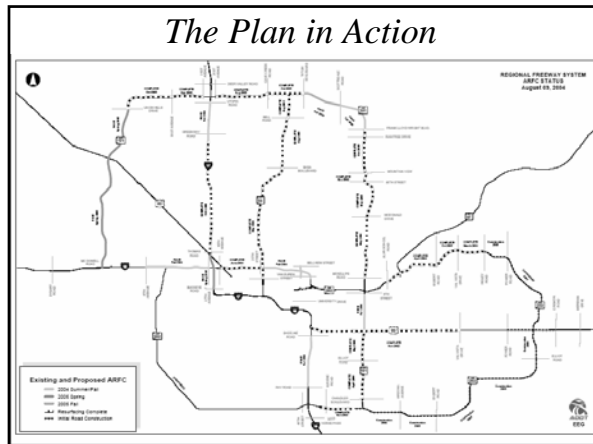
Arizona Uniqueness

- ❖ Commuter Travel Dominates
- ❖ Short Slab Lengths (13-15-17-15)
- ❖ Healthy Slab Thickness
- ❖ Narrow Joint Design
- ❖ Recent Freeway Construction
- ❖ Climate
- ❖ Growth

ADOT Uses ARFC to Provide Quiet Pavements

- ❖ ADOT is Spending \$34M to Overlay PCCP in the Phoenix Metropolitan Area
- ❖ The ARFC (R-OGFC) is Minus 9.5mm & 9-9.5% Binder
- ❖ 12.5 mm Thick When Used on Flexible Pavement
- ❖ 25 mm Thick When Used on PCCP
- ❖ Durability, Smoothness, and Now NOISE?

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Site 1 Testing (@MP Locations)

- ❖ Smoothness & Friction in Travel Lane
 - Inertial Profilometer (ASTM E950)
 - Runway Friction Tester (ASTM E1859)
- ❖ Near Field Measurement
 - CPX (ISO 11819-2)
 - Noise Intensity (Modified Caltrans)

Site 2 Testing

- ❖ The Residential Property Owners

Site 3 Testing

- ❖ Acoustical
 - Near Field
 - Far Field
- ❖ Traffic
- ❖ Environmental
- ❖ Surface Characteristics
- ❖ Material Characterization

Surface Characteristics

- ❖ Profile (Inertial Profilometer)
- ❖ Friction (Dynamic Friction Tester)
- ❖ Texture (CT Meter)
- ❖ Joint Location & Width Characterization (?)

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Material Characterization

- ❖ Complex Modulus & Loss Function
- ❖ Impedance Tube
- ❖ Volumetrics
- ❖ Permeability
- ❖ Binder Content & Properties
- ❖ 3D Tomography

How Does it Compare Acoustically to Other Surfaces

Surface Type	CPX (dBA)
Random Transverse	104.9
ADOT Uniform Trans	102.5
ADOT Long Tined	99.1
Whisper Grinding	95.5
ARFC	91.8

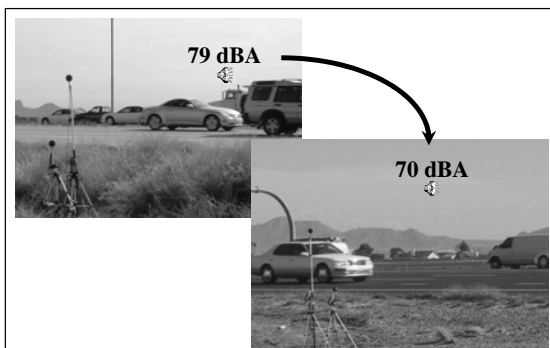
So What Were the Results?



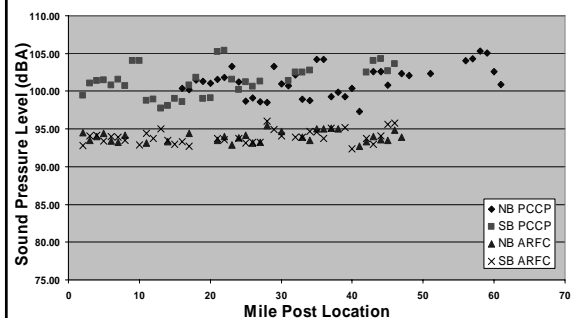
From the Road Surface



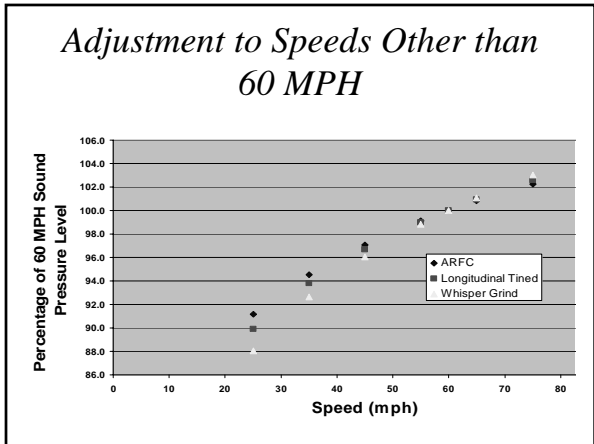
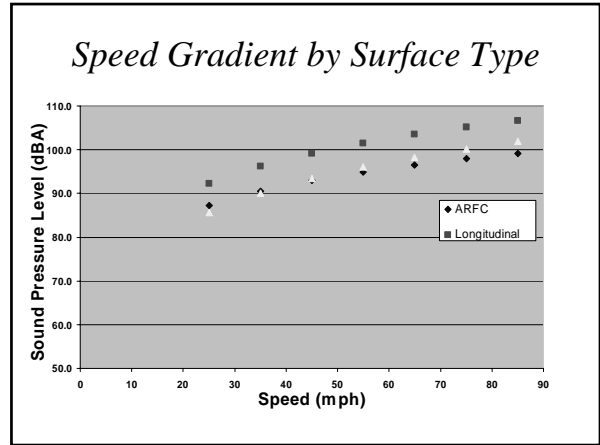
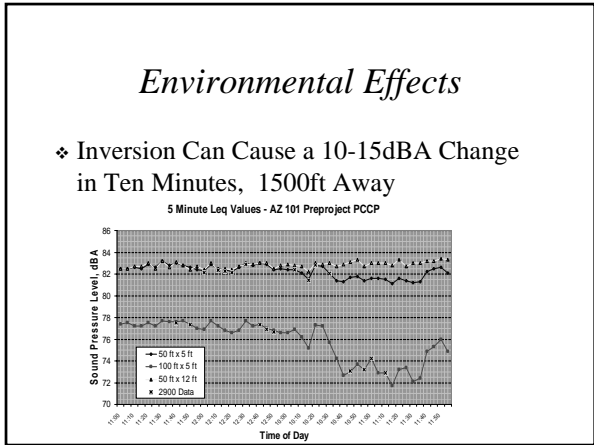
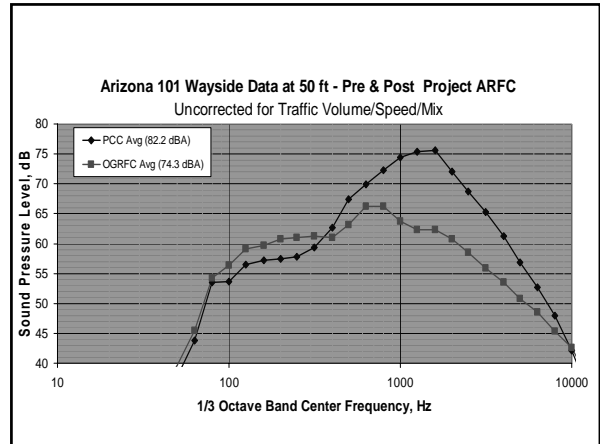
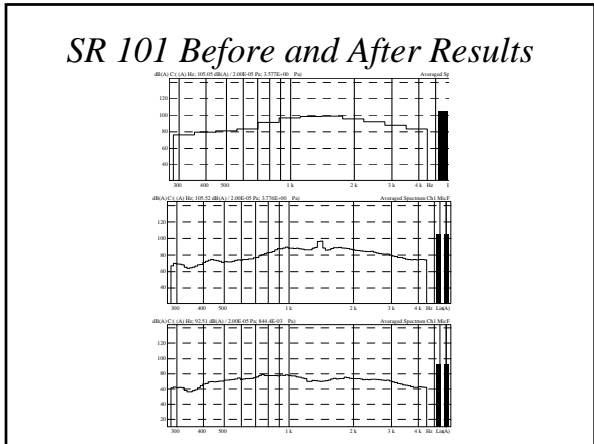
From the Road Side



SR 101 Before & After Noise Levels



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