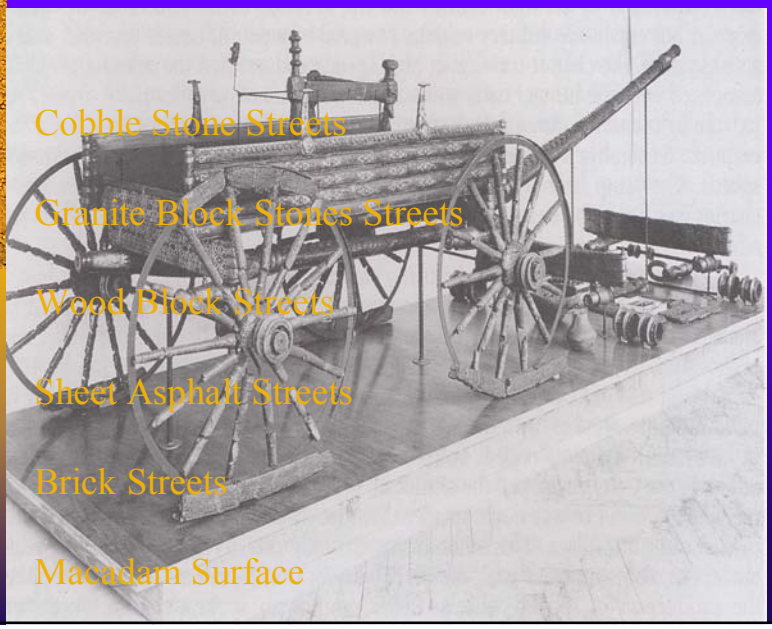
Designing for Quiet Pavements

Christ Dimitroplos
Arizona Dept. of Transportation
2739 E. Washington
Phoenix, AZ 85034
Tel: 602/712-7850
e-mail: cdimitroplos@azdot.gov

Pavements In the Past



Cobble Stone Streets

Granite Block Stones Streets

Wood Block Streets

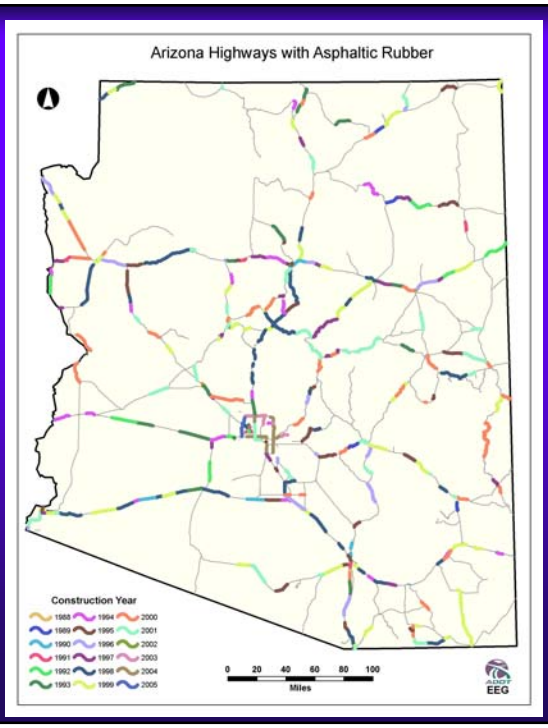
Sheet Asphalt Streets

Brick Streets

Macadam Surface

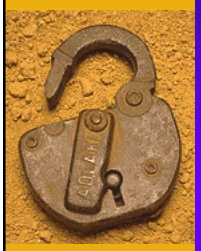
Background

- ADOT has used ARFC in research since 1976
- ADOT has used ARFC on concrete pavement since 1988
- ADOT formally began research on the noise reduction benefits of ARFC in 1995



Benefits of ARFC

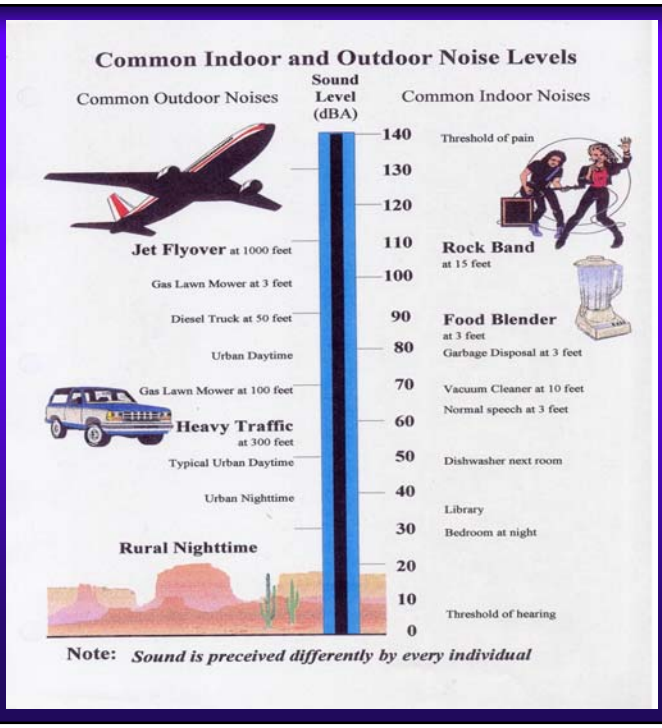
- Resists rutting under traffic
- Provides a smooth, skid resistant riding surface
- Popular with the public as it reduces noise



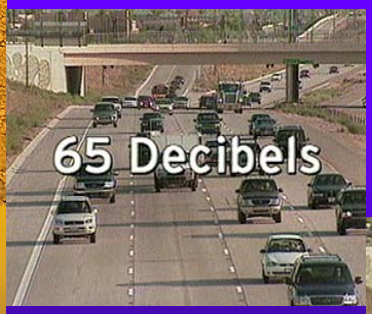
Presentation Message---

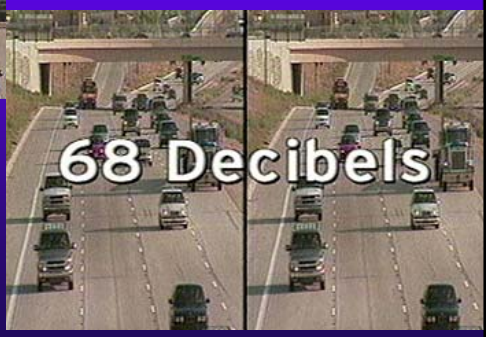
Vehicle Tires Traveling Over the Roadway Surface Produces the Noise You Hear in Your Car and in Your Homes

What is Noise, How is it Controlled, and How Does it Affect Our Lives



Doubling Traffic adds 3dBA

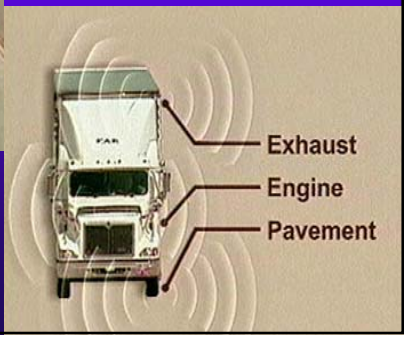




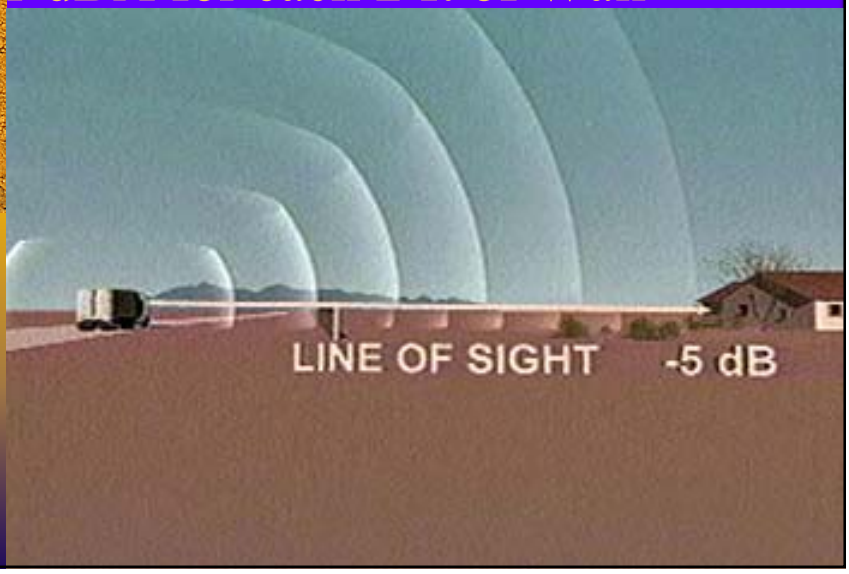
How Is It Controlled

- At the Source
  - Vehicle & Tire/Pavement Interface
- Through Distance
  - 3 dBA Reduction for Each Doubling of Distance
  - 25ft=70dBA, 50ft=67dBA, 100 ft=64
- Through Barriers
  - Berms, Walls, And Combination of both

Controlled At the Source



Controlled Through Barriers
1 dBA for each 2 ft of Wall

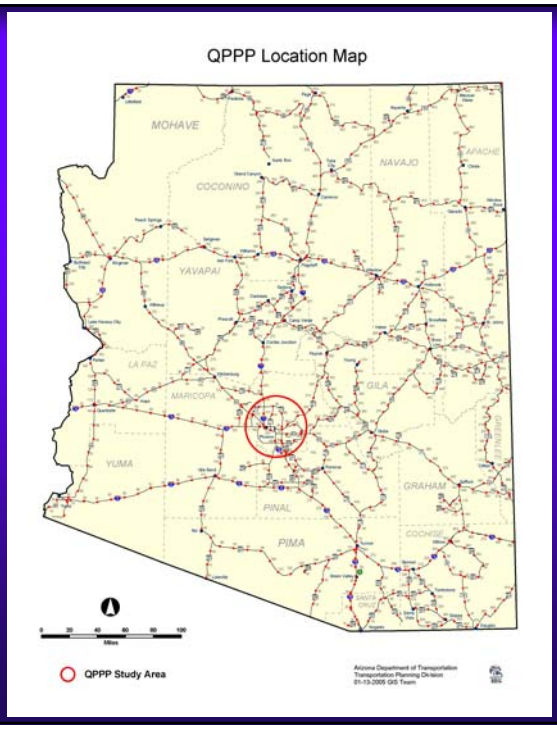


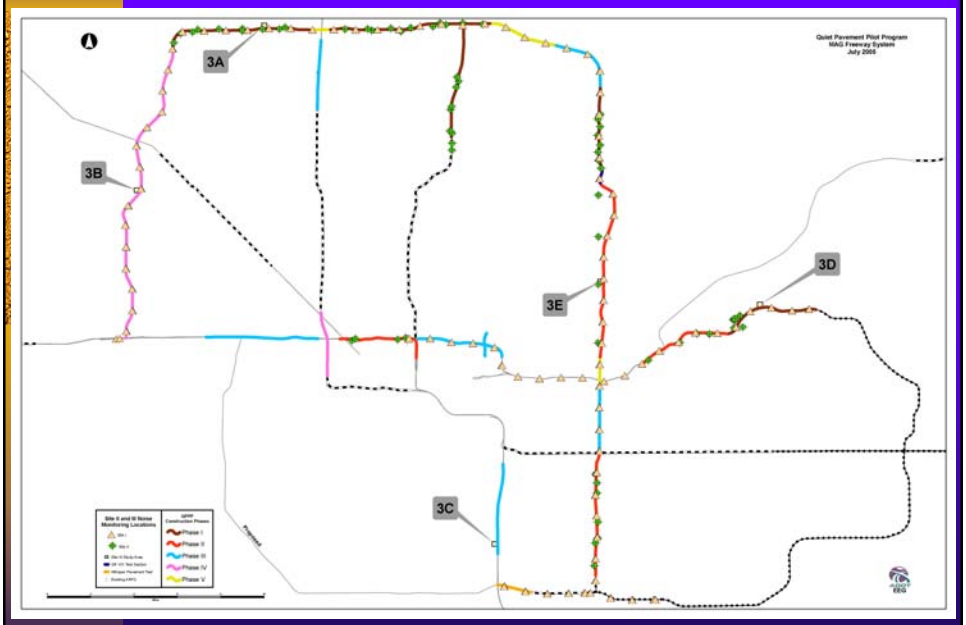
How does it affect our lives

- Disrupts recreational activity
- Diminishes the quality of life in a community
- May require expensive mitigation measures such as sound walls.

Types of Noise Measurements

- Site 1 measures noise at the tire/pavement interface
- Site 2 measures noise in residential neighborhoods
- Site 3 measures noise between near field and far field


QPPP Location Map
MOHAVE
NAVAJO
APACHE
COCONINO
YAVAPAI
LA PAZ
MARICOPA
GILA
GREENLEE
YUMA
GRAHAM
PINAL
PIMA
COCHISE
SANTA CRUZ
0 20 40 60 80 100
Miles
QPPP Study Area
Arizona Department of Transportation
Transportation Planning Division
01-13-2005 GIS Team


Quiet Pavement Pilot Program
MAG Freeway System
July 2005
3A
3B
3C
3D
3E
Site II and III Noise Monitoring Locations
Site I
Site II
Site III Study Area
OR 101 Test Section
Mission Parkway Test
Existing AR72
QPPP Construction Phases
Phase I
Phase II
Phase III
Phase IV
Phase V
Freeway

Ways of Measuring Sound

Close Proximity (Near Field)

Noise Intensity (Near Field)

Wayside (Far Field)

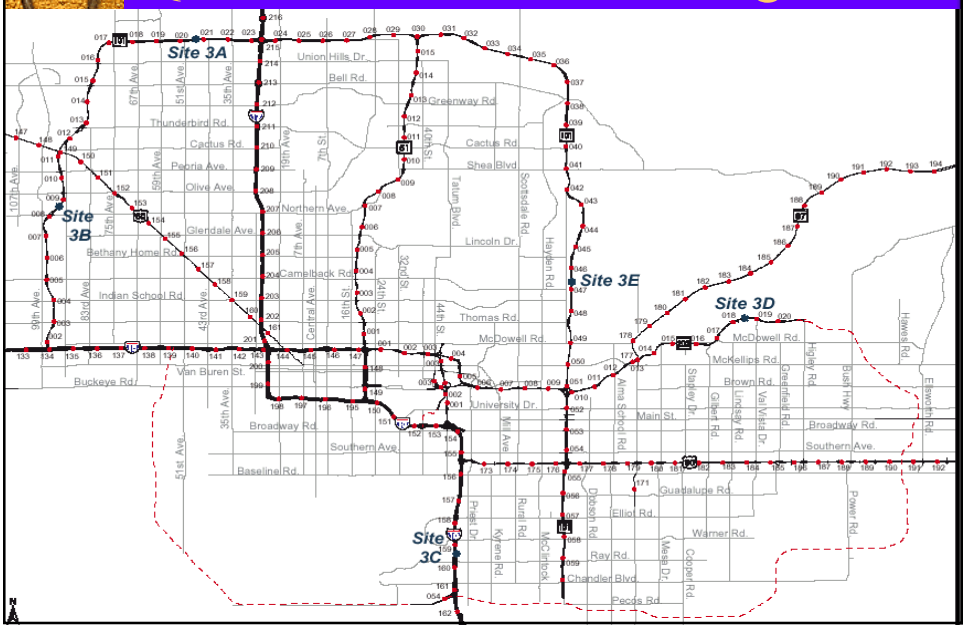
ADOT ISO CPX Trailer

Noise Intensity

In The Present

- Historically pavement surface type has not been recognized as a Noise Mitigation Strategy by the FHWA
- ADOT has committed to both short term and long term monitoring of ARFC surface treatment as a noise mitigation strategy

Quiet Pavement Pilot Program

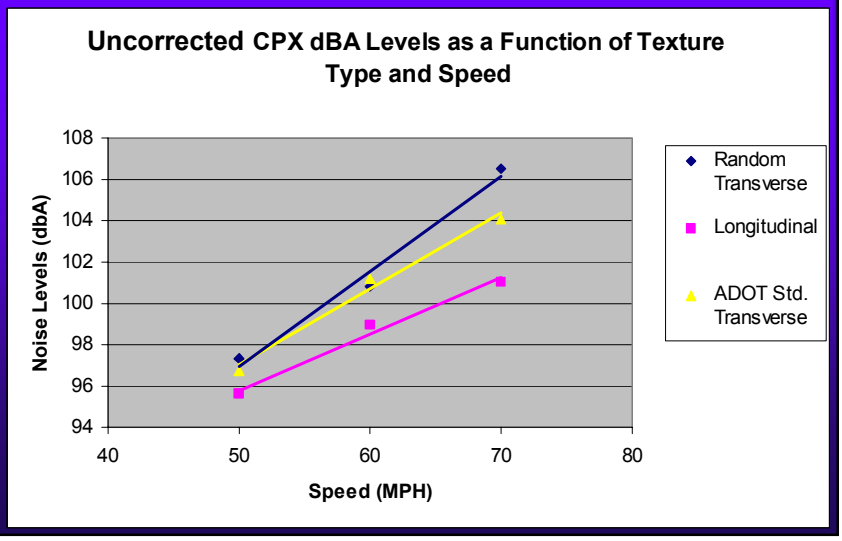


Concrete Textures

- Uniform Transverse Texture
- Random Transverse Texture
- Longitudinal Texture

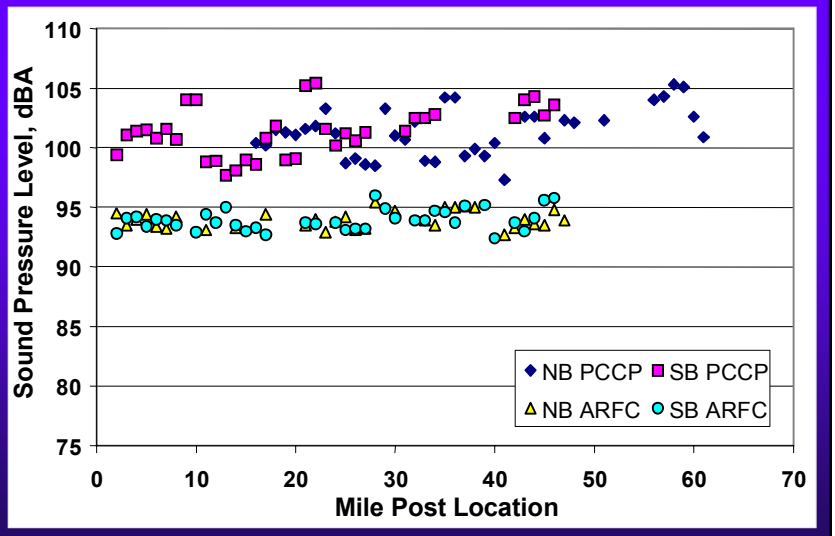
Evaluated Three Tining Types

CPX Noise Levels as a Function of Texture Type and Speed



Site 1 CPX Results on SR101

North & South Bound Directions



In Summary

- Surface Type Does Matter
- Noise Should be Managed Just Like Friction, Roughness, Rutting, and Cracking
- **It's a Quality of Life Issue!!!**

Thank You

6,000 Yrs

100 Yrs

Future