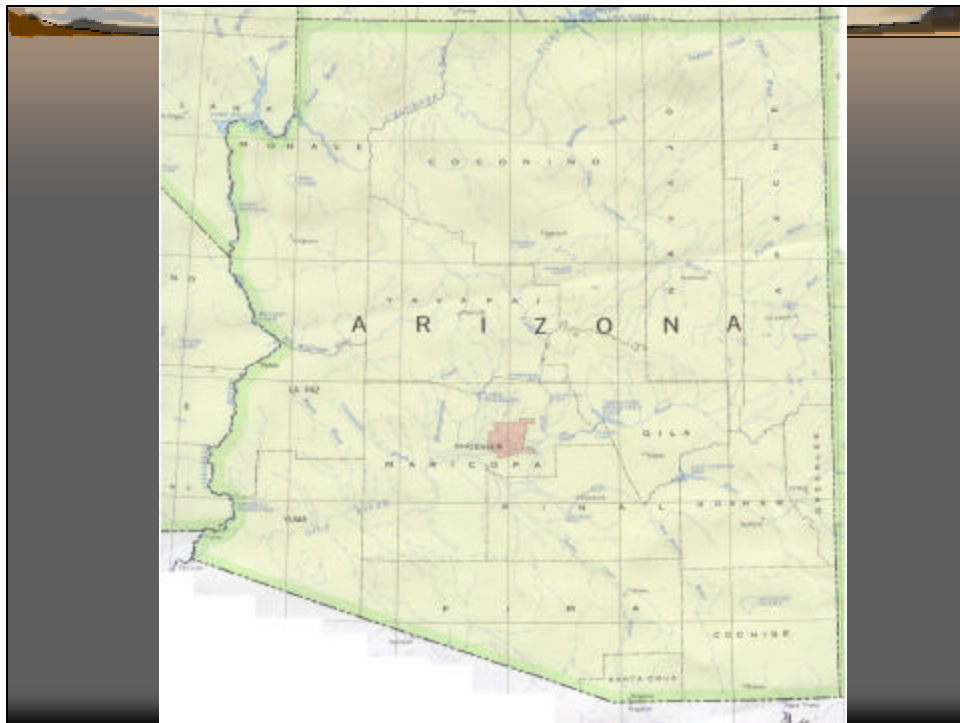
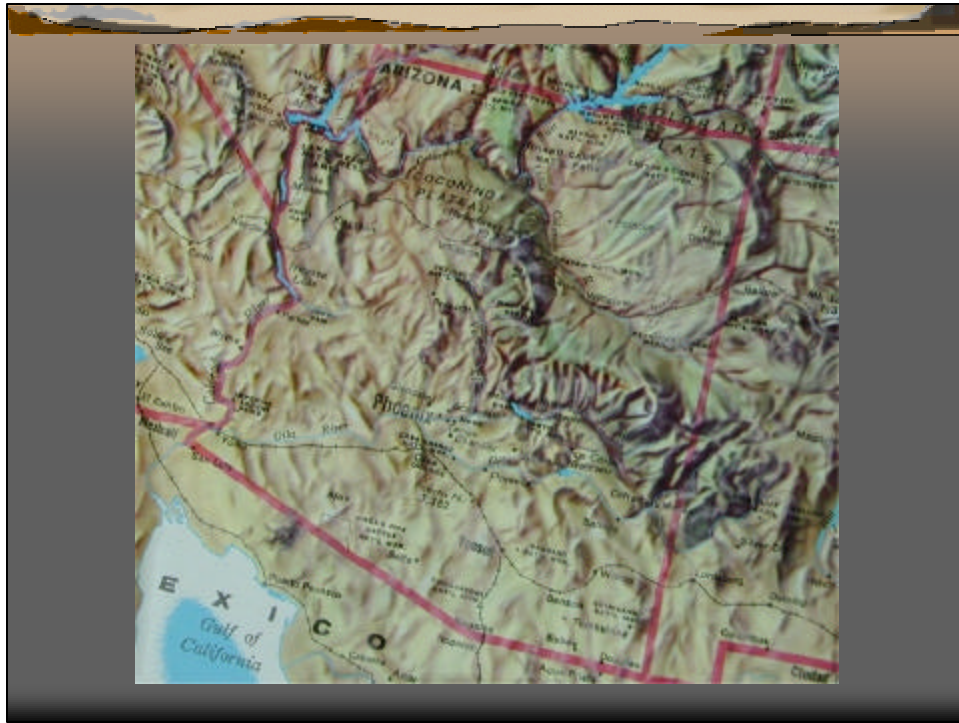


Pavement Surface Type as a Noise Mitigation Strategy





Arizona Information

- ➔ Elevation 100 ft to 13,000 ft
- ➔ Rainfall 2-3 inches to 30 inches
- ➔ Traffic Loading 2-3 Million ESALS
- ➔ 96% of the Network is Asphalt Concrete
- ➔ Population of 5 million
- ➔ Sixth Largest City In US

"Missed By That Much"
--Land Based Attacks



Aerial Attack (Turkey Buzzard)

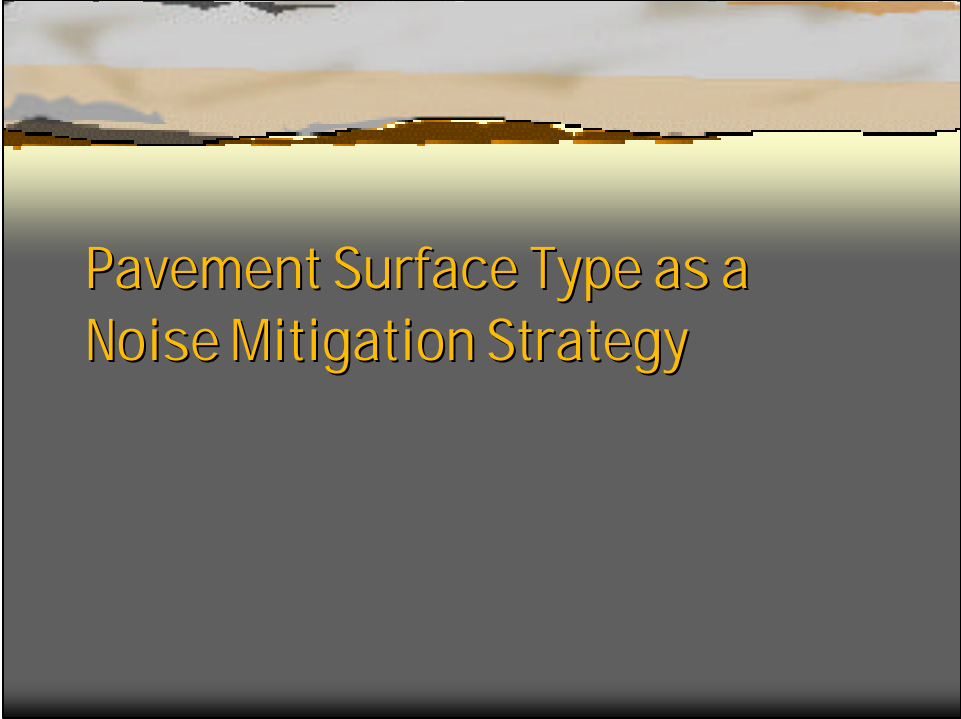


Fishin Ain't as Easy in Arizona

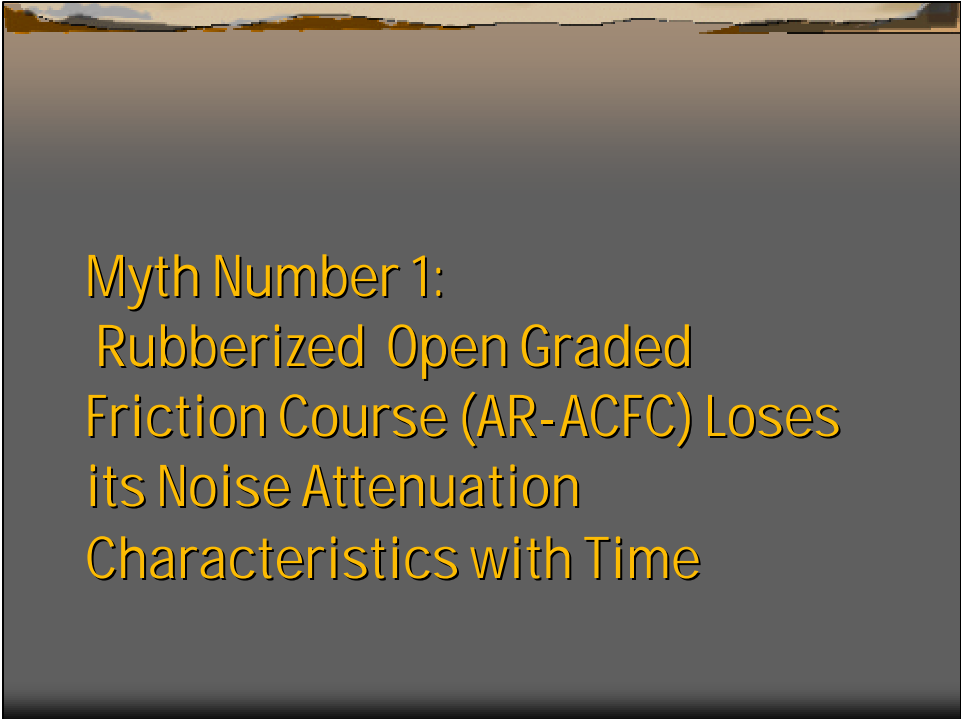


Noise Trailer



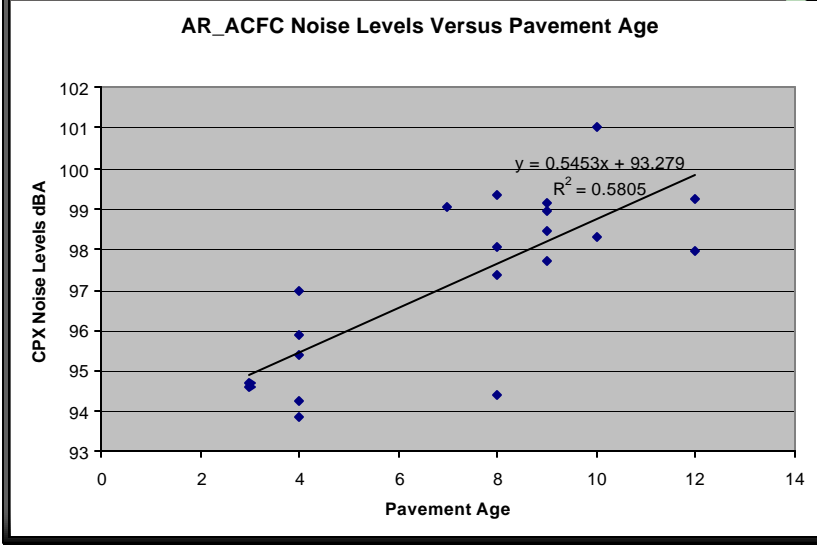


Pavement Surface Type as a
Noise Mitigation Strategy

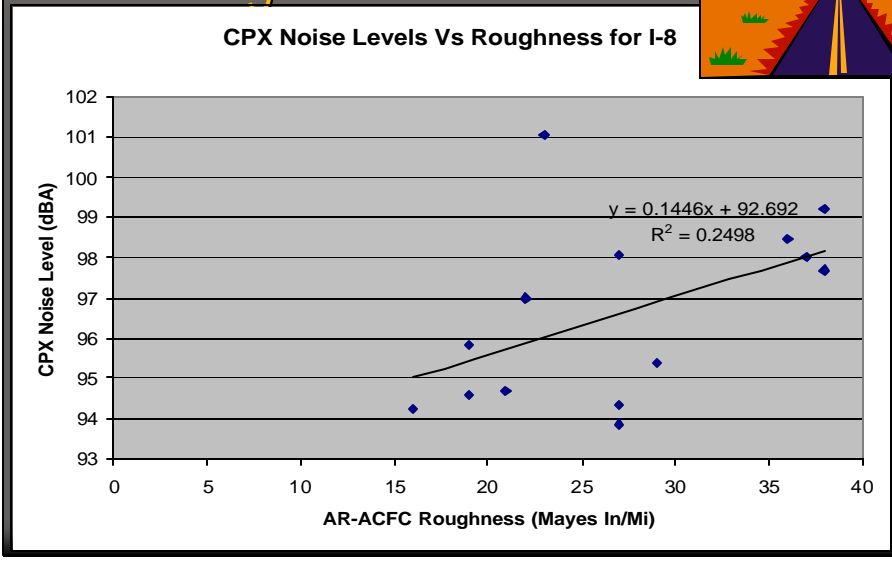
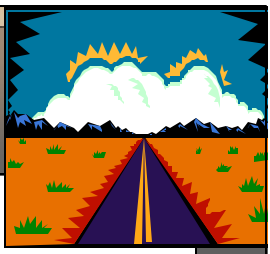


Myth Number 1:
Rubberized Open Graded
Friction Course (AR-ACFC) Loses
its Noise Attenuation
Characteristics with Time

Change in AR-ACFC Noise Properties with Time



CPX Noise Levels Vs Roughness



Myth Number 2

All Wearing Course Surfaces Perform the Same in Regards to Noise Characteristics

Wearing Course Experiment

- SMA
- PEM
- AR-ACFC
- P-ACFC
- ACFC

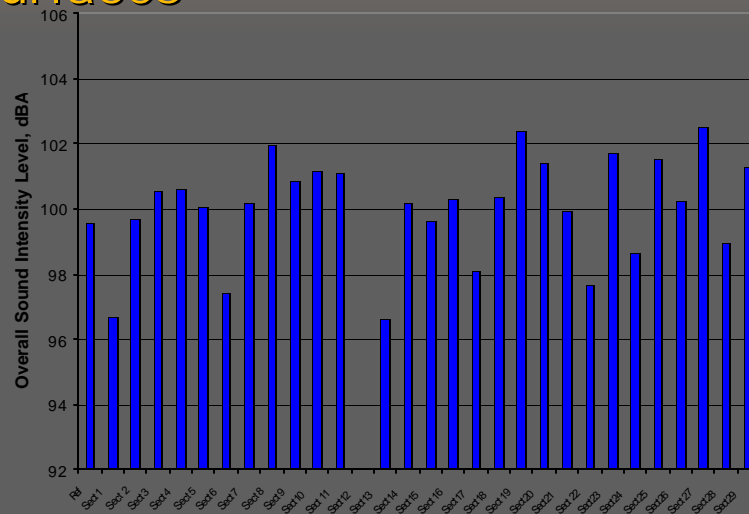
19	0.7	ACFC (3/4")	SMA (3/4")	190
3	4			74
3 1/2	19	AR-ACFC (3/4")	ACFC (3/4")	190
2"	1.0			45
3	2			190
3 1/2	19	SMA (3/4")	AR-ACFC (3/4")	2 3 17
2"	1.3			189
3	1			89
3 1/2	19	PEM (1 1/4")	P-ACFC (3/4")	2 3 17
2"	1.5			189
3	9	P-ACFC (3/4")	PEM (1 1/4")	60
3 1/2	19			189
2"	1.8	ACFC (3/4")	SMA (3/4")	2 2 32
3	8			189
3 1/2	19	AR-ACFC (3/4")	P-ACFC (3/4")	2 2 03
2"	2.1			188
4	6	SMA (3/4")	PEM (1 1/4")	75
4 1/2	19			188
2"	2.4	P-ACFC (3/4")	ACFC (3/4")	47
4	4			188
4 1/2	19	PEM (1 1/2")	AR-ACFC (3/4")	18
2"	3.3			187
4	0	ACFC (3/4")	ACFC (3/4")	90
4 1/2	19			187
2"	3.5	PEM (1 1/4")	PEM (1 1/4")	61
4	8			187
4 1/2	19	AR-ACFC (3/4")	P-ACFC (3/4")	33
2"	4.1			187
4	5	SMA (3/4")	SMA (3/4")	05
4 1/2	19			186
2"	4.4	P-ACFC (3/4")	AR-ACFC (3/4")	78
4	3			186
4 1/2	4.7	AR-ACFC (1 1/2")	AR-ACFC (1 1/2")	48
2"	4			186
4 1/2	5.0			48
3"	3			186
4"	0			186

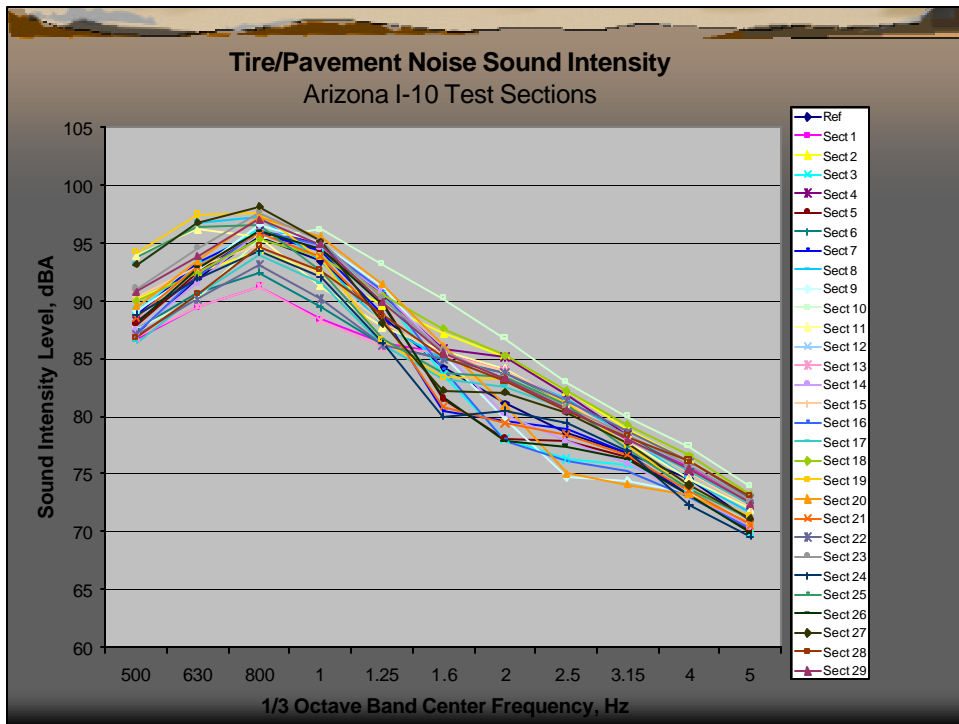
CPX Noise Levels for Surfaces

Wearing Course Surface Type	CPX Noise Level Reading (dBA)
SMA	95.9
AR-ACFC	95.0
PEM	96.0

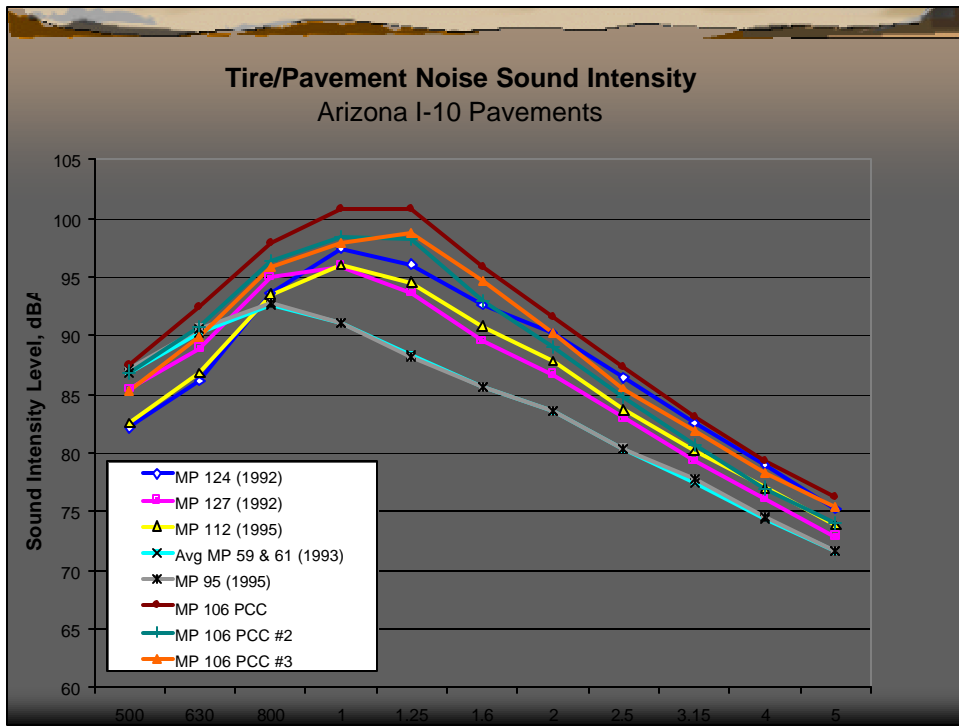
Sound Intensity Results for All Surfaces

Tire/Pavement Noise Sound Intensity
Arizona I-10 Test Sections





Myth Number 3:
 Pavement Type Does Not Affect
 Noise Generation
 Characteristics



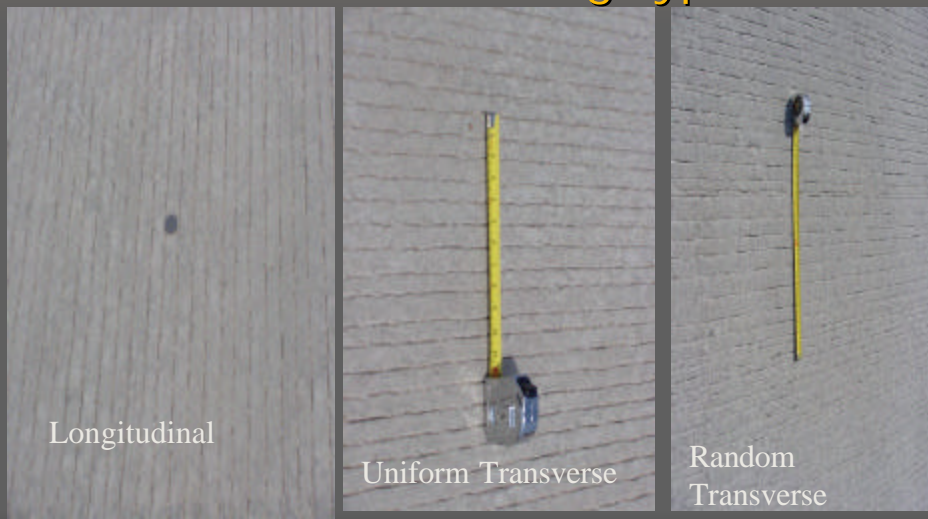
Myth Number 4 (Challenge): Random Transverse Tining Improves Noise Properties

Corollary:
Texture Methods Can Improve Noise
Characteristics

PCCP Tining Experiment



Evaluated Three Tining Types

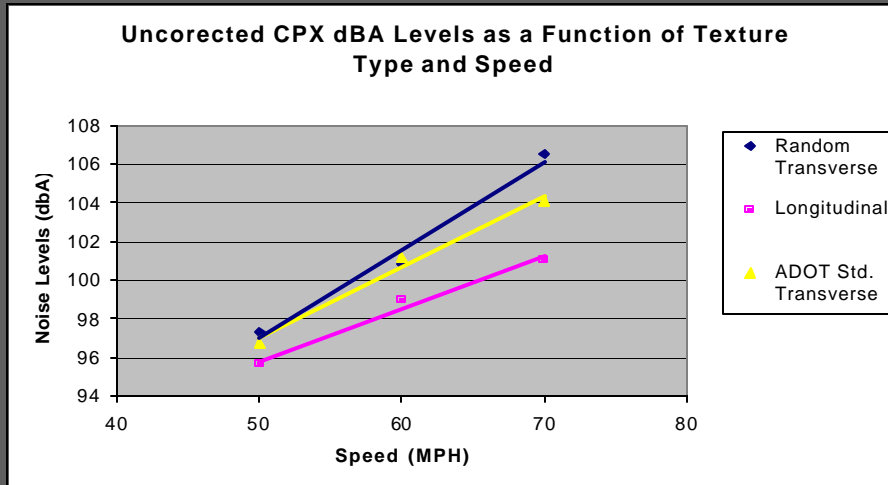


Longitudinal

Uniform Transverse

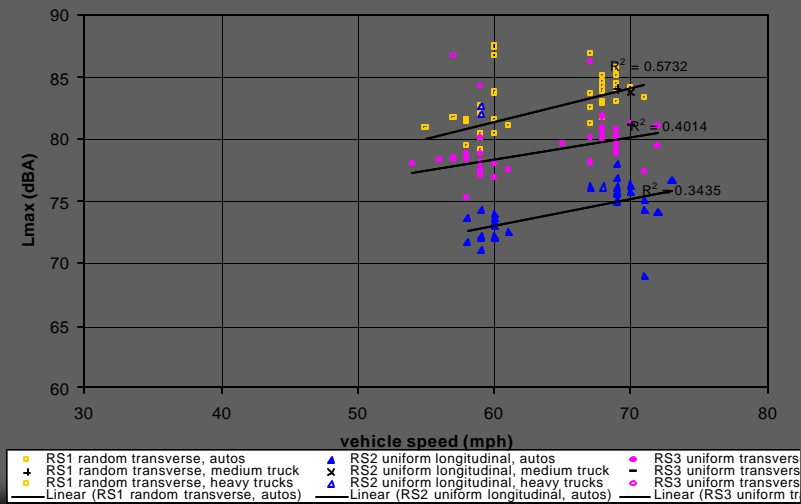
Random Transverse

CPX Noise Levels as a Function of Texture Type and Speed



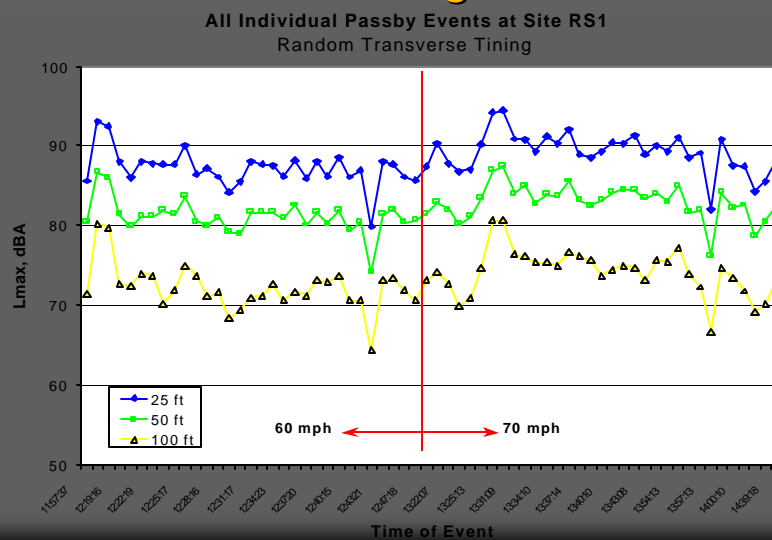
Volpe Pass-by Results for 50 ft

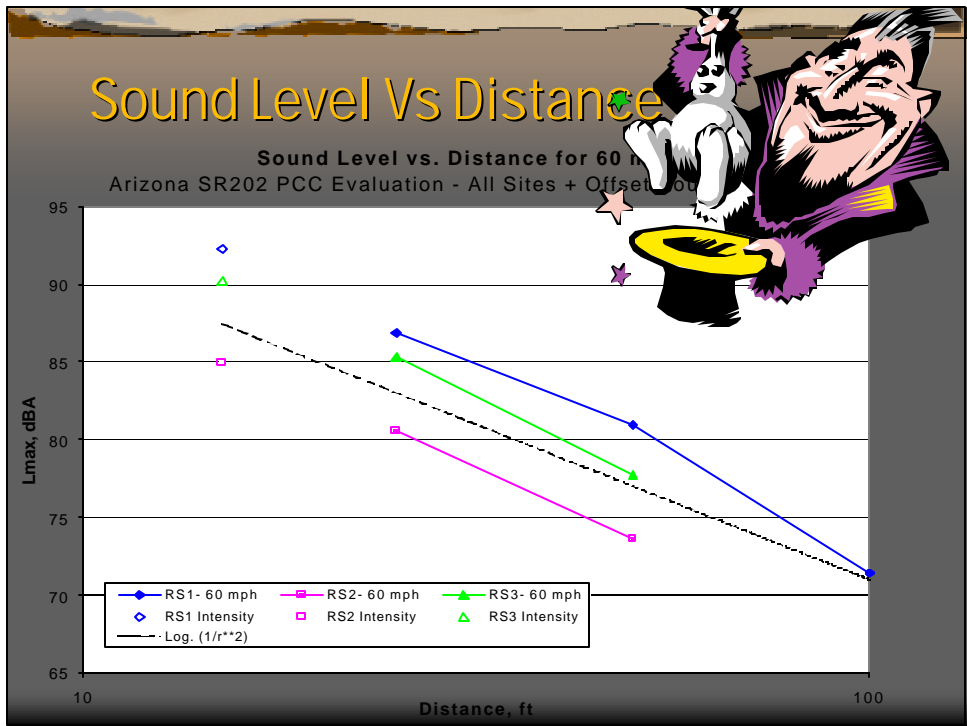
ADOT PCC Pavement Study
Other Vehicles (Subaru) 09/2002



Myth Number 5: You Can't Use Roadway Based Measurements to Predict Roadside Noise Levels

All Individual Pass-by Results at Transverse Tining Site





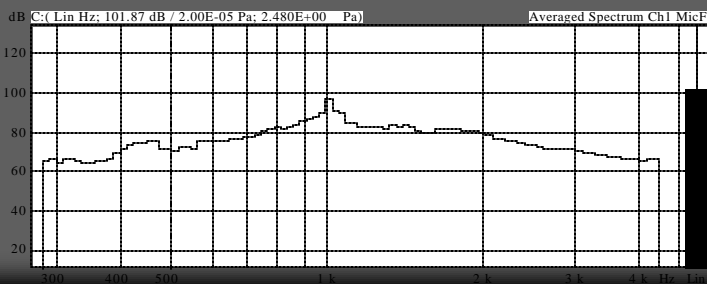
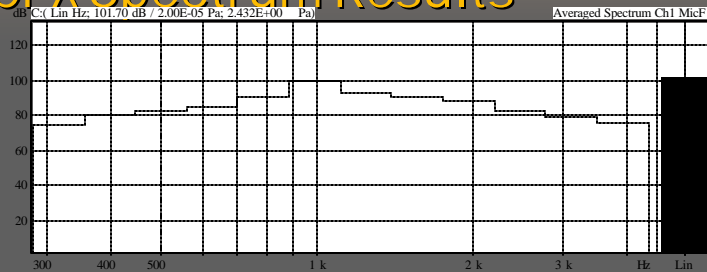
Comparison of Roadway Based (CPX) to Roadside Based (Traditional) Measurement

- ➔ Texas 78-80%
- ➔ Arizona 73-78%

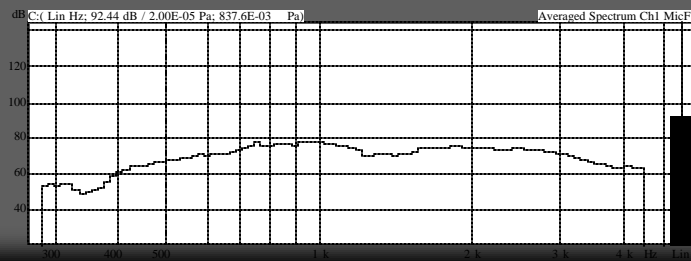
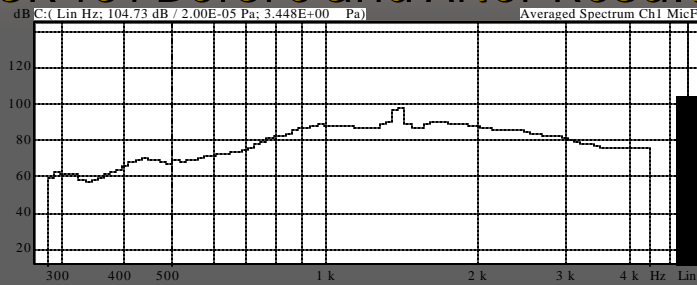
- ➔ GM 75%
- ➔ Recent Study 90%

What Happens When You Cover Up Uniformly Tined PCCP with One Inch of AR-ACFC

CPX Spectrum Results



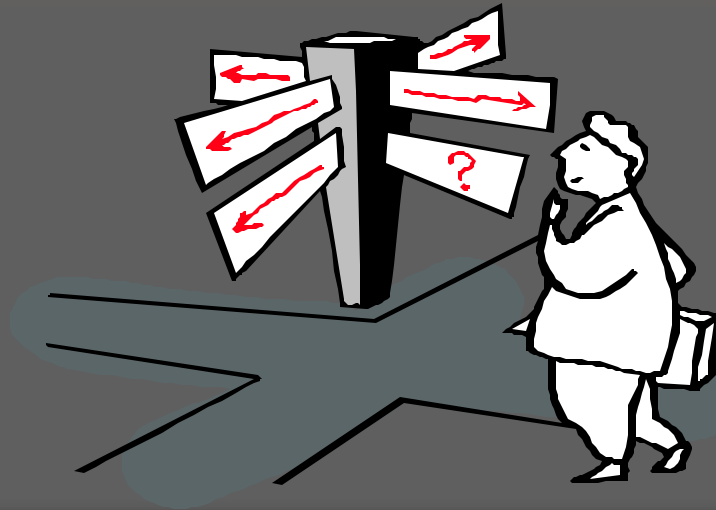
SR 101 Before and After Results



In Summary

- Surface Type Does Matter
- Roadway Based Measurements Can Be Used
- Noise Should be Managed Just Like Friction, Roughness, Rutting, and Cracking
- It's a Quality of Life Issue

Mix Design Procedures For Noise



The End---But Keep Focused



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Comparison of NI & CPX Results

Tire/Pavement Comparisons on I-10 Test Sections
Using CPX and Intensity Methods

