THE UNIVERSITY OF TEXAS AT AUSTIN
CENTER FOR TRANSPORTATION RESEARCH

On-Board Sound Intensity Tests on Quieter Pavements in Austin, Texas

Manuel Trevino

July 2017

Austin District Study

- TxDOT Austin District interest for quieter pavements
- Tire/pavement noise tests (OBSI) from 2014 to present
- Thin overlay mixes (TOM) placed for noise reduction purposes
- OGAC surfaces also placed to reduce noise
- Concern for louder surfaces (e.g., seal coats)

Thin Overlay Mixes

- Non-structural hot-mix asphalt mixes placed in thin lifts of about 2.5 cm (1 in.) thick, although some are as thin as 1.25 cm (0.5 in.)
- Used by TxDOT in various districts
- Used by the Austin District for noise abatement purposes

Conventional Overlay Mixes

- Typical HMA overlays are about 5-cm (2-in.) thick
- Rehabilitation technique for all pavement types
- Improve surface characteristics
- Extend pavement service life

Thin Overlay Mixes

- Developed as an alternative to conventional overlays for reducing life-cycle costs
- Preserve pavements exhibiting surface distresses such as raveling, aging, bleeding, minor cracking, minor disintegration, texture loss, skid resistance loss
- Enhance pavement performance and extend its service life

Thin Overlay Mixes

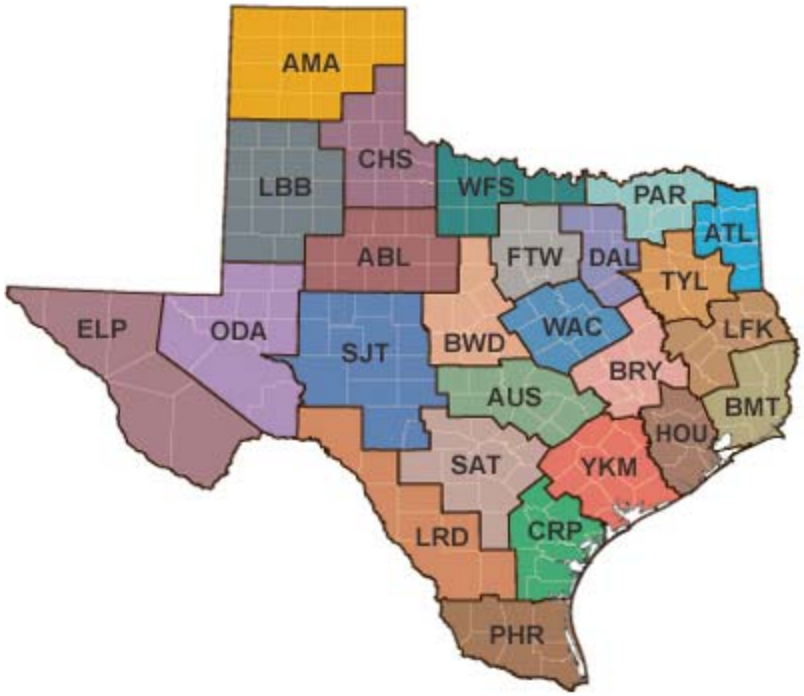
- Benefits:
  - Improve user serviceability (i.e., smoothness and comfort)
  - Skid resistance
  - Splash and spray reduction
  - Noise reduction
  - Reduced life-cycle costs
  - No loose stones
  - No curing time required

Thin Overlay Mixes

- High-quality aggregate
- Polymer-modified asphalt
- High asphalt content
- Excellent cracking resistance
- Acceptable rutting resistance
- Noise generation is not overly sensitive to aggregate gradation or asphalt content

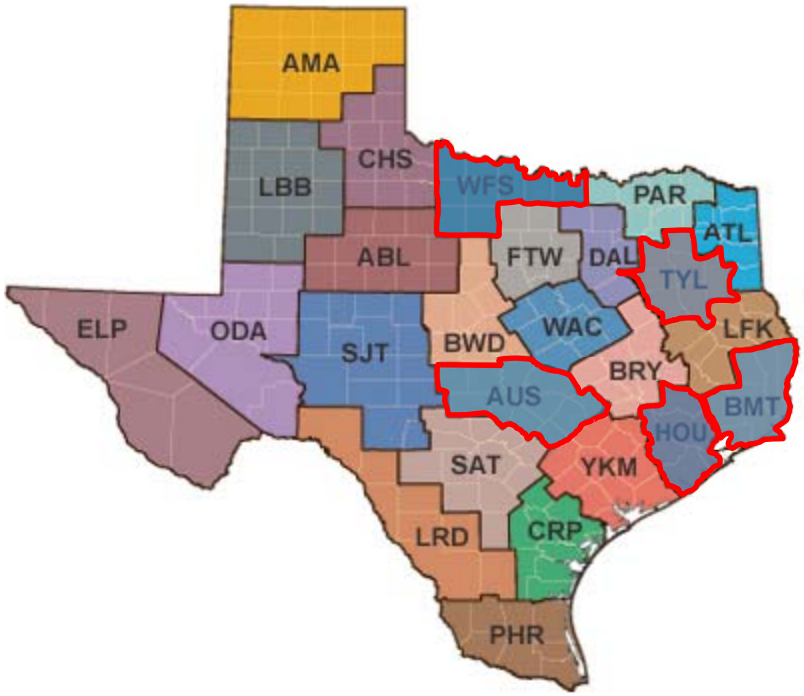
Thin Overlay Mixes

- In Texas, used in:



Thin Overlay Mixes

- In Texas, used in:
  - Austin
  - Beaumont
  - Houston
  - Tyler
  - Wichita Falls



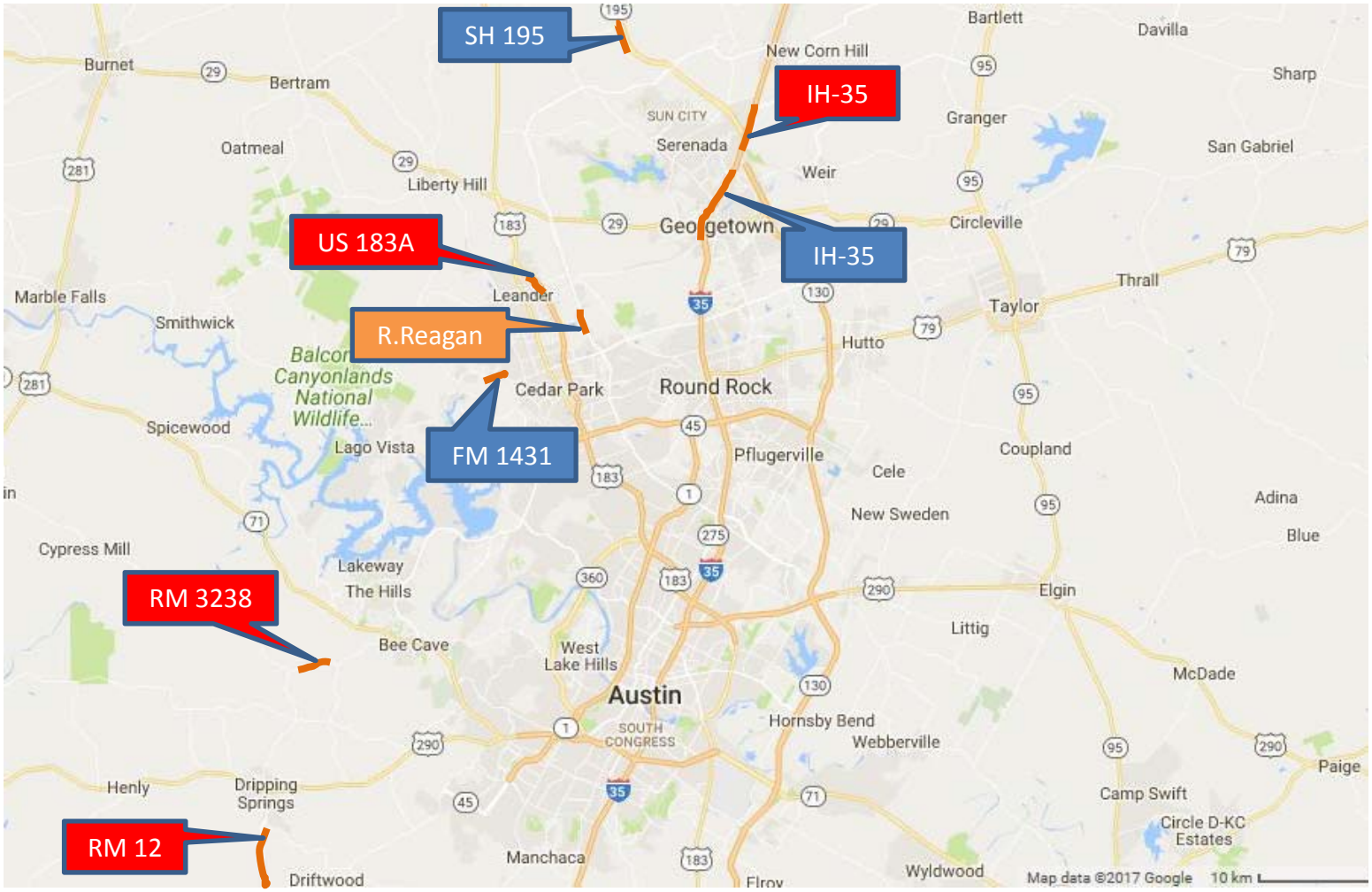
Permeable Friction Courses (PFC)

- Open-graded asphalt pavements
- Normally considered the quietest pavement type
- Some PFCs do not maintain their porosity over time due to clogging and compaction
- May have a reduced service life because of raveling and surface aggregate loss
- Cannot be used in areas subjected to freezing

Pavements Studied

- Thin Overlay Mixes (TOM):
  - Interstate 35
  - RM 12
  - RM 3238
  - US 183A FR
- PFC
  - Interstate 35
  - FM 1431
  - SH 195
- DGAC
  - Ronald Reagan Blvd.

Pavements Studied



IH-35 TOM

- 21.5-km (13.36-mi)
- From the Bell/Williamson County line to Lakeway Dr., near Georgetown

IH-35

IH-35 TOM

IH-35 TOM

IH-35 TOM

IH-35 TOM

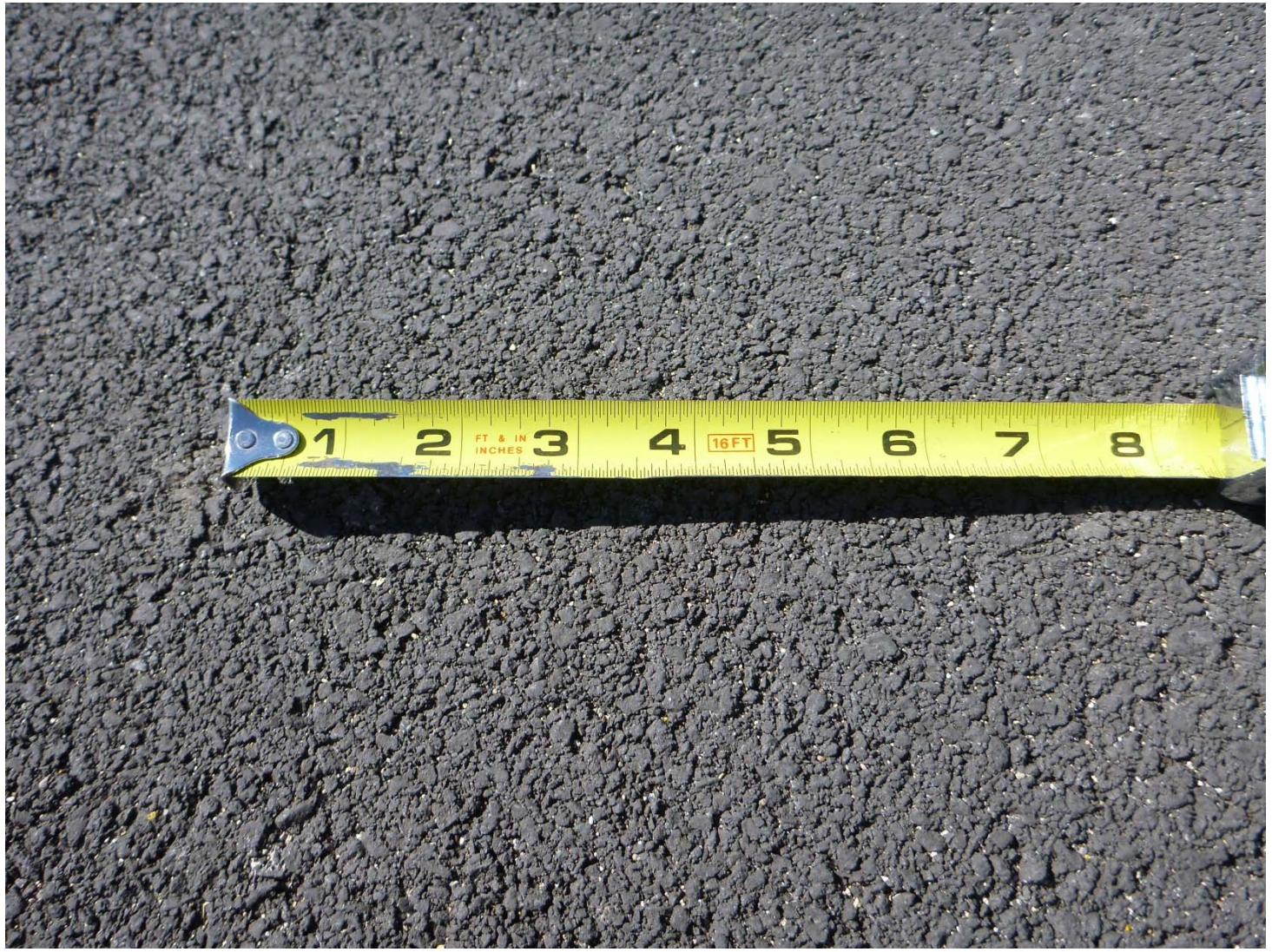
RM 12

- Ultra-thin overlay: 1.25 cm (0.5-in.) thick
- 10 km (6.21 mi) – from just south of US 290 to Wimberley city limits
- Originally resurfaced with a seal coat. Replaced with the ultra-thin pavement.

RM 12

RM 12

RM 12



RM 3238

- 12.9-km (8-mi)
- North of US 290, between Bee Cave and Dripping Springs

RM 3238

RM 3238

RM 3238

US 183A Frontage Road

- New toll road near Leander, north of Austin
- Tested shortly after TOM was paved

US 183A Frontage Road

US 183A Frontage Road

Photo by John Wirth

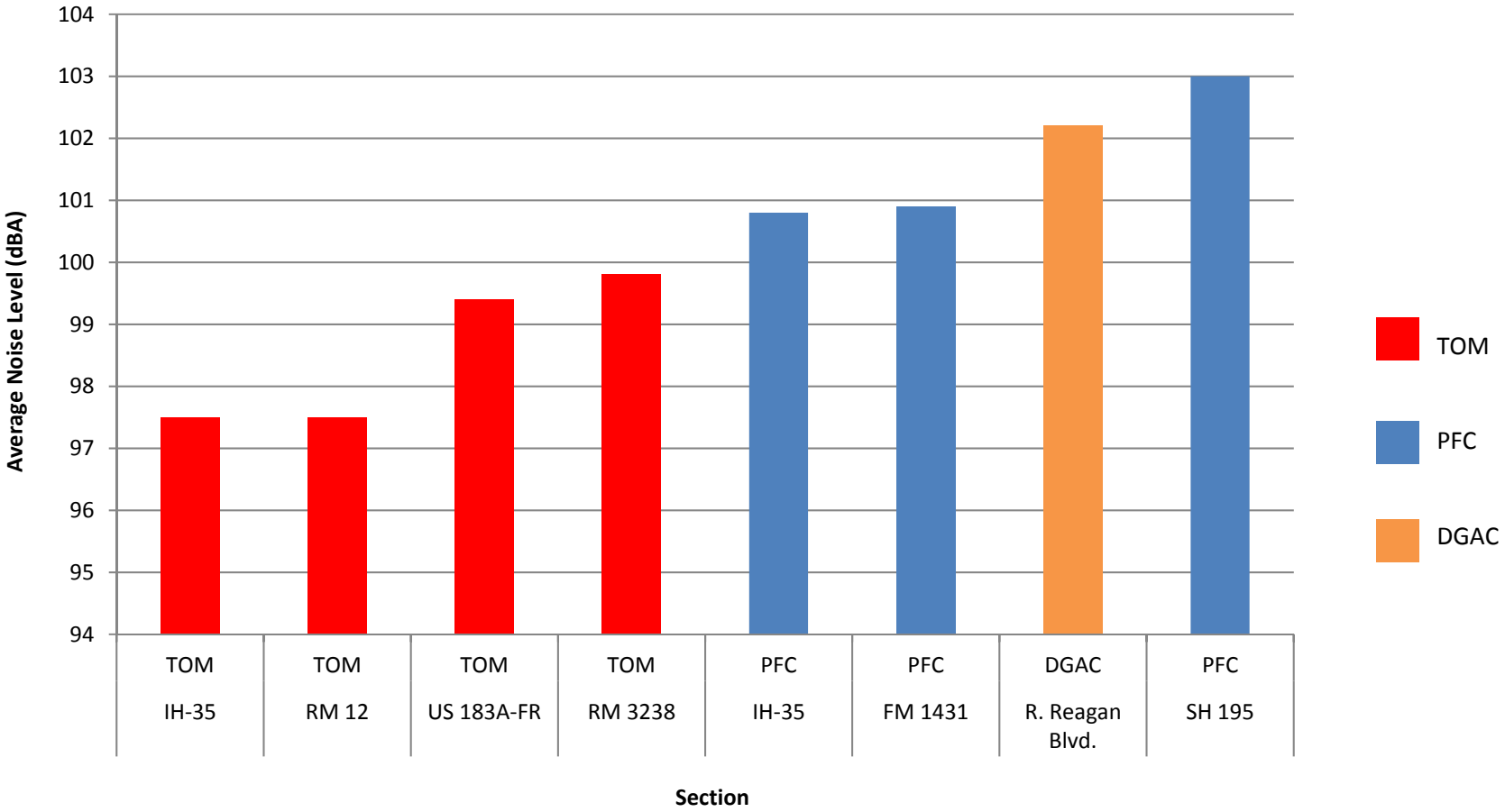
On-Board Sound Intensity

On-Board Sound Intensity

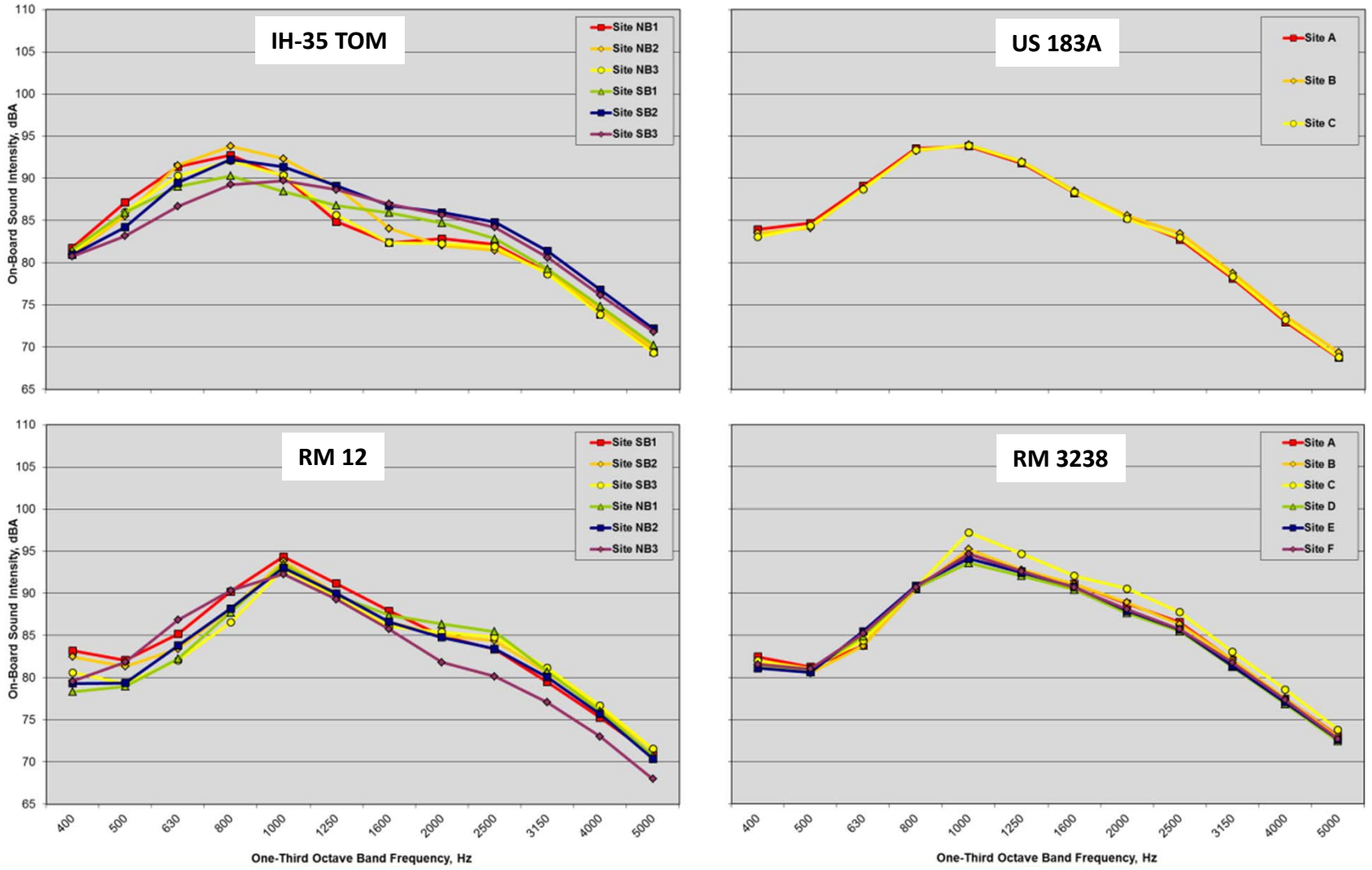
On-Board Sound Intensity

On-Board Sound Intensity

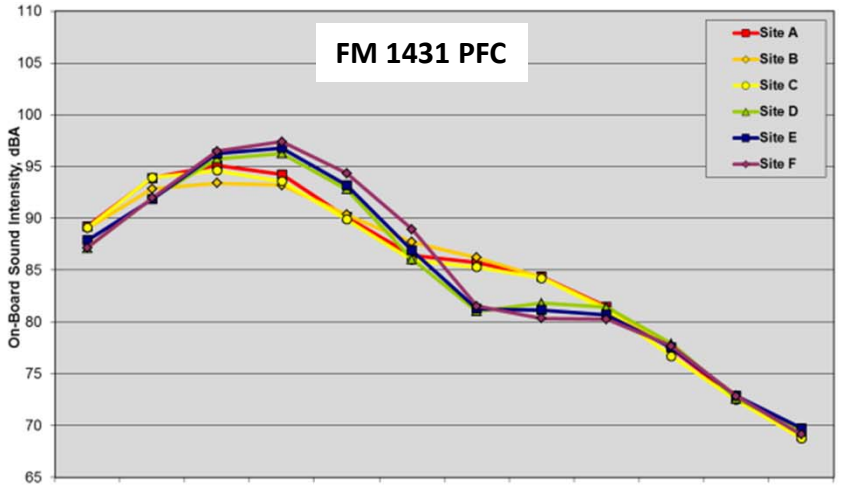
Austin District OBSI Results

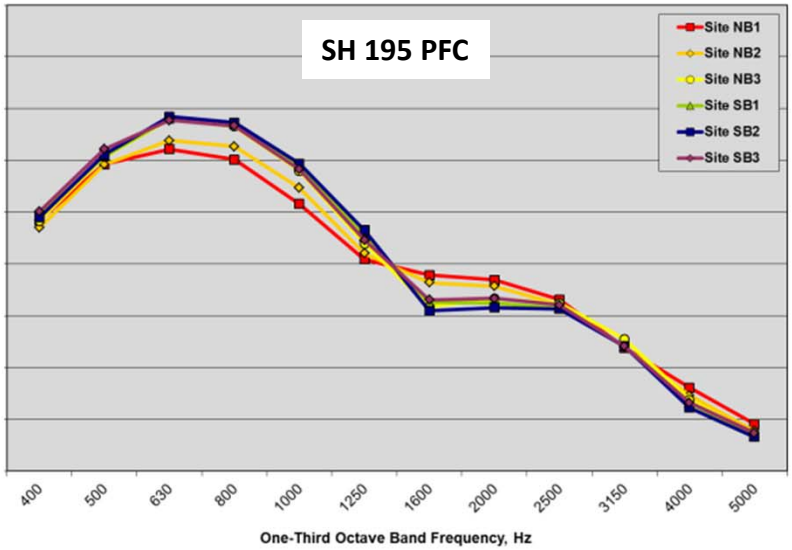


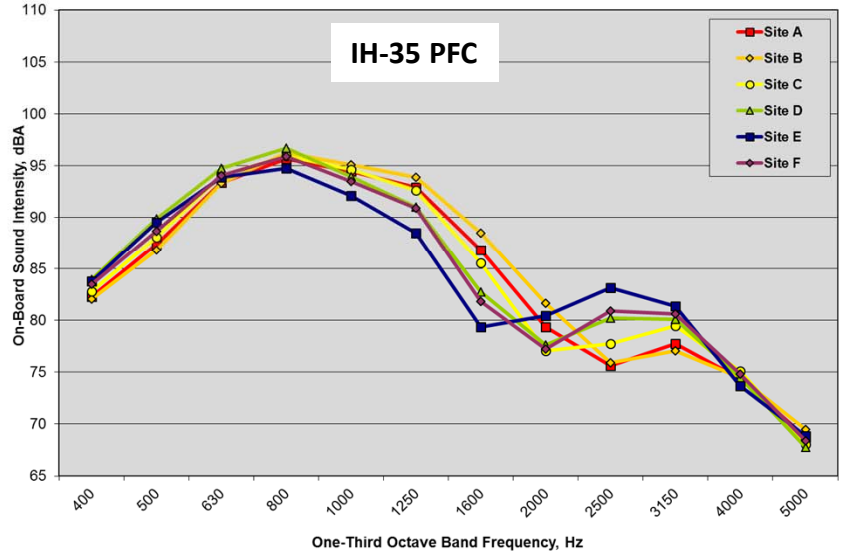
TOM Frequency Spectra



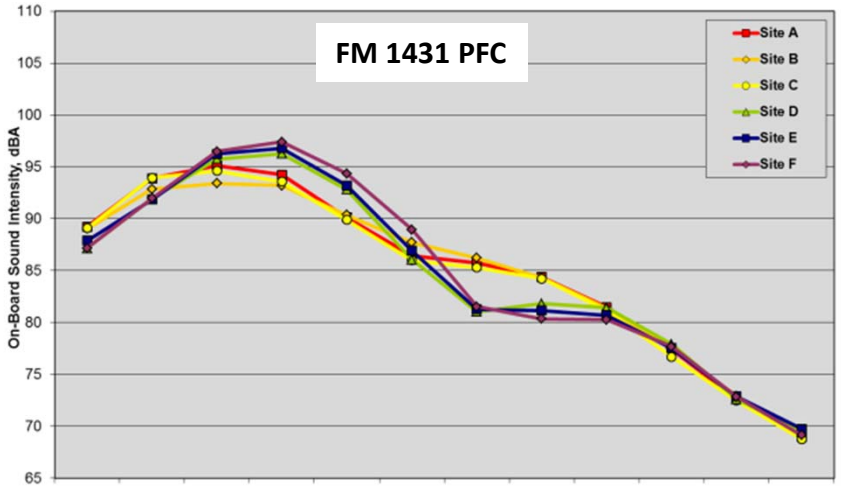
PFC Frequency Spectra

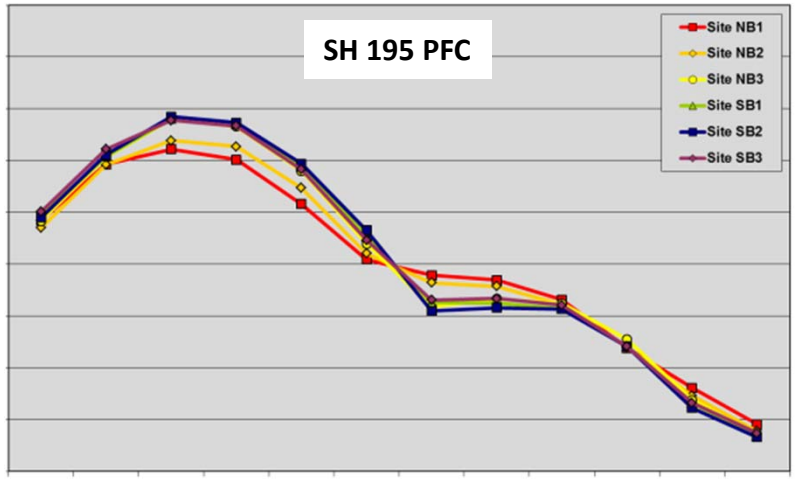


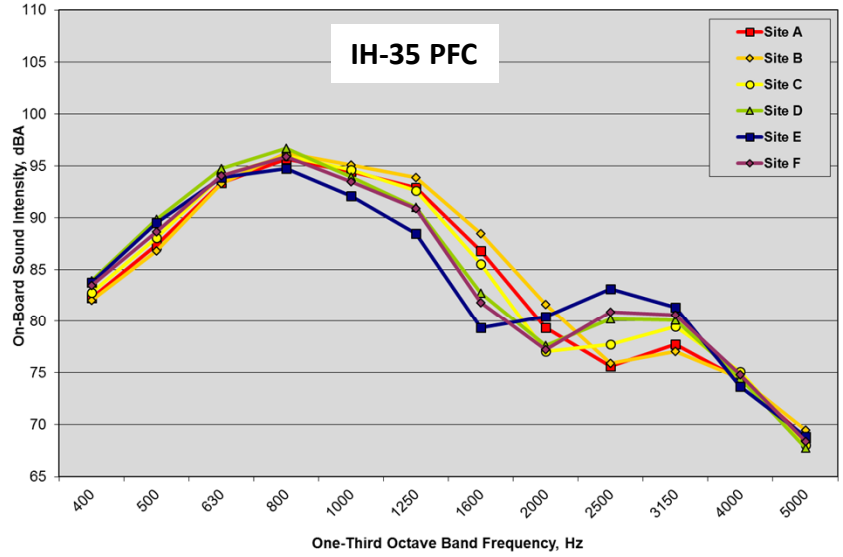


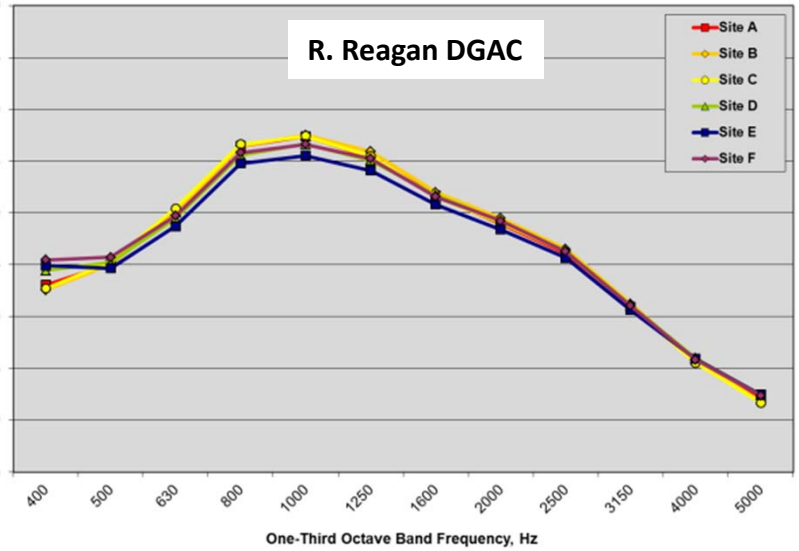


PFC and DGAC Frequency Spectra

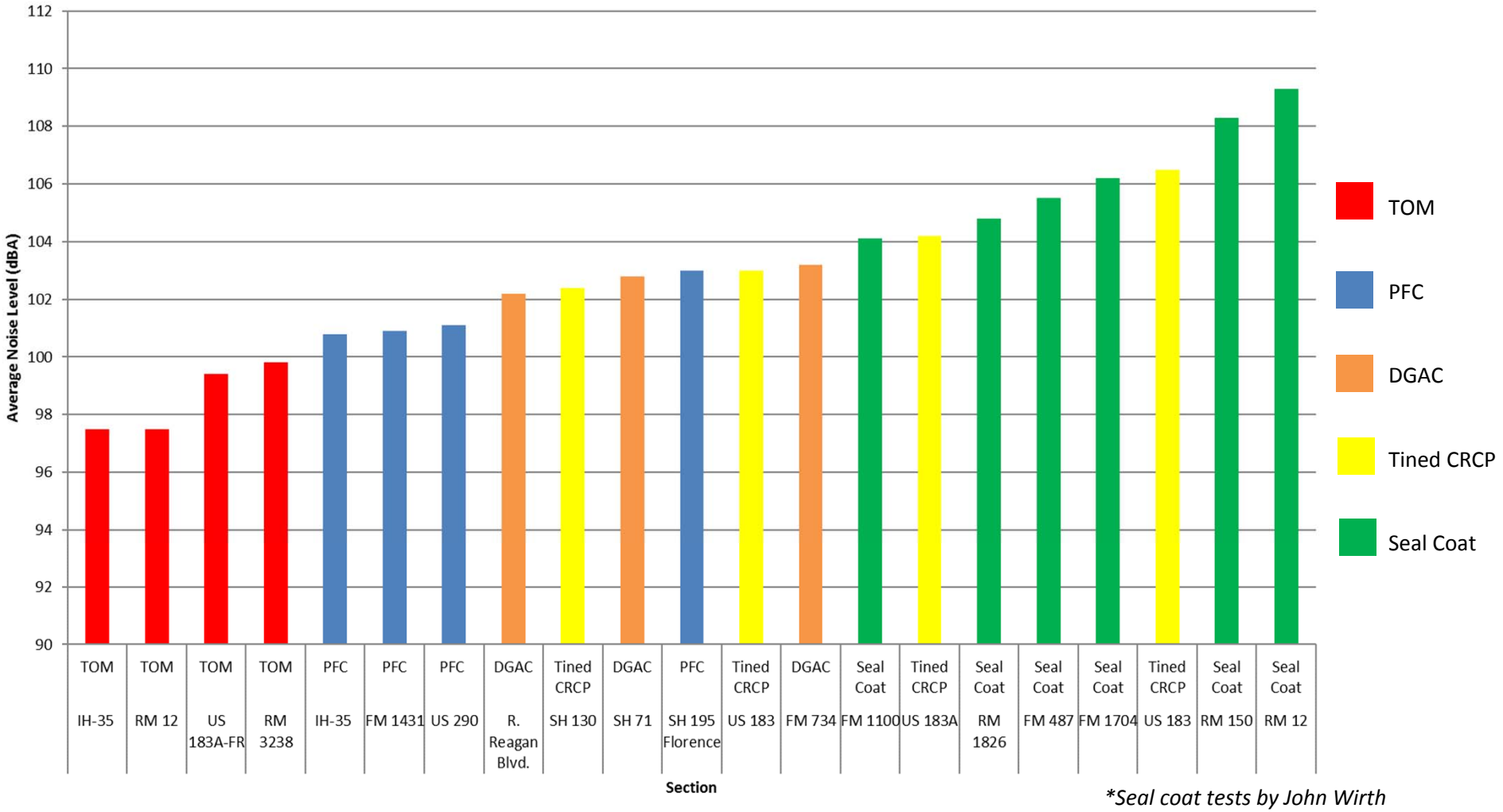








TOM vs. Other Pavements



**Seal coat tests by John Wirth*

Discussion of Results

- TOM average noise level: 98.5 dBA
- PFC average noise level: 102.0 dBA
- TOMs have become the quietest pavement type in the Austin area
- TOMs have kept their noise reduction properties over time
- Seal coats are the loudest pavement (106.4 dBA on average)

Acknowledgement

- Mike Arellano, TxDOT-Austin District
- John Wirth, TxDOT