



# *Tire / Pavement Noise*

## **OBSI and How it is Being Used in Texas**

Presented by: John Wirth from TxDOT  
At RPUG Conference 10/28/2008



# *Tire - Pavement Noise -*

What is OBSI?

On-Board Sound Intensity



# *Tire / Pavement Noise*

Standard Method of Test for

**Measurement of Tire/Pavement  
Noise Using the On-Board Sound  
Intensity (OBSI) Method**

AASHTO Designation: **TP 76-08**

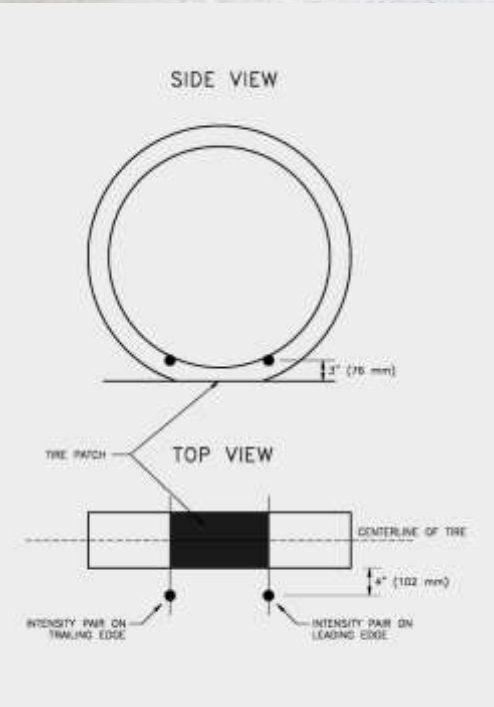


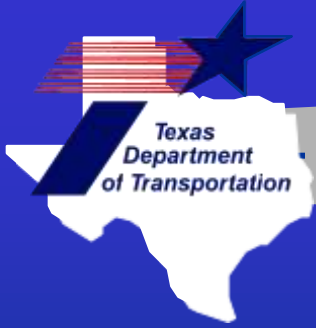
**Single Probe OBSI**



**Dual Probe OBSI**

# Single Probe OBSI





# *Tire - Pavement Noise -*

## Research Program

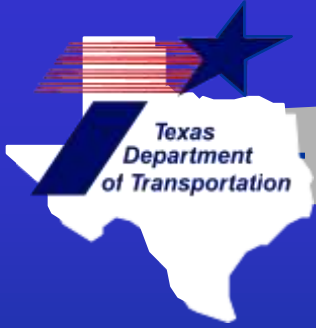
- **Goals**
  - Construction/Pavement (CST)
    - Improved Designs
      - Safety/Durability (+) ...and Quieter
    - Measurement Protocol ...OBSI
  - Environmental (ENV)
    - Avoid Impacts = Avoid Noise Barriers
    - Measurement Protocol ...SPB and OBSI
      - SPB compared to TNM “Average”
      - Seek FHWA approved adjustment in TNM
- **Status: Collecting Data**
  - Two OBSI systems (TxDOT and CTR)
    - According to AASHTO TP 76-08 Standard



# *Tire / Pavement Noise*

## **Data Collection Objectives and Work Plan**

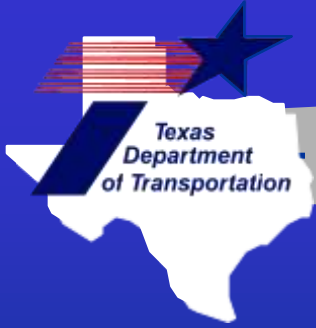
- **Objectives**
  - **Process development**
    - Characterize Texas pavements
    - Factors
    - Trends
    - Noise 'Families'
  - **Information support (CST- M&P)**
    - Design guidelines
    - Project-level support
    - Facts / information exchange
  - **Policy support (ENV)**
    - Policy decision support
    - Facts / information exchange



# *Tire / Pavement Noise*

- **Action Plan**

- Become familiar with OBSI
- Participate in state and national OBSI discussions
- Analyze data collected, try to understand data types
- Test Section selection (4–8 sites / sect.)
- Monitoring schedule
- Collection coordination (TxDOT/CTR)
- Database management

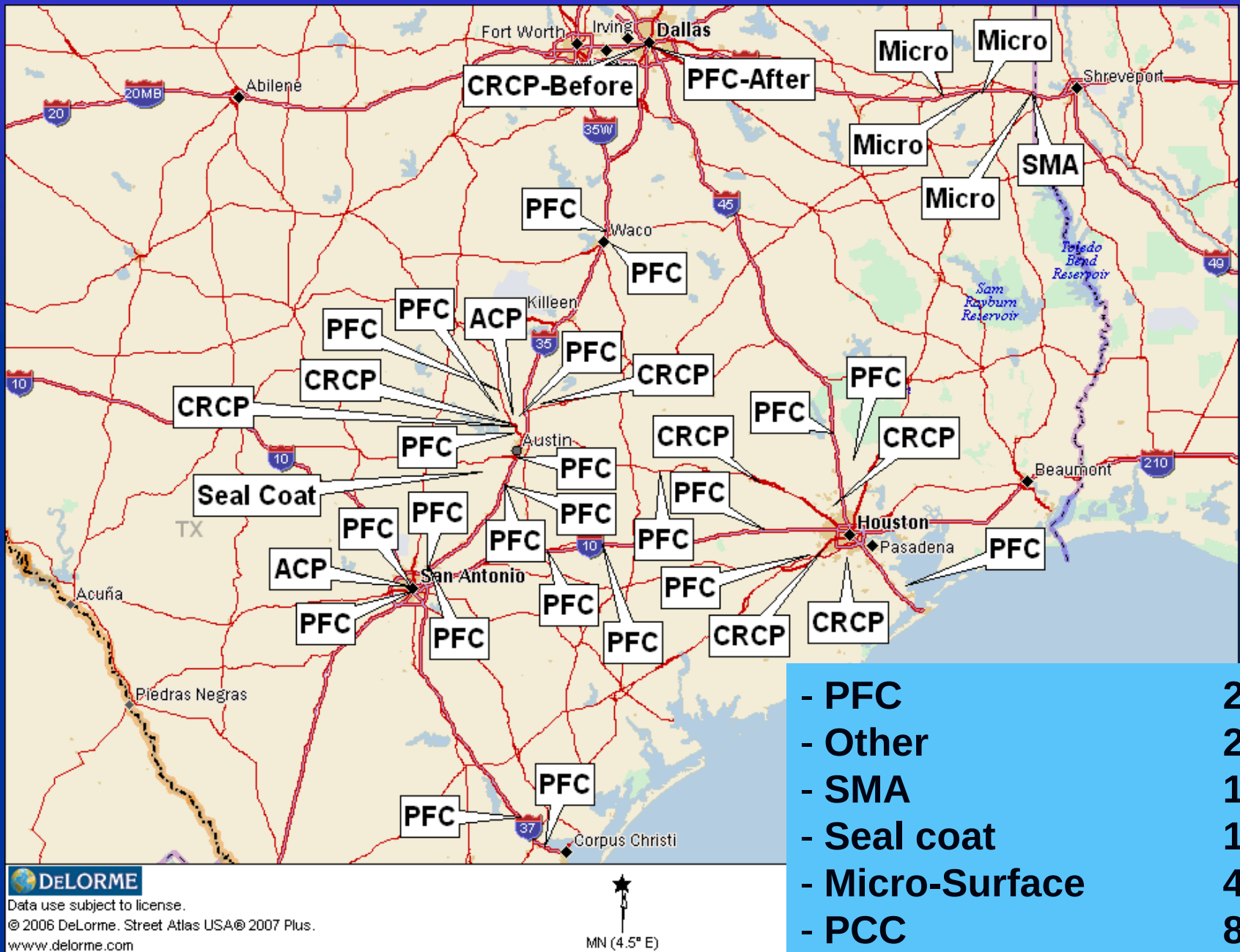


# ***Tire - Pavement Noise -***

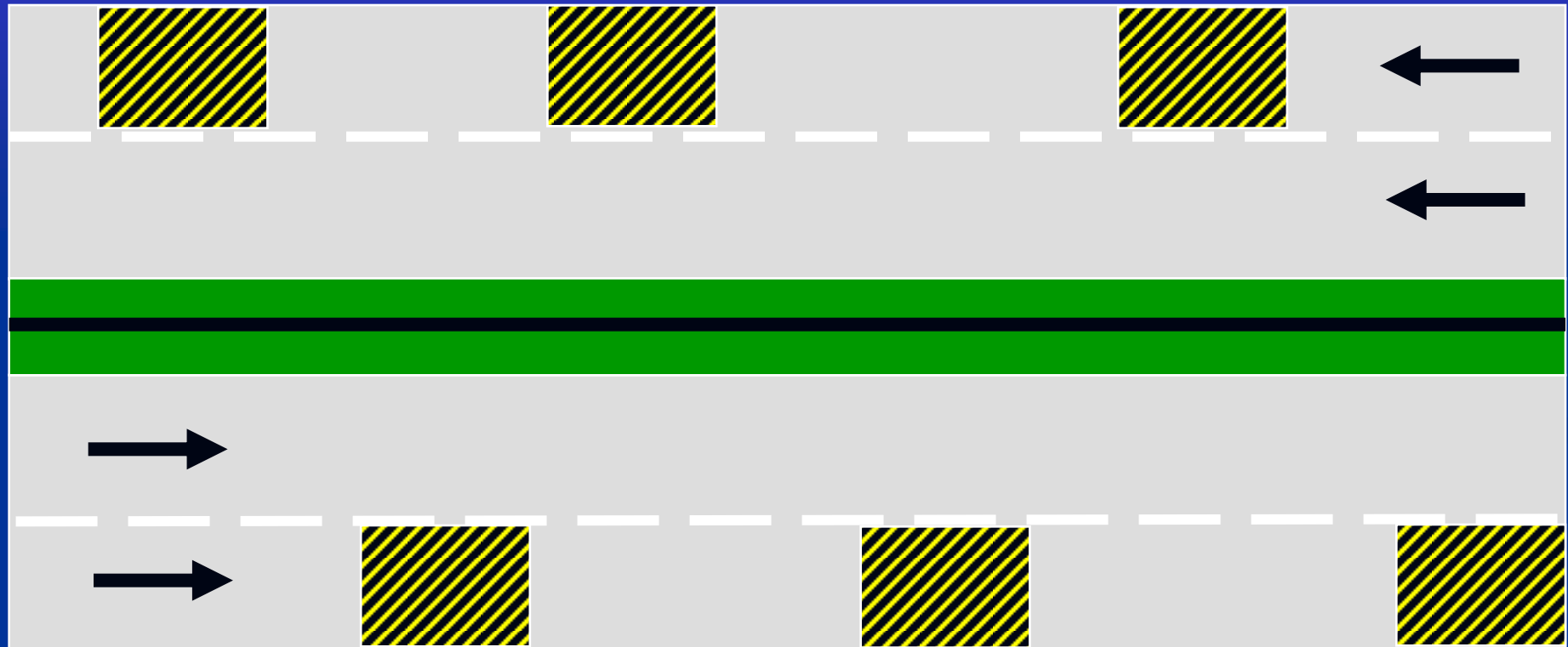
- **Action Plan – continued**
  - **Test Sections tested to date by ‘Family’**

|                 |           |
|-----------------|-----------|
| - PFC           | <b>24</b> |
| - Other         | <b>2</b>  |
| - SMA           | <b>1</b>  |
| - Seal coat     | <b>1</b>  |
| - Micro-Surface | <b>4</b>  |
| - PCC           | <b>8</b>  |
  - **Additional Test Sections planned**

# TxDOT & CTR OBSI Test Sections Collected to Date

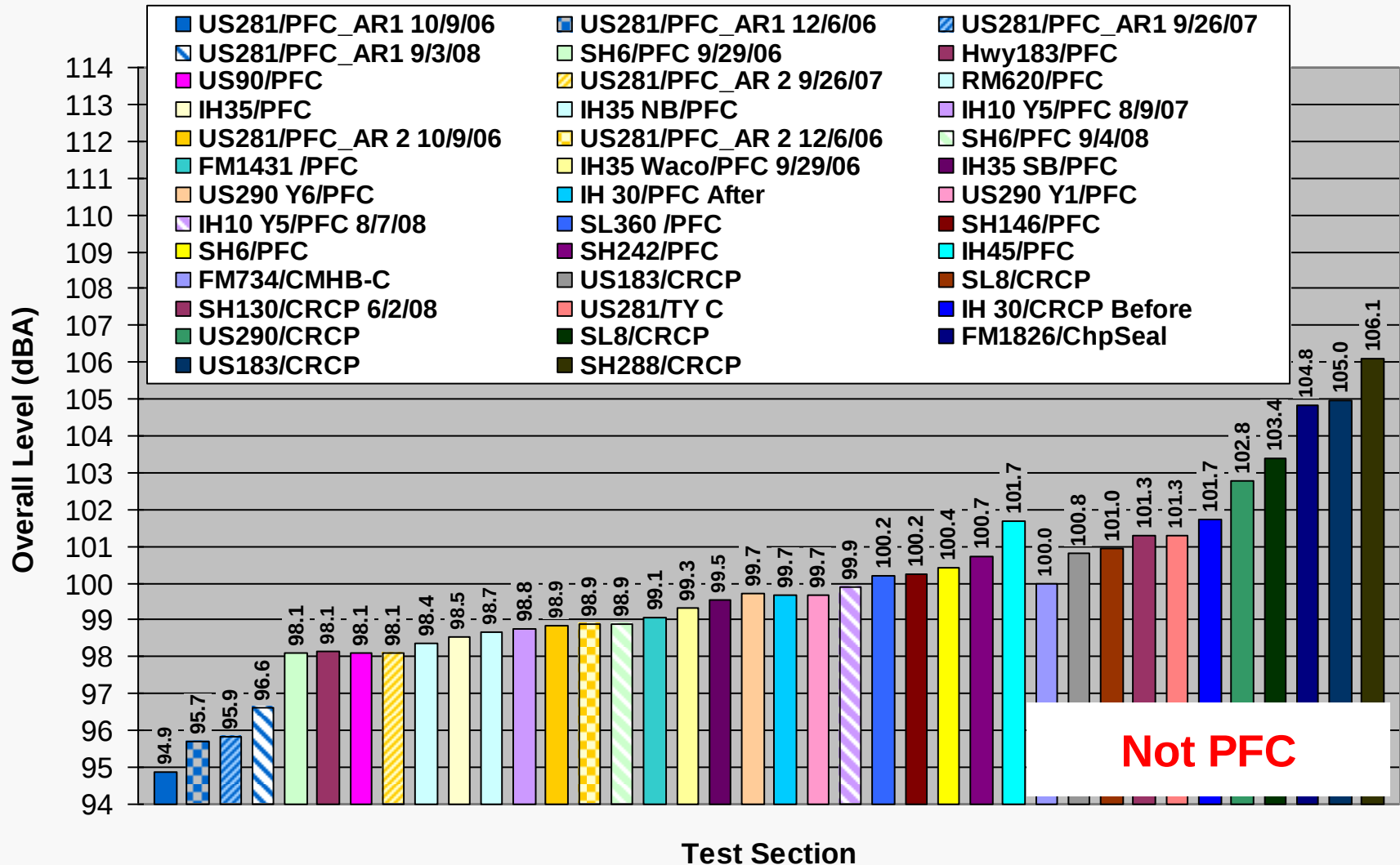


# One Noise Test Section with 6 OBSI Test Sites

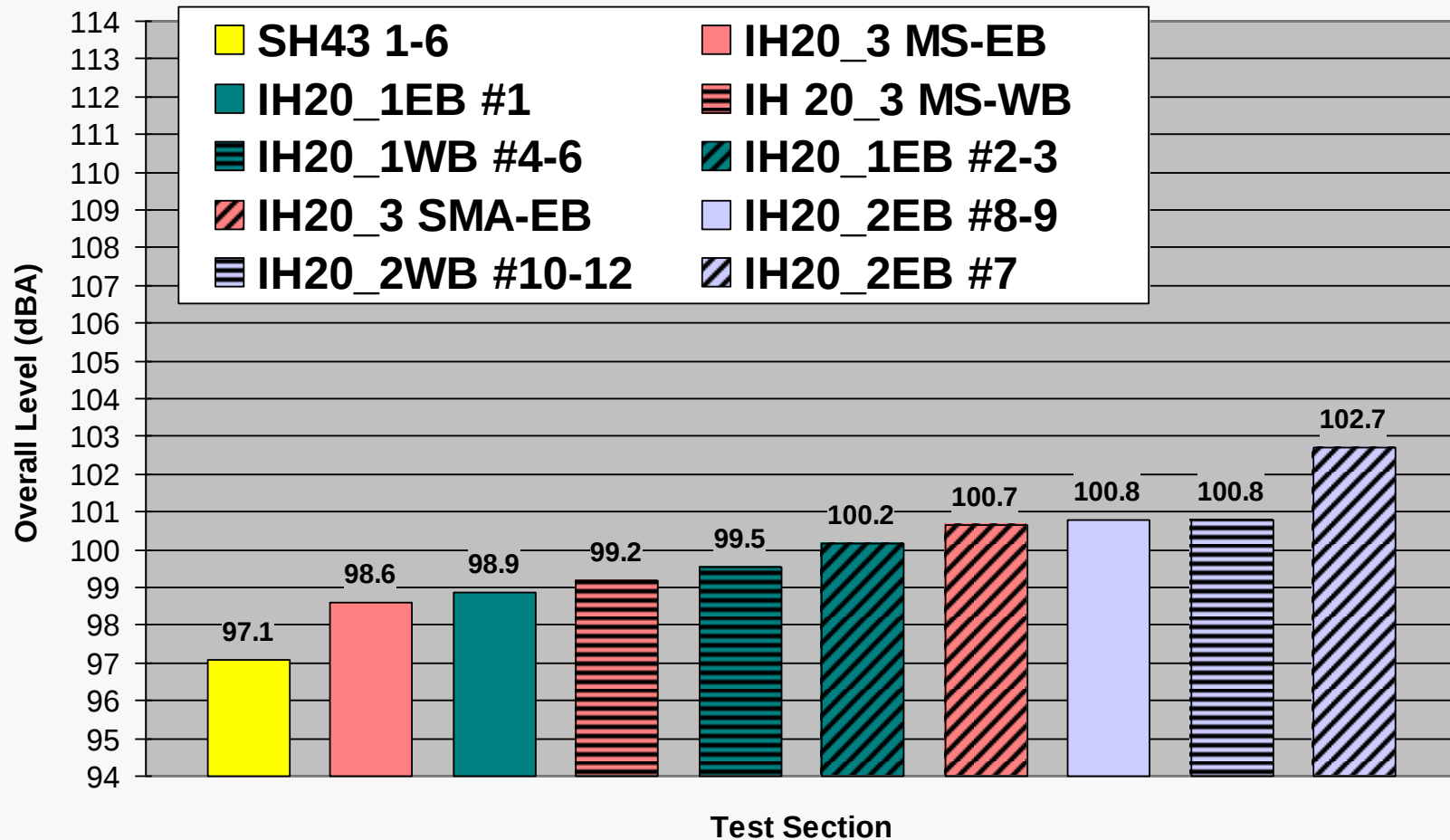


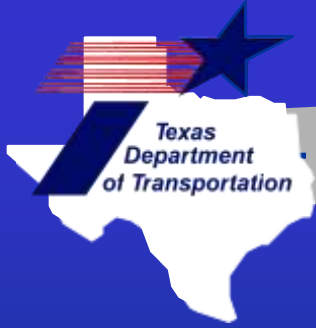
OBSI Site 440'

# Tire/Pavement Noise Sound Intensity Flexible Pavement Test Sections - TxDOT & CTR



**Tire/Pavement Noise Sound Intensity**  
**Microsurface Pavement Test Sections, Near Marshall, TX - Comparison**





# *Tire - Pavement Noise*

## **Texas OBSI Rodeo's**

**9/6/2007 & 7/15/2008**

### Participants

TxDOT

CTR

The Transtec Group, Inc.



# *Tire - Pavement Noise -*

## **Items to Note:**

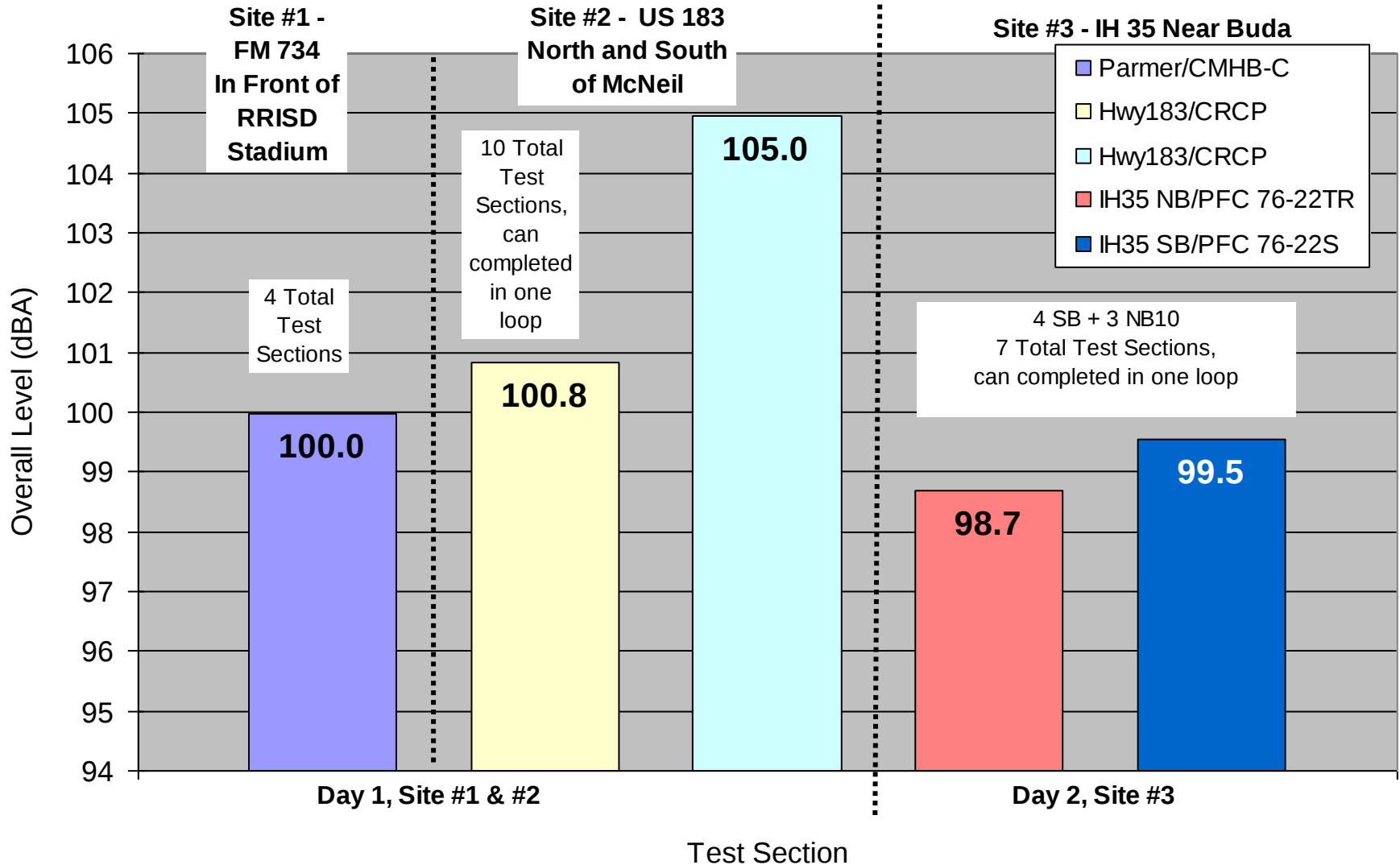
### **TxDOT & CTR**

- Used Single Probe OBSI System
- Larson Davis Analyzer
- 2001 Chevrolet Malibu Test Vehicle
- 15" Tiger Paw AWP Test Tire (9/6/07 CTR & TxDOT)
- 16" Tiger Paw SRTT Test Tire (7/15/08 TxDOT only)

### **Transtec**

- Used Dual Probe OBSI (TGI Design 9/6/07)
- Used Dual Probe OBSI (Donavan Design 7/15/08)
- Transtec Designed Sound Analyzer
- Buick Test Vehicle
- 16" Tiger Paw SRTT Test Tire

**Tire/Pavement Noise Sound Intensity  
Local Rodeo Test Sections - Site Comparison**



# FM 734 Test Site, Section 1T



# IH 35 Test Site, Section 7T

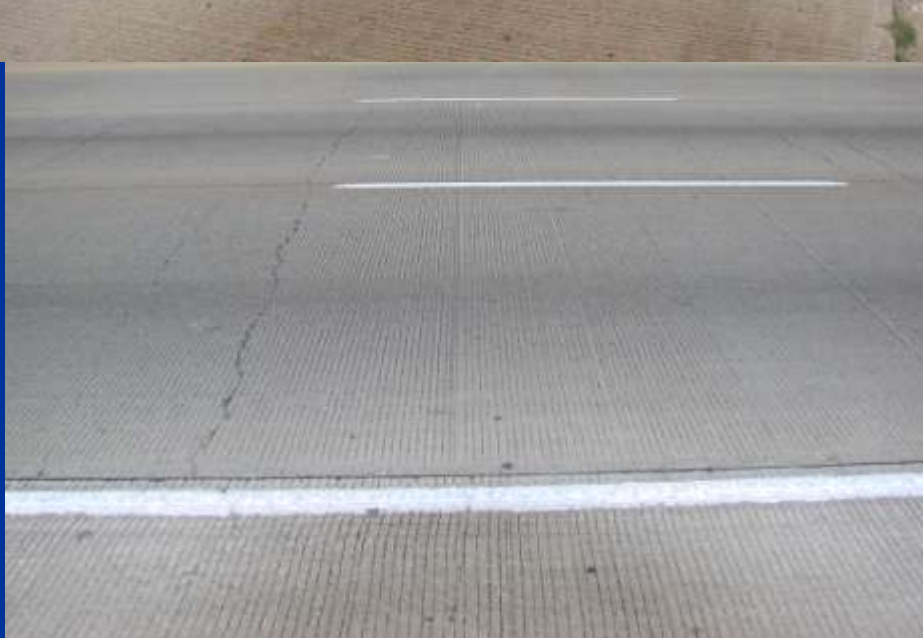


# US 183 Test Site, Section 5T Newer CRCP



# US 183 Test Site, Section 10T

## Older CRCP



## 2007 Local OBSI Rodeo - TxDOT vs TGI - Austin, TX

### US 183 - Newer Concrete

|     | TxDOT | TGI   | Diff |
|-----|-------|-------|------|
| 5T  | 102.1 | 104.7 | 2.6  |
| 6T  | 102.7 | 105.5 | 2.8  |
| 7T  | 101.0 | 103.9 | 3.0  |
| 8T  | 101.2 | 103.5 | 2.3  |
| 9T  | 101.7 | 103.6 | 1.8  |
| Avg | 101.7 | 104.2 | 2.5  |

Avg Diff  
of Runs

2.5

### IH 35 SB - PFC

|     | TxDOT | TGI   | Diff |
|-----|-------|-------|------|
| 7T  | 101.0 | 101.9 | 0.9  |
| 8T  | 100.8 | 102.2 | 1.4  |
| 9T  | 100.4 | 102.0 | 1.6  |
| 10T | 100.9 | 102.1 | 1.3  |
| Avg | 100.7 | 102.0 | 1.3  |

Avg  
Diff of  
Runs

1.3

### FM 734 - CMHB-C

|     | TxDOT | TGI   | Diff |
|-----|-------|-------|------|
| #1T | 101.0 | 105.2 | 4.1  |
| #2T | 101.7 | 105.6 | 4.0  |
| #3T | 100.2 | 104.4 | 4.2  |
| #4T | 101.6 | 104.9 | 3.3  |
| Avg | 101.1 | 105.0 | 3.9  |

Avg Diff  
of Runs

3.9

### US 183 - Older Concrete

|     | TxDOT | TGI   | Diff |
|-----|-------|-------|------|
| 10T | 106.2 | 108.0 | 1.8  |
| 11T | 106.3 | 108.1 | 1.7  |
| 12T | 106.8 | 108.6 | 1.8  |
| 13T | 106.4 | 107.7 | 1.4  |
| 14T | 105.9 | 107.3 | 1.4  |
| Avg | 106.3 | 107.9 | 1.6  |

Avg Diff  
of Runs

1.6

### IH 35 NB - PFC

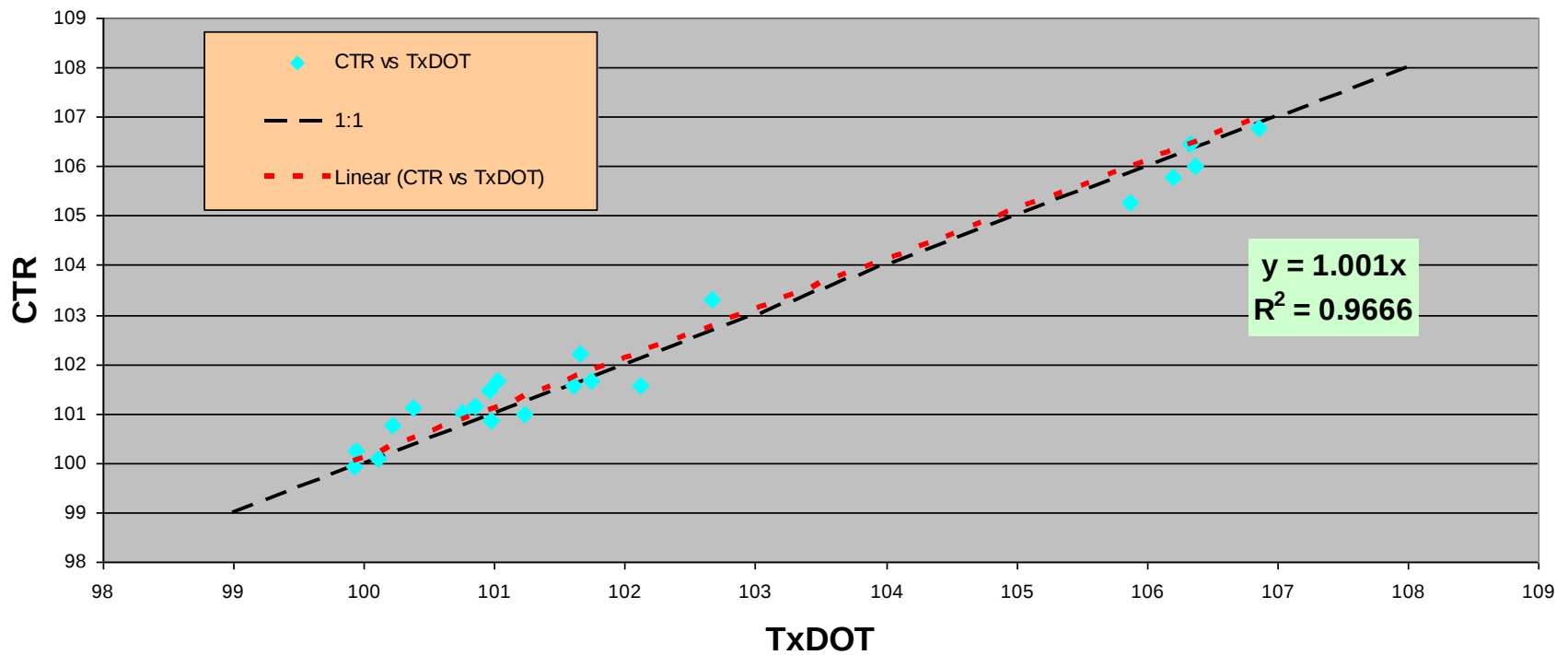
|     | TxDOT | TGI   | Diff |
|-----|-------|-------|------|
| 11T | 99.9  | 100.9 | 1.0  |
| 12T | 99.9  | 100.7 | 0.8  |
| 13T | 100.1 | 100.6 | 0.5  |
| Avg | 100.0 | 100.7 | 0.8  |

Avg  
Diff of  
Runs

0.8

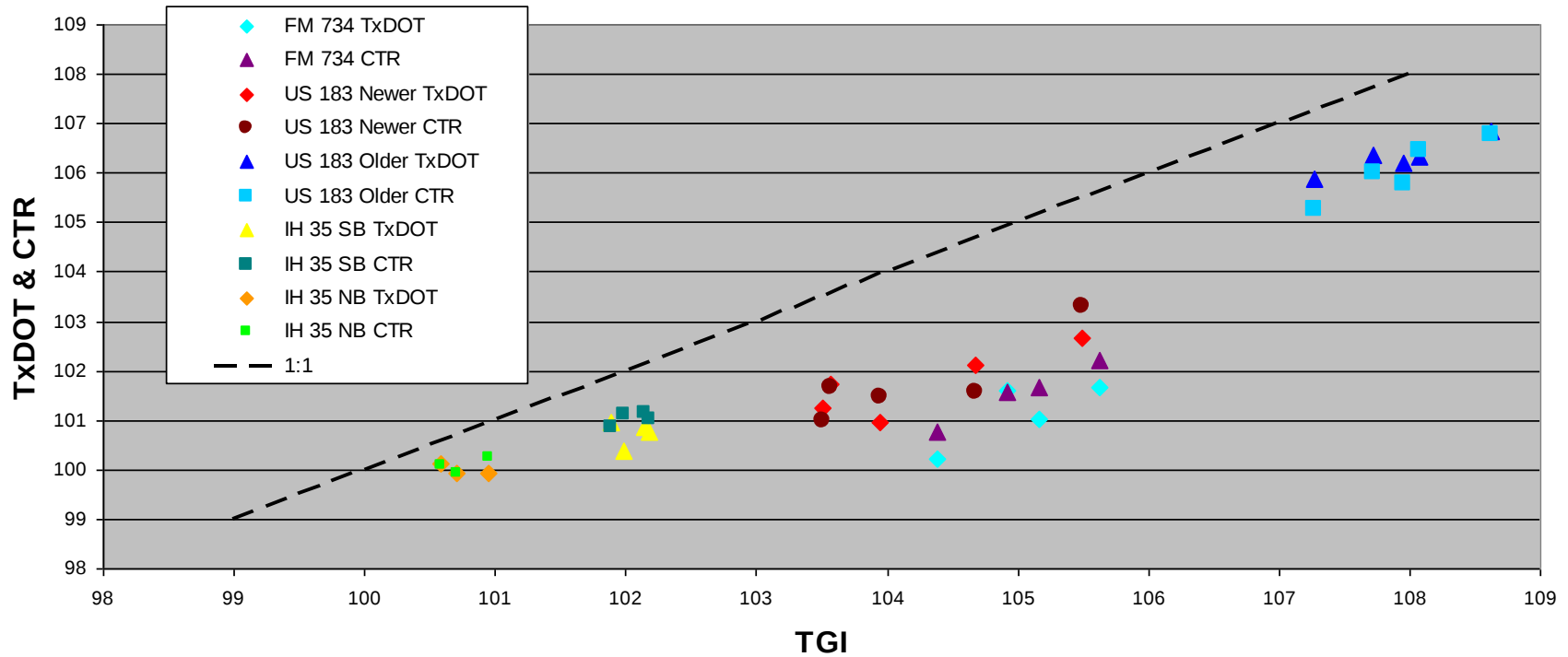
# Original Data Collection on 9/6/2007

Tire/Pavement Noise Sound Intensity  
OBSI Local Rodeo Test Sections - Comparison



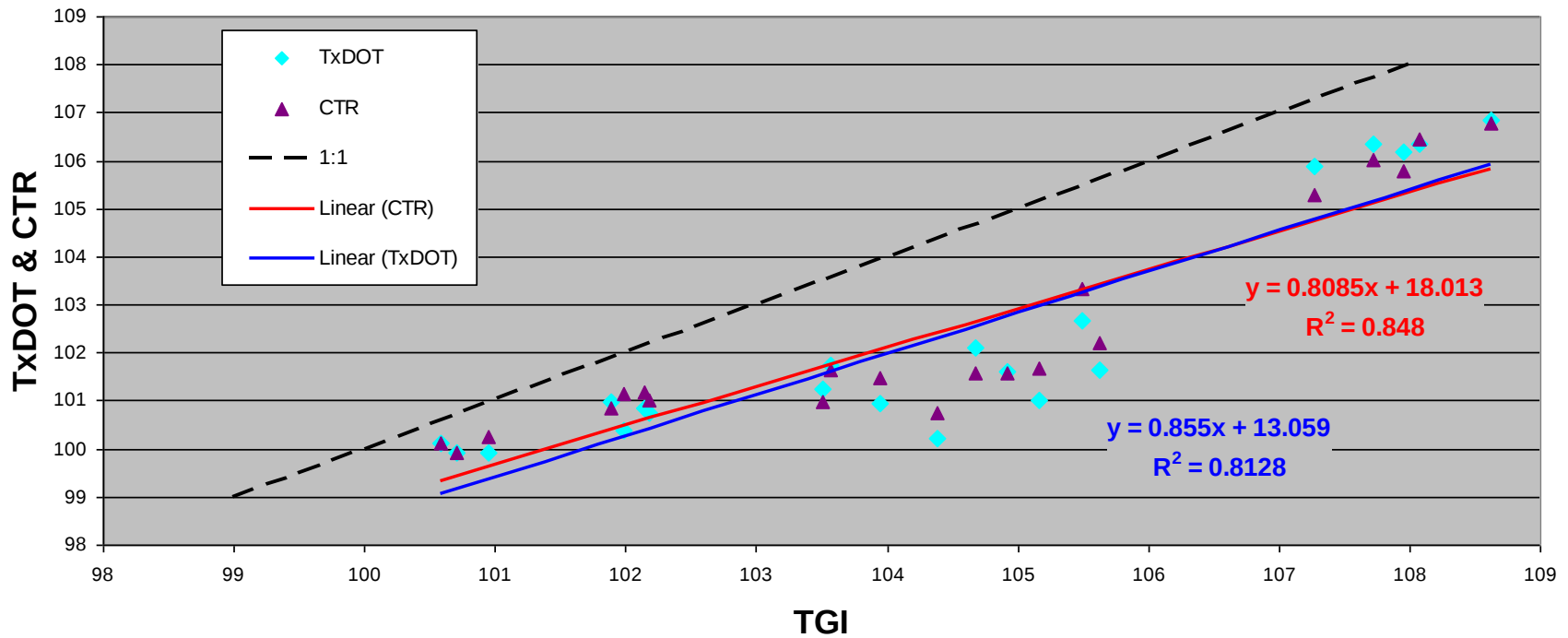
# Original Data Collection on 9/6/2007

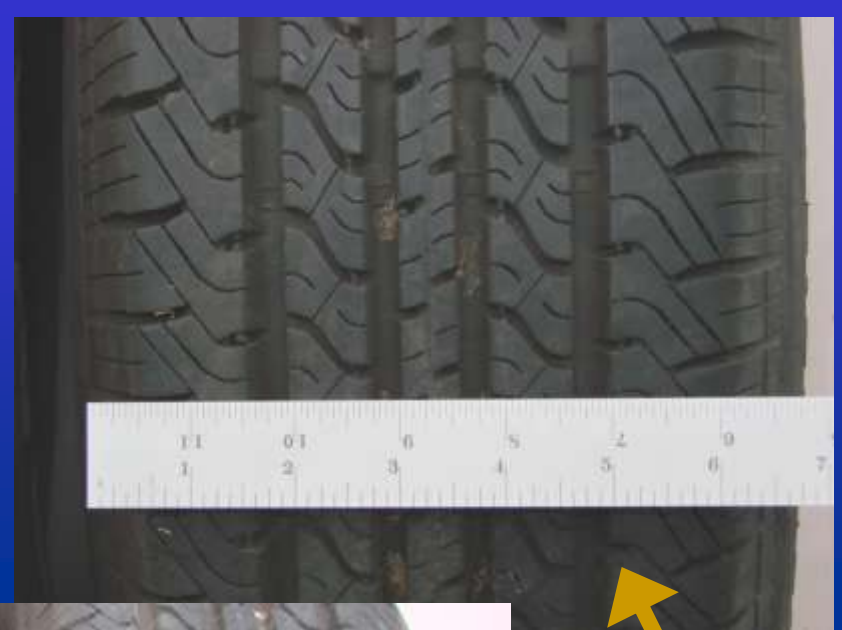
**Tire/Pavement Noise Sound Intensity  
OBSI Local Rodeo Test Sections - Comparison**



# Original Data Collection on 9/6/2007

## Tire/Pavement Noise Sound Intensity OBSI Local Rodeo Test Sections - Comparison





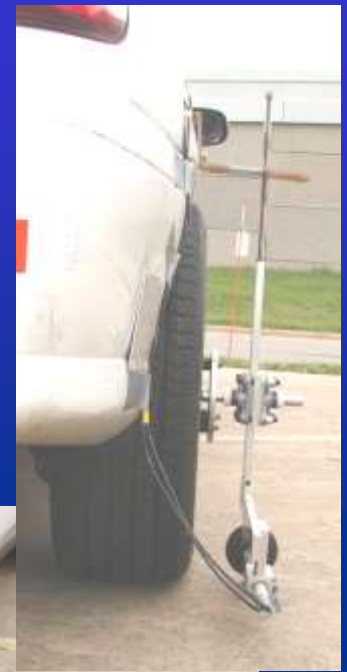
**SRTT**

**AWP**



# AWP Tire





**SRTT Tire**

## 2007 Local OBSI Rodeo - TxDOT vs TGI - Austin, TX

Follow-Up with TxDOT using a SRTT Tire: Data Collected on 7/15/08

### US 183 - Newer Concrete

|     | TxDOT | TGI   | Diff |
|-----|-------|-------|------|
| 5T  | 102.9 | 105.1 | 2.2  |
| 6T  | 103.0 | 105.9 | 2.9  |
| 7T  | 102.6 | 104.2 | 1.6  |
| 8T  | 103.1 | 103.5 | 0.4  |
| 9T  | 103.4 | 103.8 | 0.4  |
| Avg | 103.0 | 104.5 | 1.5  |

Avg Diff of Runs

**1.5**

### FM 734 - CMHB-C

|     | TxDOT | TGI   | Diff |
|-----|-------|-------|------|
| #1T | 102.8 | 104.4 | 1.6  |
| #2T | 104.0 | 104.7 | 0.7  |
| #3T | 102.5 | 103.9 | 1.4  |
| #4T |       |       |      |
| #5T | 103.3 | 104.5 | 1.2  |
| Avg | 103.2 | 104.4 | 1.2  |

Avg Diff of Runs

**1.2**

### US 183 - Older Concrete

|     | TxDOT | TGI   | Diff |
|-----|-------|-------|------|
| 10T | 106.4 | 107.4 | 1.0  |
| 11T | 106.7 | 107.2 | 0.5  |
| 12T | 106.8 | 107.8 | 1.0  |
| 13T | 106.4 | 107.2 | 0.8  |
| 14T | 106.1 | 107.0 | 0.9  |
| Avg | 106.5 | 107.3 | 0.8  |

Avg Diff of Runs

**0.8**

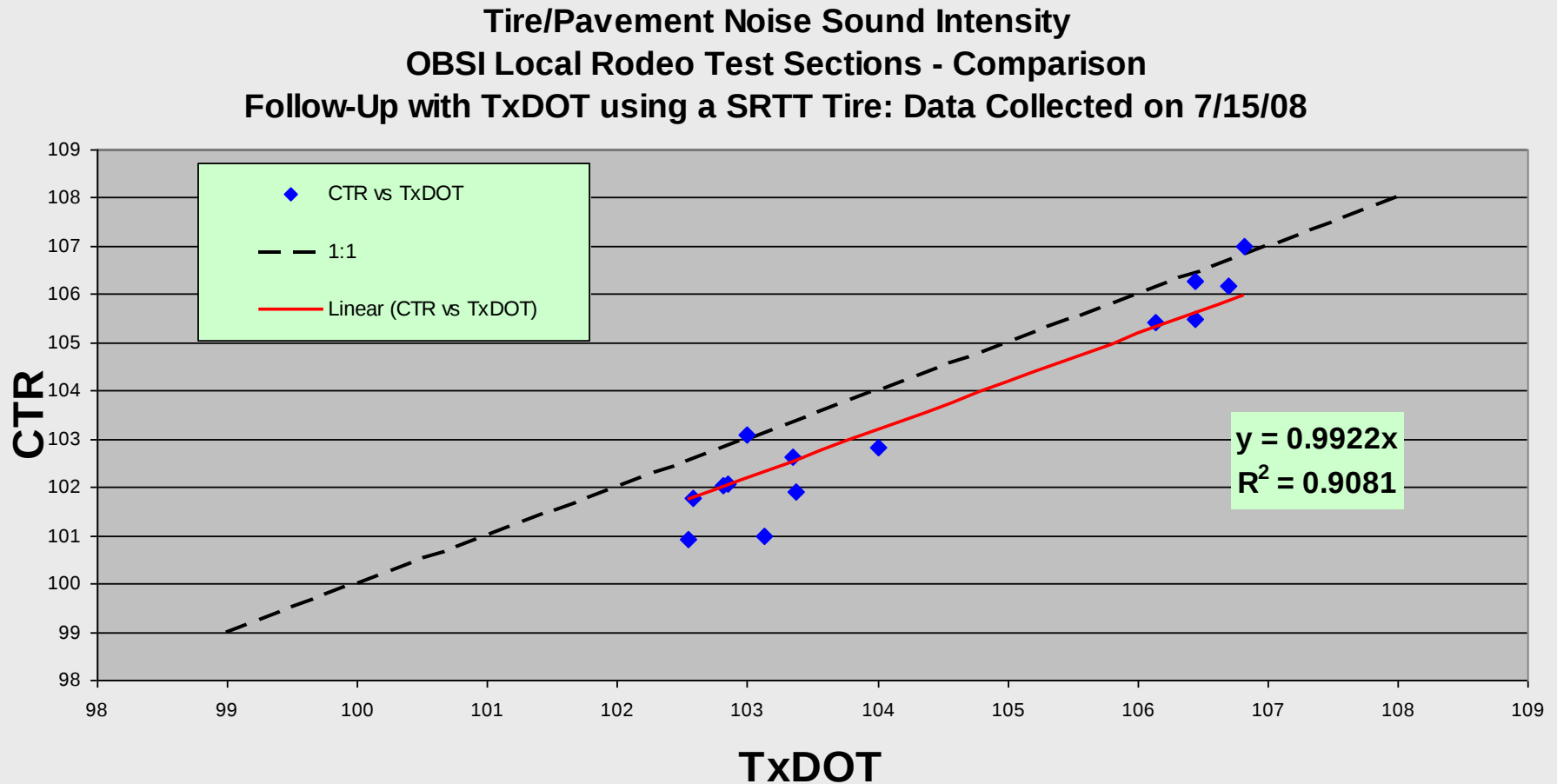
**0.7** dBA = Tire Age Difference

**0.2** dBA = Microphone Spacing

**0.3** dBA = Environmental Correction

**1.2** dBA = Average Difference FM 734

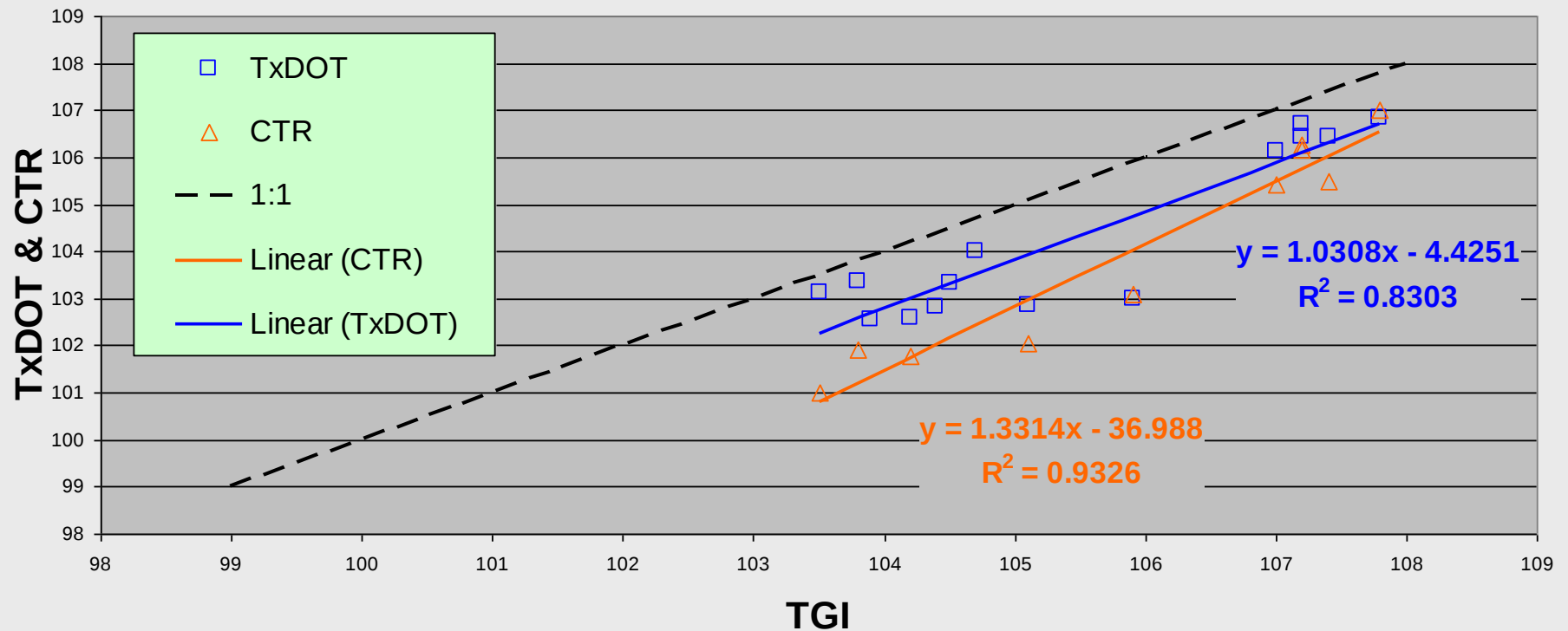
# Follow-Up Data Collection on 7/15/2008



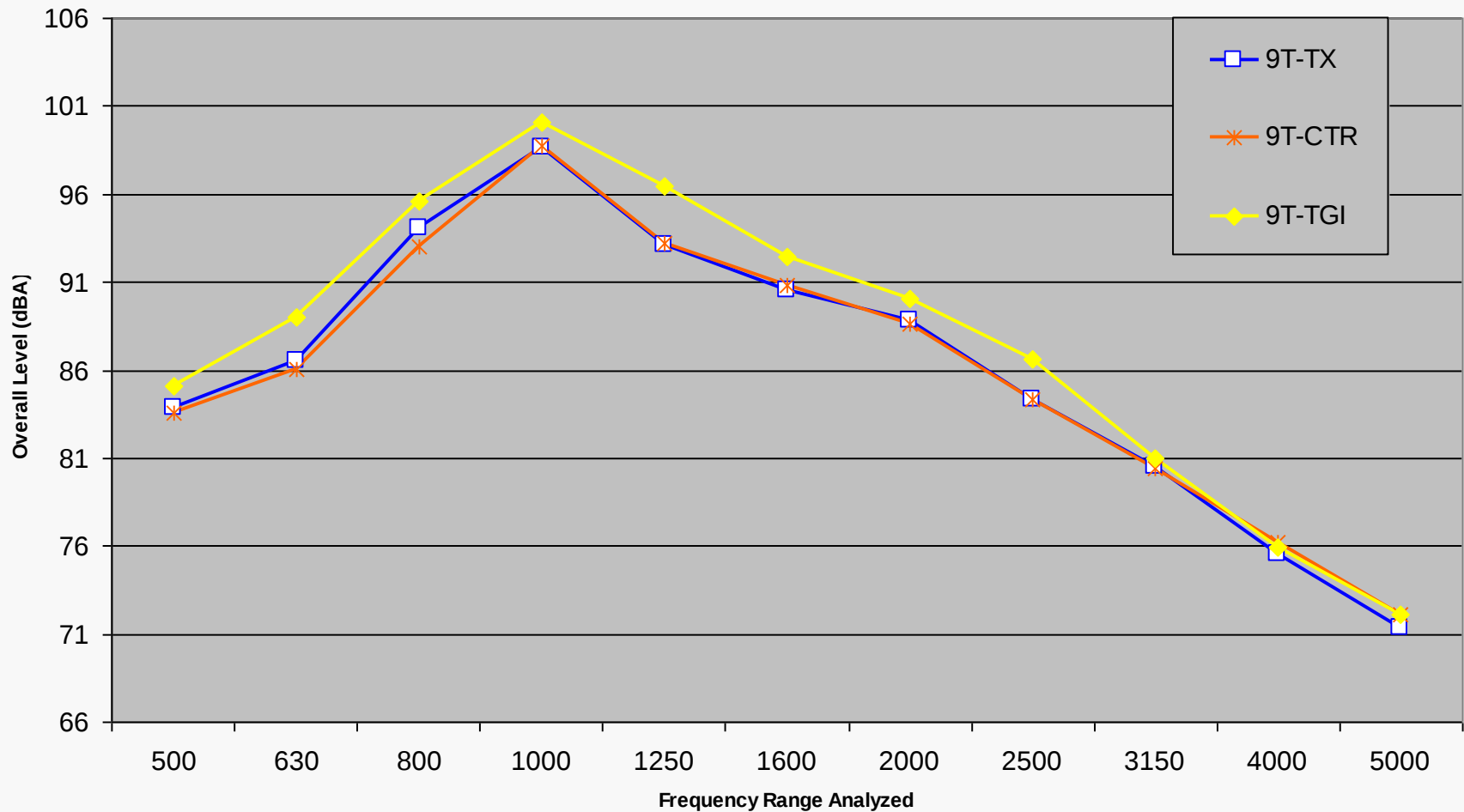
# Follow-Up Data Collection on 7/15/2008

## Tire/Pavement Noise Sound Intensity OBSI Local Rodeo Test Sections - Comparison

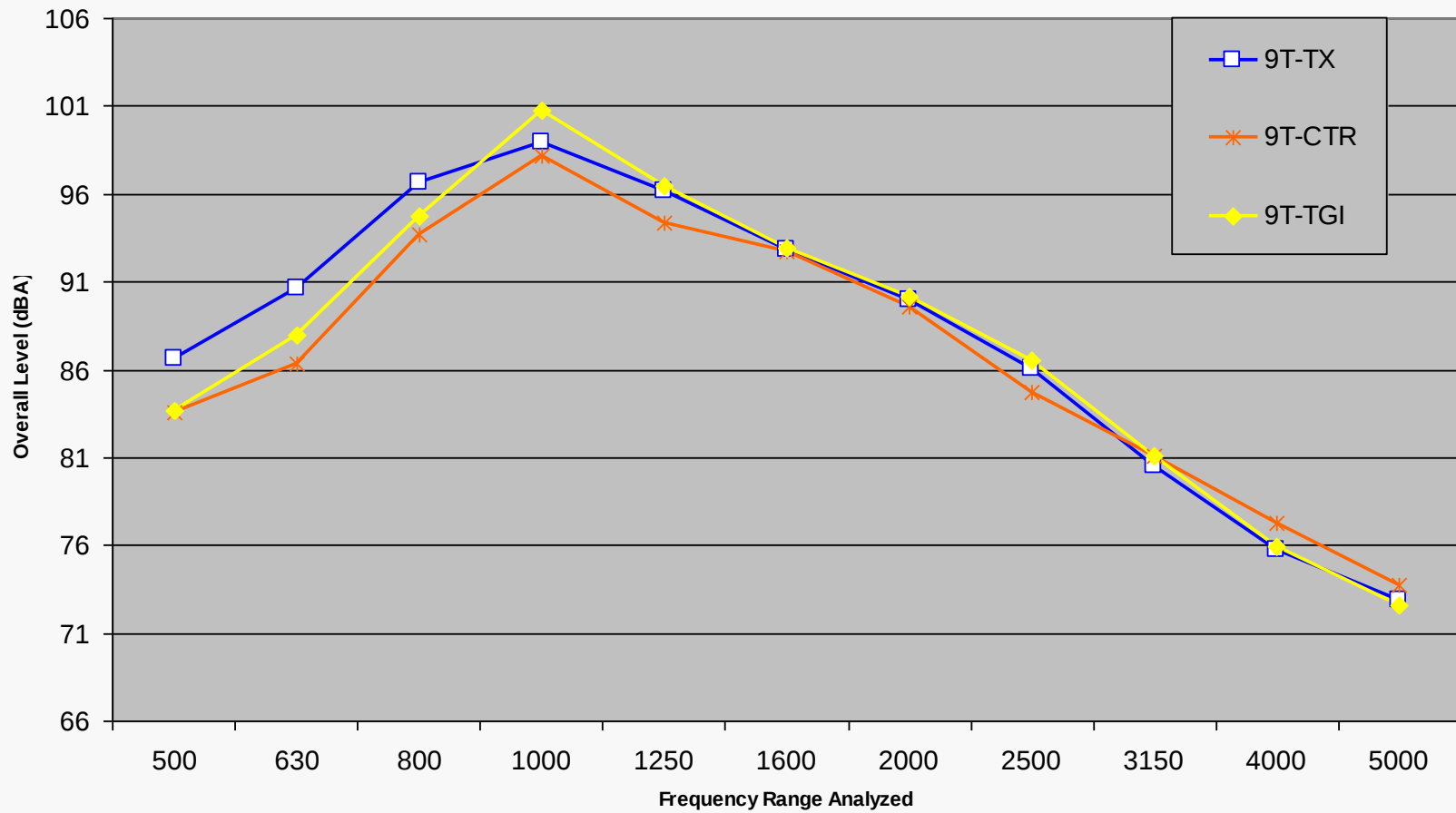
Follow-Up with TxDOT using a SRTT Tire: Data Collected on 7/15/08



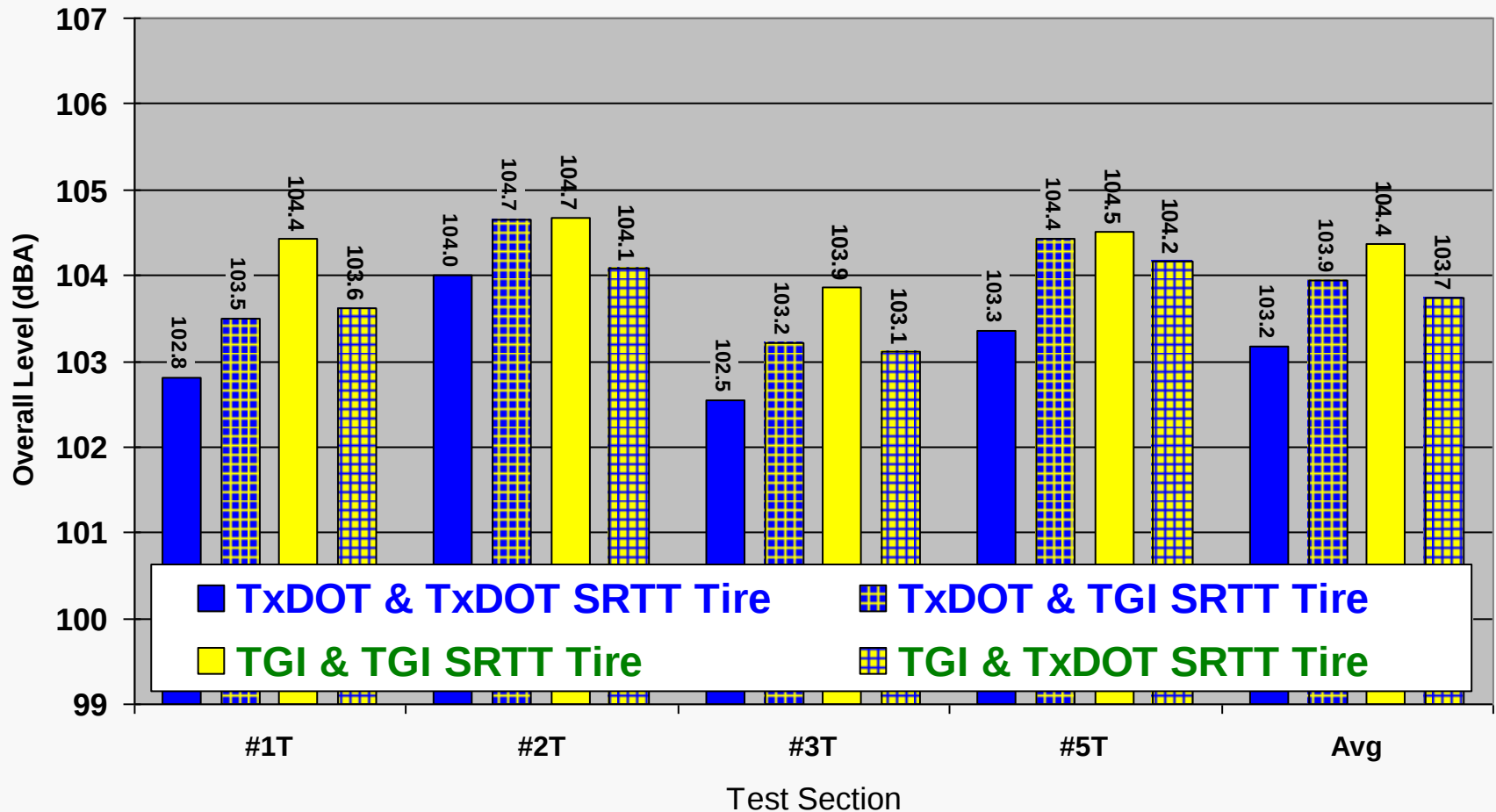
## Tire/Pavement Noise Sound Intensity US 183 Test Section - 9T - 9/6/2007



## Tire/Pavement Noise Sound Intensity US 183 Test Section - 9T - 7/15/2008



**Tire/Pavement Noise Sound Intensity**  
**FM 734 OBSI Local Rodeo Test Sections - New Vs Older SRTT Tire**  
**Comparison**  
**Tires Run on TxDOT & Transtec Vehicles - 7/15/2008**



**SPTC**

Noise Pooled Fund

**Other DOTs**

Noise Studies

International

Tours / Studies

**AASHTO**

SCOM / JToP/  
NCHRP

**Volpe/FHWA**

Acoustic Center

**TRB**

Noise Session

**Noise Std ETG**

Manuel Trevino

**Design / Policy**

Jeff Seiders

**PAM Branch**

**John Wirth**

Magdy Mikhail

**Flex Branch**

Dale Rand

**Conc Branch**

Lisa Lukefahr

**RTI**

German Claros

**Research**

**CTR**

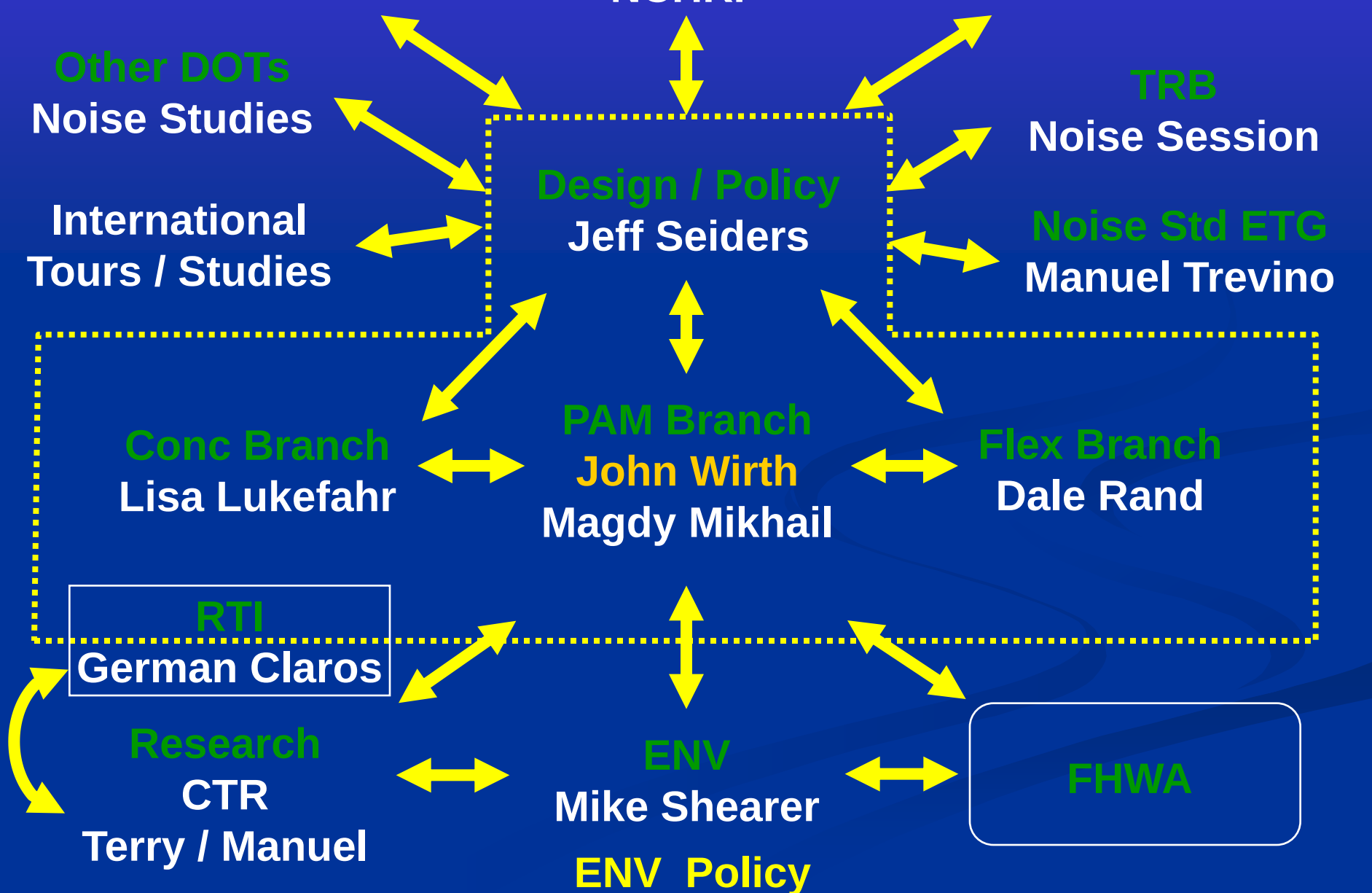
Terry / Manuel

**ENV**

Mike Shearer

**ENV Policy**

**FHWA**





# *Tire - Pavement Noise*

Special thanks  
for help and support:

- CTR
- The Transtec Group (Rob Rasmussen)
- Dr Paul Donovan (Illingworth & Rodkin, Inc)



# *Tire - Pavement - Noise*

# Thank You!

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