SEAUPG 2004 Conference - Baton Rouge
Presented By Dale A. Rand, P.E. - Texas DOT

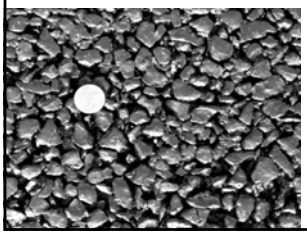
Permeable Friction Courses

TxDOT Experiences

SEAUPG

Baton Rouge, La.

Nov. 17, 2004



Dale A. Rand, P.E.
TxDOT Construction Division
Flexible Pavements Branch

Background

- TxDOT used OGFC (plant mix seal) up until the early 1990s
- TxDOT ceased using OGFC in the early 90s due to durability issues
- TxDOT started using PFC in 2000
- The use of PFC is growing at a steady rate
- There are approximately 50 PFC projects completed or currently under construction in Texas

Comparison of Plant Mix Seal and Permeable Friction Course

Characteristic	Plant Mix Seal	Permeable Friction Course
Binder Grade	AC-10 AC-10 (+ 3% latex)	PG 76-22 Asphalt Rubber (A-R)
Binder %	5 – 7%	6 – 7 % (PG 76) 8 – 10% (A-R)
Fiber	N/A	0.3 % Cellulose or Mineral
Cantabro Loss	N/A, > 30 %	< 20%
Permeability	Moderate	High
Air Voids	12% – 15%	18% - 22%
Production Temperature	212F – 220F Not all moisture removed	300F – 350F Removes all moisture
Drain down	0.5 – 1.5%	0.0 Typical 0.3% Maximum
Typical thickness	1.0 inch or less	1.25 to 1.5 inches
Typical life	5 – 8 years	10 – 14 years

OGFC – Gradation Comparison (% Passing)

Sieve Size	Texas Grade 1 Plant Mix Seal	Texas Grade 2 Plant Mix Seal	Georgia 1/2 inch Modified OGFC	Georgia 1/2 inch PEM	ODOT OGFC	Texas 1/2 inch PFC PG76
1/2 inch	95-100	95-100	85-100	90-100	100	80-100
3/8 inch	50-80	50-80	55-75	35-60	90-100	35-60
#4	0-8	5-20	15-25	10-25	25-40	1-20
#8	N/A	N/A	5-10	5-10	N/A	1-10
#10	0-4	5-15	N/A	N/A	0-10	N/A
#200	N/A	N/A	2-4	1-4	0-5	1-4

National Asphalt Pavement Association Sheldon G. Hays Award

- Wichita Falls District
- US 287 – Wilbarger County
- Vernon Area Office
- Contractor – Duininck Bros.
- Surface Mix – 1.5 inches of PFC placed on Superpave level up mix
- Average IRI = 43 inches per mile
- Award is given to 1 hot mix project per year

US 287 - Wilbarger Co.

Comparison of Vehicle Spray/Ride Quality

CRCP

SFHMACP (Superpave)

PFC

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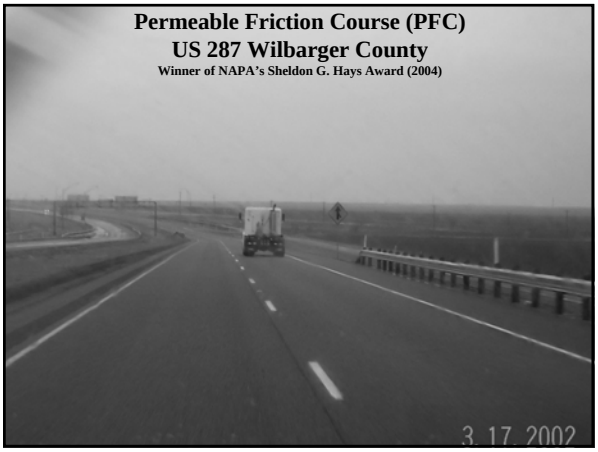
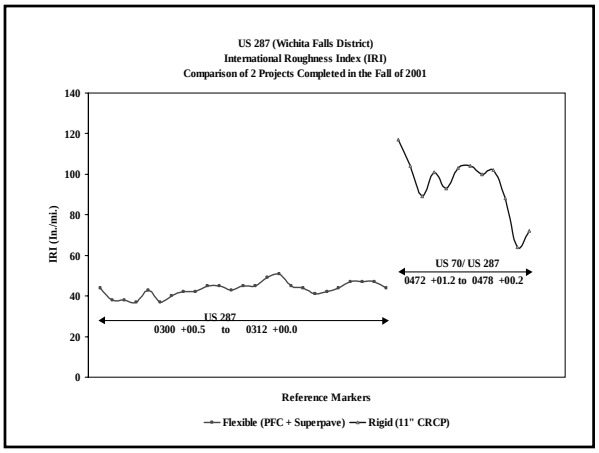
Concrete Pavement
US 287 Wilbarger County

Concrete Pavement
US 287 Wilbarger County

Stone Filled (Superpave) HMAC
US 287 Wilbarger County

Permeable Friction Course (PFC)
US 287 Wilbarger County
Winner of NAPA's Sheldon G. Hays Award (2004)





Rubber Pavements Association Outstanding Project Award

- San Antonio District
- IH 35 – Bexar County
- New Braunfels Area Office
- Contractor – Dean Word Company
- Surface Mix – 1.5 inches of A-R PFC

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IH 35 – San Antonio
PFC Overlay on Existing CRCP

- Existing concrete pavement
  - Relatively sound structurally (Durable)
  - Approximately 20 years old (Durable)
  - History of numerous wet weather accidents (Safety?)
  - Ride Quality was poor (IRI = 200) (Comfort?)
  - Considered to be one of the loudest pavement surfaces around (Comfort?)

A-R PFC Overlay on CRCP
IH 35 San Antonio

- 1.5 inches of A-R PFC
  - Improved the ride quality of the existing CRCP by approximately 61%
  - Improved the skid resistance by over 200%
  - Reduced the noise level by an average of 8 to 14 decibels (measured by 3 different individuals)
  - Significant reduction in major accidents after the PFC overlay

Accident, Climatic Data
I-35 San Antonio

Before/After Resurfacing CRCP with PFC

Accident Data, I-35

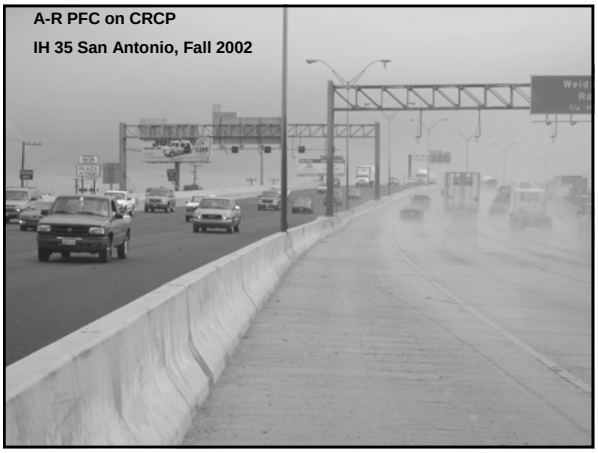
- Before placing PFC
  - July 1, 2001 - June 30, 2002
- After placing PFC
  - November 1, 2002 - October 31, 2003
- Accident categories
  - Major = injury accident
  - Minor = non-injury accident
- Information provided by the San Antonio Police Department (SAPD)

Climatic & Accident Data

IH 35 San Antonio: Before and After PFC Overlay

July 2001-June 2002	Nov 2003-Oct 2003
• Total Precipitation:	• Total Precipitation:
– 31.78 inches	– 32.63 inches
• Total Days with…	• Total Days with…
– Measurable precipitation: 69	– Measurable precipitation: 99
• Major Accidents: 85	• Major Accidents: 48
• Major Accidents on Days with Precipitation: 39	• Major Accidents on Days with Precipitation: 19

Climate data obtained from National Oceanographic and Atmospheric Administration



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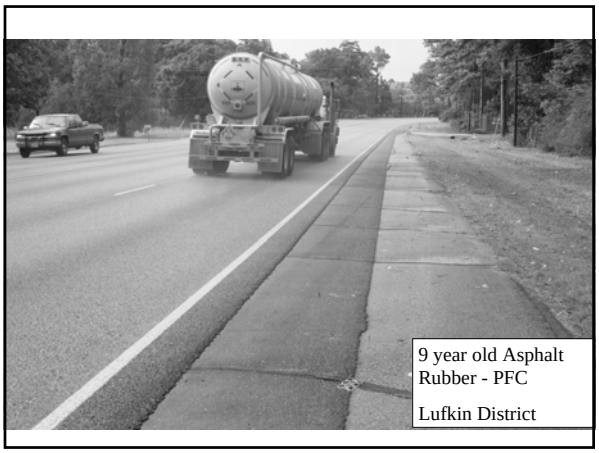

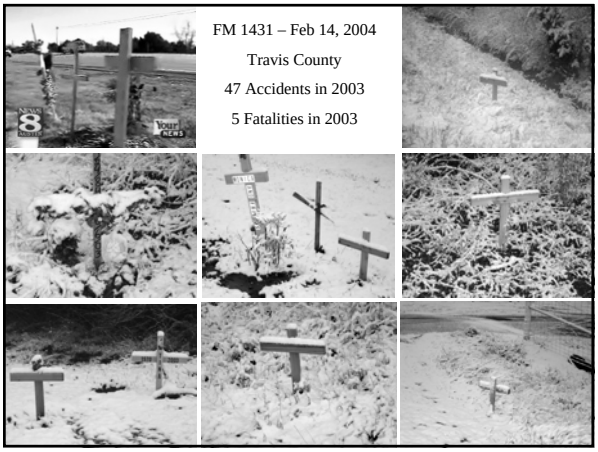

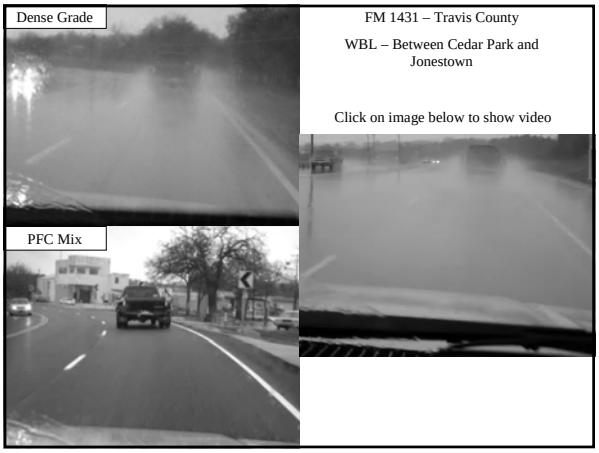

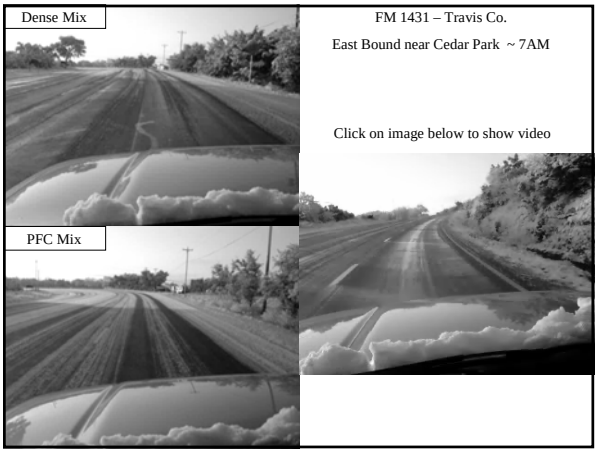

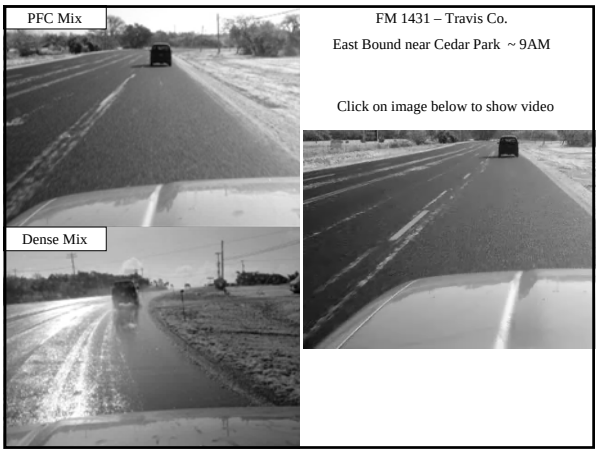

Conclusions

- PFC may be the most effective tool for improving the performance of existing (and new) pavements (including concrete)
- PFC is an excellent "Public Relations" tool
- PFC and SMA help meet TxDOT's vision of having comfortable, safe, and durable pavements
  - Opinion – In warm climate regions, PFC is unmatched in terms of safety and comfort