

Warm Mix Asphalt at MnROAD



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Mn/DOT

13th Annual Minnesota Pavement Conference

Benefits of WMA

Environmental

- ★ Lower greenhouse gas emissions
- ★ Lower fuel consumption
- ★ Reduced exposure of workers to fumes

Performance

- ★ Reduced binder aging
- ★ More time for mixture compaction
- ★ Cold weather paving
- ★ Longer haul distances

Early WMA Trials at MnROAD (Oil Gravel)

Cell 32 (1998) – Cold Mix Paving Practice

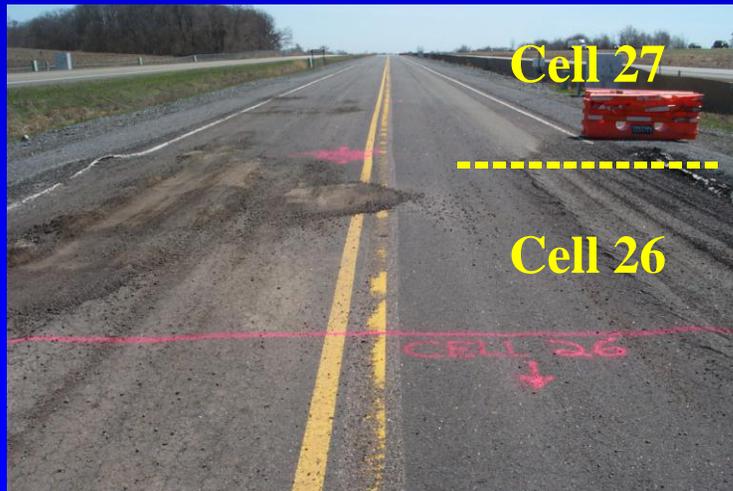
Cell 27 (1999) – Chip Seal / Large Stone Base

Cell 28 (1999) – Oil Gravel (luke warm mix) / Large Stone Base

Cell 26 (2000) – Oil Gravel (warm mix) / Reclaimed Base

Cell 27 (2000) – Oil Gravel (warm mix) / Large Stone Base

Several County Roads throughout Minnesota



- ★ Oil Gravel requires solid base
- ★ No Transverse Cracking or Rutting
- ★ Some Fatigue and Rough Ride
- ★ Similar to current WMA development

After 12 years and a catchy name...

Warm Mix Asphalt



WMA – Mathy Process

- ★ **Olmsted & Goodhue Counties July 2007**

2008 Planned Projectes

- ★ **Bituminous Roadways**
- ★ **Crow Wing County**
- ★ **MnROAD Mainline – 6 Cells, 1 process**

2008 MnROAD Construction

Warm Mix Asphalt						Control
15	16	17	18	19	23	24
3" WM	5" WM 58-34	5" WM 58-34	5" WM 58-34	5" WM 58-34	5" WM 58-34	3" 58-34
11.1" 64-22 1993 HMA	12" 100% recycle PCC	12" 50% RePCC 50% Class 5	12" 100% RAP	12" CI-5	12" Mesabi Ballast	4" Cl6sp
	Clay	Clay	Clay	Clay	Clay	Sand
58-34 Surface Binder	12" Cl3sp	12" Cl3sp	12" Cl3sp	12" Cl3sp	12" Cl3sp	100' Fog Seal 2008
	7" Select Gran	7" Select Gran	7" Select Gran	7" Select Gran	7" Select Gran	100' Chip Seals 2009 2010 2011 2012
	Clay	Clay	Clay	Clay	Clay	

WAM-Foam



Rediset WMX



Low Emission Asphalt



Aspha-Min



Gencor



Advera



Terex



Sasobit



Stansteel



REVIX



Evotherm



Double Barrel



Cecabase RT



Green

Evotherm 3G – Revix

**WATERLESS, REDUCED
TEMPERATURE MIX
TECHNOLOGY**

**NOT WARM MIX
BUT
HOT MIX AT A COOLER
TEMPERATURE**

Process Development

- **PROCESS IS A CO-DEVELOPMENT OF MATHY TECHNOLOGY & ENGINEERING SERVICES AND PARAGON TECHNICAL SERVICES, INC**
- **A PATENT APPLICATION HAS BEEN FILED ON THE TECHNOLOGY**

“It was our belief that if you could coat the aggregate you could compact the mix given current roller technology”

Revix Summary

- Several different additives evaluated in the field, more in the lab.
- Temperature reductions range from 60 to 80°F below typical hot mix temperatures for the same mix.
- All additives necessary to produce the mix are typically added at the asphalt terminal.
 - ★ Additives can be added at the HMA plant.
 - ★ Binder preferably comes to contractor ready to use—all he does is run the plant as he normally does but at a lower temperature
- A mix design is necessary to adjust additive loading and check TSR properties
- Mathy demonstrated that irrespective of plant type or possible moisture content left from aggregate and/or RAP that this approach would work

Construction Experiences – Plant

Hardrives plant in Becker

Wear & Non Wear

Level 4 Superpave mixes

Used 20% RAP from MnROAD millings

Binder shipped from Mathy with WMA
chemical package already added

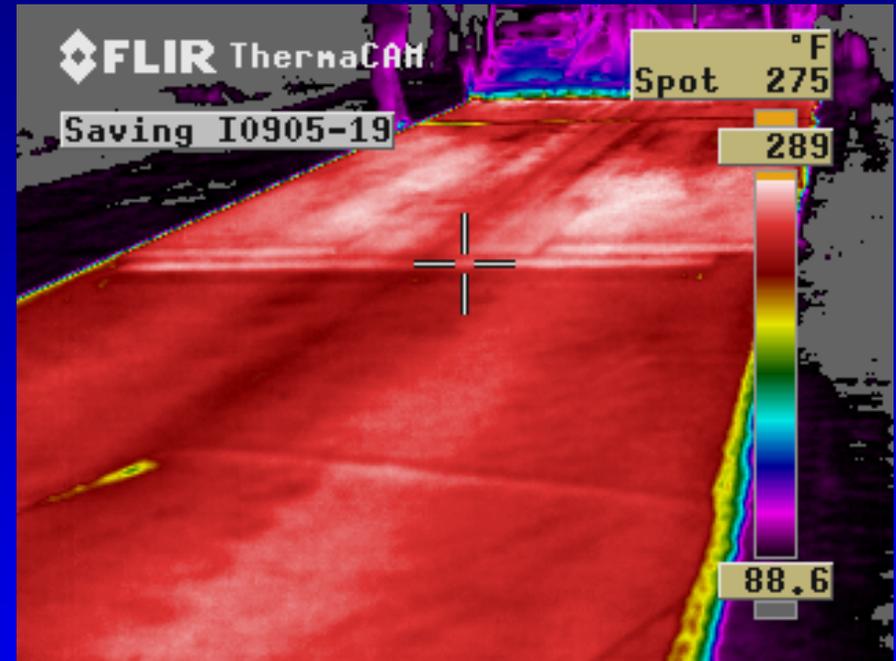
Construction Experiences – Paving

Reduced fumes and emissions

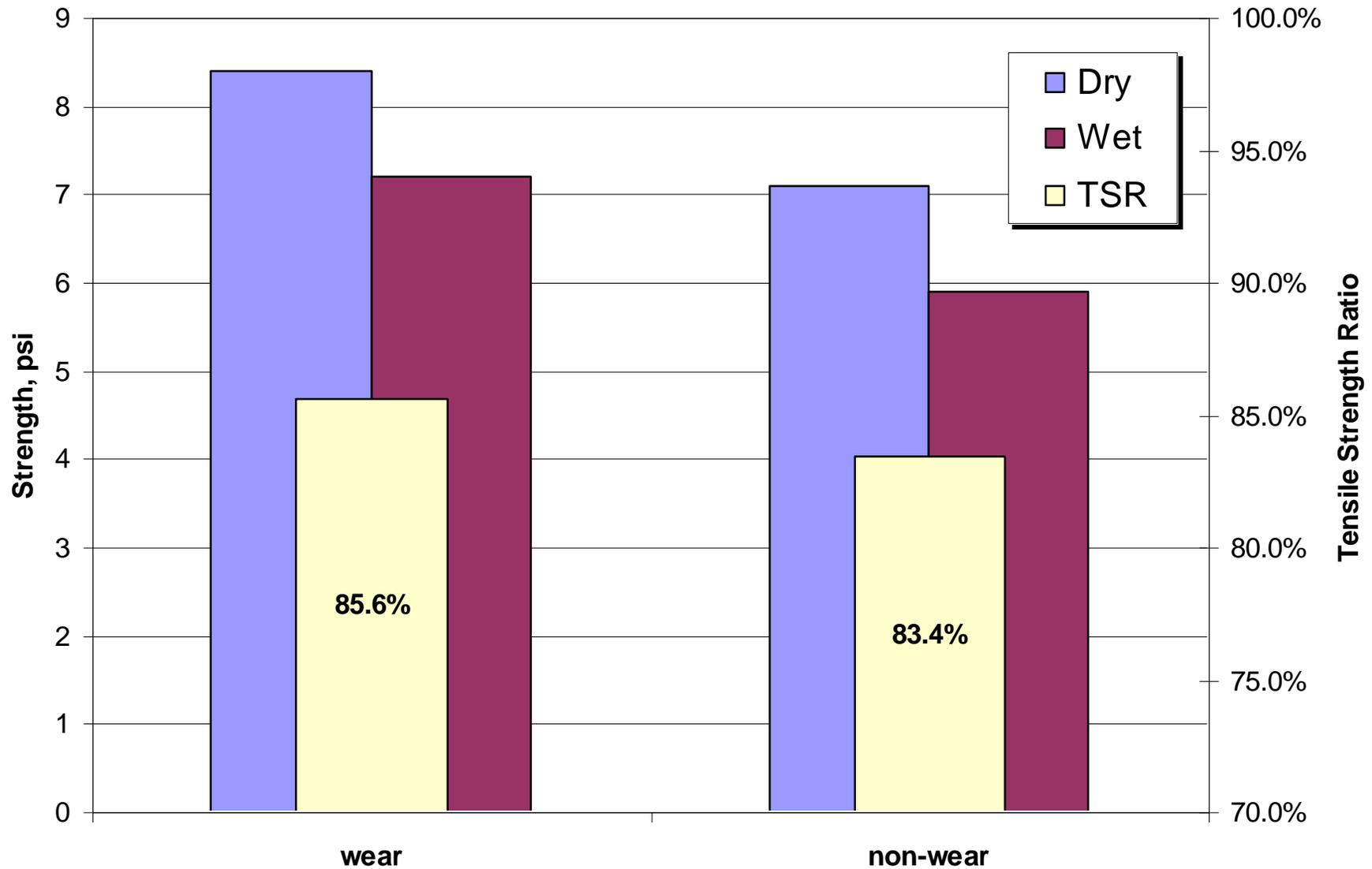
Equal compaction to HMA with less effort

Easy to work with for the paving crew

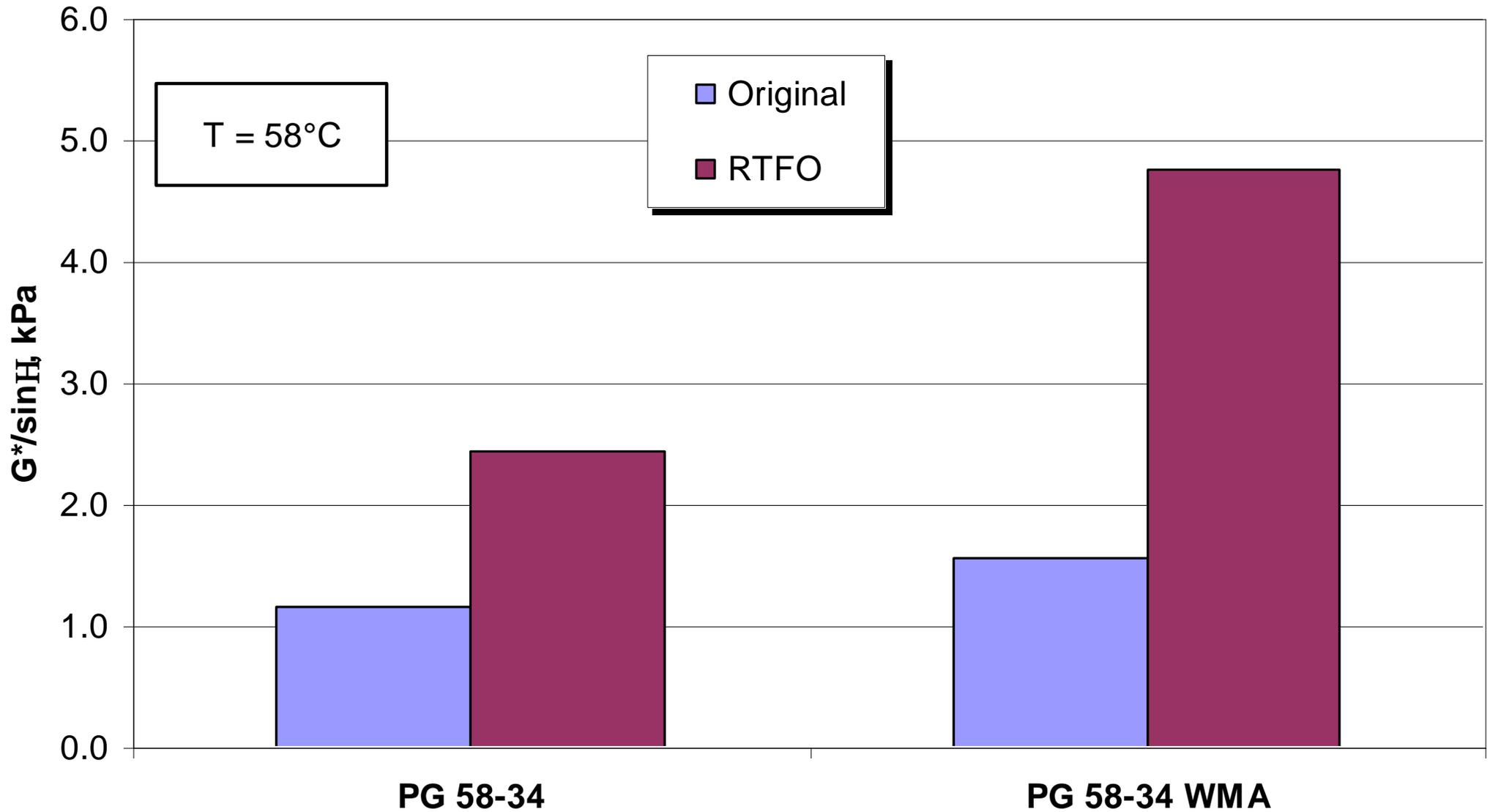
Still slightly tender the following morning



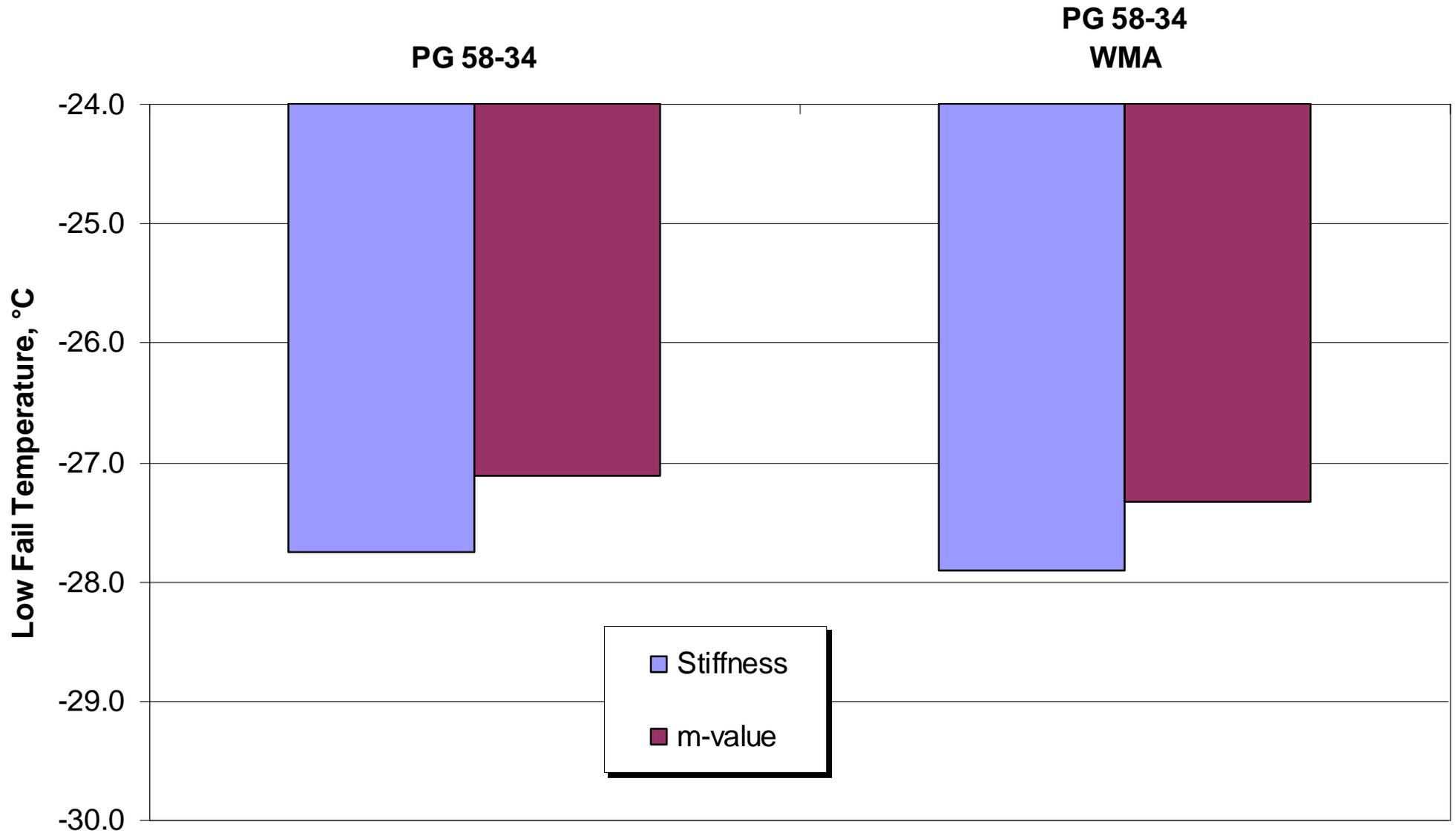
Stripping Potential



Binder DSR Testing



Binder BBR Testing



Performance Measures



FWD



ALPS



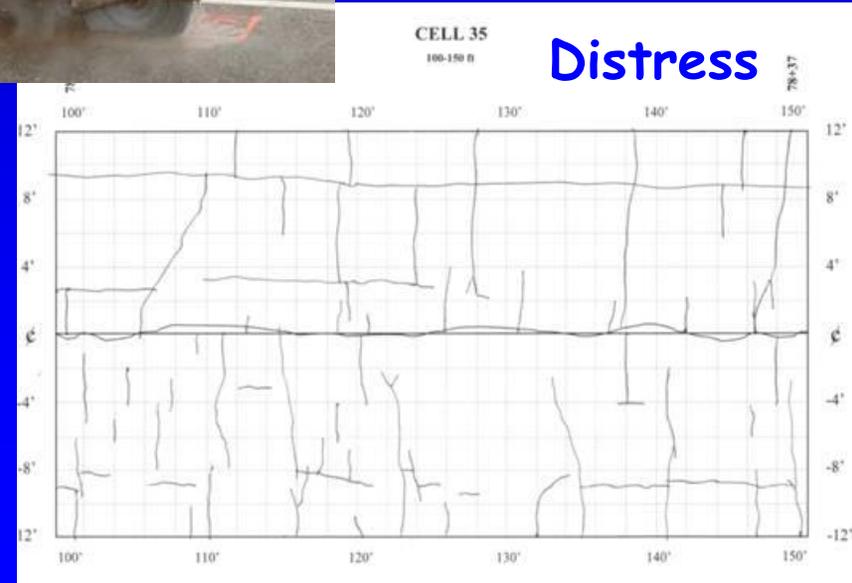
Saw



Faultmeter

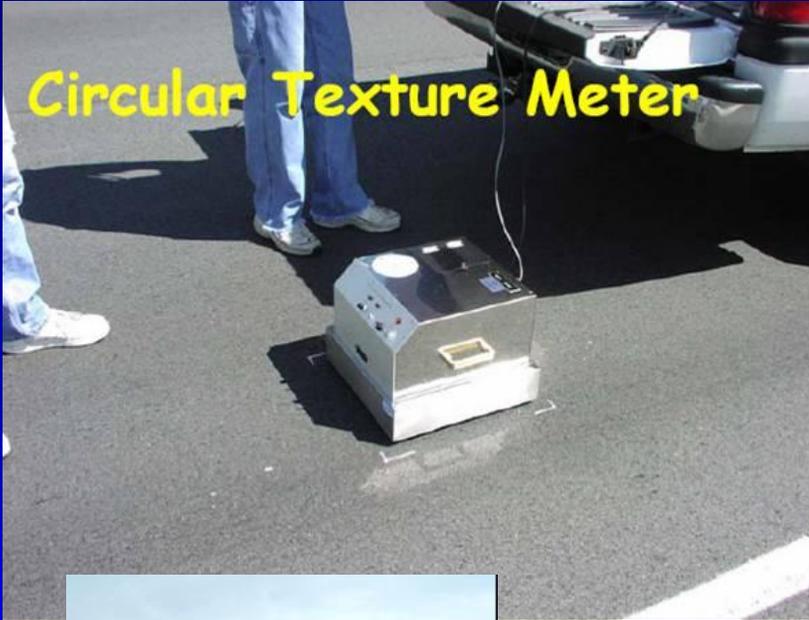


Core Truck



Surface Characteristics

Circular Texture Meter



Skid Trailer



OBSI



LISA



Pathways Van



Dynamic Friction Tester



Load Testing, Sensor Monitoring



Squirrel SQL Client Version 2.5.1

File Drivers Aliases Plugins Session Windows Help

Connect to: FWD Active Session: 1 - MNROAD as mnroad

SQL file: K:\SQL Files\TC31_DATA.sql*

```
SELECT cell, day, hour, qhr, seq_1, seq_2, seq_3, seq_4, seq_5, seq_6, seq_7, seq_8, seq_9, seq_10 FROM (SELECT cell, day, hour, qhr, MIN(DECODE(SEQ, '1', VALUE)) AS seq_1, MIN(DECODE(SEQ, '2', VALUE)) AS seq_2, ...
```

CELL	DAY	HOUR	QHR	SEQ_1	SEQ_2	SEQ_3	SEQ_4	SEQ_5	SEQ_6	SEQ_7	SEQ_8	SEQ_9	SEQ_10
31	2004-01-02 ...	1	0	-3.05705	<null>	-3.22997	-1.74708	-1.01254	-0.35247	1.18146	2.48176	4.04633	<null>
31	2004-01-02 ...	9	0	-3.12061	<null>	-3.39023	-2.34066	-1.37966	-0.4207	1.121	2.43907	4.01879	<null>
31	2004-01-05 ...	2	0	-9.96312	<null>	-9.95537	-5.75004	-3.48438	-1.40752	0.80098	2.19536	3.76589	<null>
31	2004-01-05 ...	6	0	-11.94653	<null>	-11.85311	-6.75906	-3.87646	-1.52659	0.74048	2.13253	3.75588	<null>
31	2004-01-05 ...	12	0	-10.39215	<null>	-10.34561	-7.80386	-4.78417	-1.8992	0.71022	2.10739	3.68574	<null>
			0	-13.82991	<null>	-13.69436	-9.47775	-6.33109	-3.09773	0.47316	1.96158	3.6156	<null>
			0	-13.53279	<null>	-13.4338	-9.54484	-6.38233	-3.2732	0.41514	1.93392	3.60307	<null>

(seconds) - Total: 23.204, SQL query: 21.454, Building output: 1.75

Logs: Errors 0, Warnings 0, Infos 9 26 of 44 MB 0 3:43:48 PM CST



Thank You!

A photograph of a snowy parking lot. In the background, a white semi-truck is parked. In the foreground, there is a large pile of snow next to a grey utility box. The sky is clear and blue, suggesting a bright day. The overall scene is a winter setting with snow on the ground and trees in the distance.

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2007 03 05 18:06