Georgia's Micro-milling Expereince

SEAUPG ANNUAL MEETING
THE WYNFREY HOTEL
BIRMINGHAM, ALABAMA
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Why Micro-milling?

1. The price of HMA has been high and money is tight
2. Seek cost effective pavement preservation treatments
3. One of the options is to mill and inlay with a thin layer of OGFC
4. Concerned with the issue of bonding between conventional milled surface and an overlay of OGFC which is directly placed on the milled surface
5. A fine-tooth milling with carbide grinder drum, called Micromilling, is recommended for an experiment

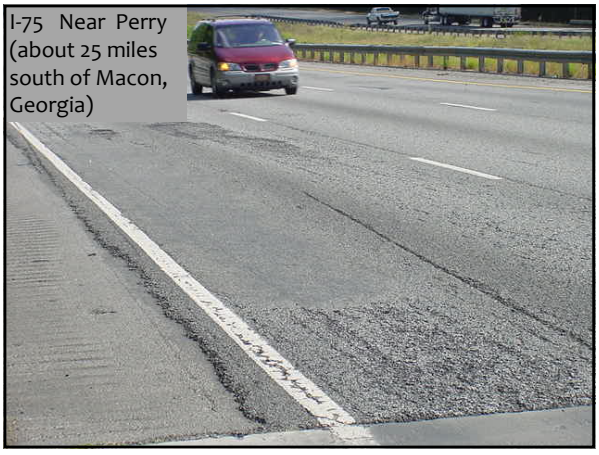
Important issues need to be considered for promoting this rehabilitation process

1. Establish specifications for the micro-milled surface texture to meet the short-term and long-term performance requirements
2. Whether the requirements can be determined for routine quality assurance purpose
3. Whether the requirements are achievable and cost effective from the construction standpoint

Micro-milling

A Rehabilitative Strategy for Savings

CSNHS-M003-00(560)01 Houston-Peach

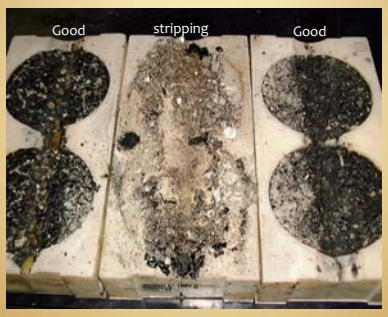


I-75 Near Perry (about 25 miles south of Macon, Georgia)

Rutting/Stripping Susceptibility assessement during pavement evaluation

- Testing roadway cores using APA underwater (in a water tank of 149 F for 8,000 cycles) are used to detect asphalt stripping tendency and severe rutting (similar to Hamburg wheel test)
- It is mandatory in Georgia that the underlying HMA materials be subject to wet APA test before recommending for HMA overlay for any interstates projects.

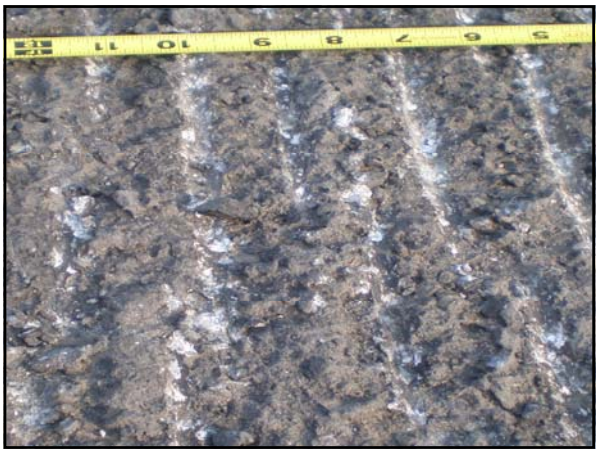
APA shows varying degrees of moisture damaged materials (the middle one is disqualified)



Severe Testing Using APA Under Water @ 149 F

Based on the good test results of numerous cores thorughout the whole project, a micro-milling process is recommended followed by a new OGFC (PEM) overlay, a cost saving strategy by eliminating a new middle layer of HMA while managing the risk of possible delamination

Conventional Milling Drum



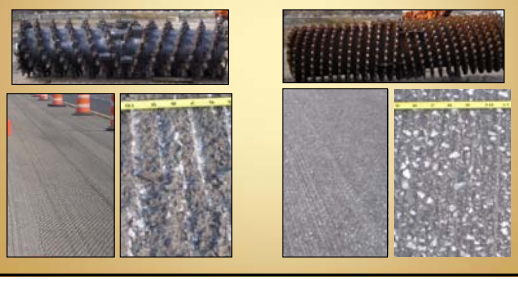
Micro-milling Drum

Approximately 3 times the milling teeth as a conventional milling drum

Rough Milling VS Micro Milling

Rough Milling
- Ridge-to-ridge pitch ~ 25 mm
- Ridge-to-valley Depth ~ 10 mm

Micro Milling
- Ridge-to-ridge pitch ~ 9 mm
- Ridge-to-valley Depth ~ 3 mm



Section 432-Mill Asphaltic Concrete Pavement (Micro-mill) Specification Requirements:

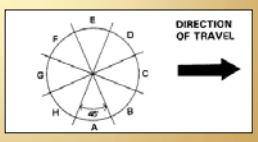
- The use of the micro-milled pavement as a temporary riding surface shall be for a maximum of ? days
- Difference between ridge and valley of the mat surface shall not exceed 1/16 in (1.6 mm) ***Target*** *1/8 in (3.2 mm)* ***Correction***
- Laser Road Profiler acceptance testing measured indices must meet of 825 mm/km ***Target*** 900 mm/km ***Correction***
- ****Conventional milling must meet*** **Laser Road Profiler acceptance testing measured indices of 1025 mm/km** ***Target and*** **1175 mm/km** ***Correction on interstates***

Special Research

- Surface Texture
  - Circular Track Meter (CTM)
  - Ultra Light Inertial Profiler (ULIP)
- Tack Application Rates
  - Pads placed prior to tack application

Circular Track Meter (CTM)

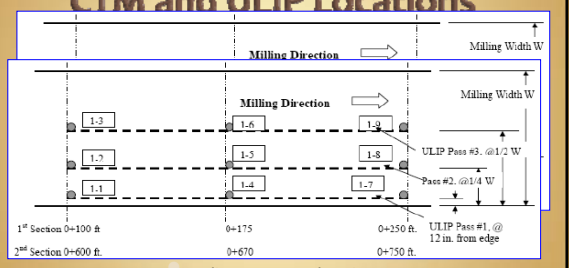
1. Take readings at 8 arcs (A, B, . H)
2. 128 samples
3. Compute Mean Profile Depth (MPD) for each arc and avg. of 8 arcs



Ultra Light Inertial Profiler (conducted by NCAT personnel)

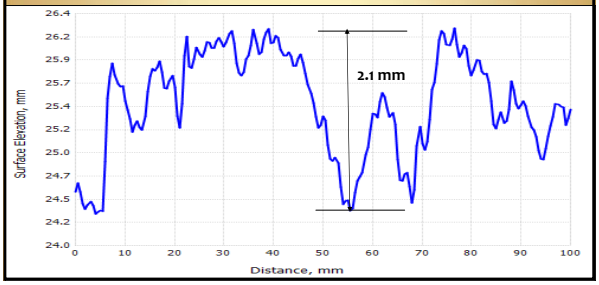
- Equipped with laser sensor,
- Can calculate ridge-to valley depth

CTM and ULIP Locations



Indicate CTM test location

A Typical Micromilled surface profile (100 mm base length)



Summary of All Micro-Milling Texture Test Results (Ridge to Valley)

Number	Date Tested	Speed ft/min	Average RVD	Location
1	9/17/2007	28	3.91	NB-MP 130 L1-1
2	9/17/2007	28	3.96	NB-MP 130 L1-2
3	9/17/2007	24	3.06	SB-MP 135 L2
4	10/02/2007	22-23	3.84	SB-MP130.4 L3
5	10/2/2007	19	3.25	SB-MP 130.9 L3
6	5/14/2007	13-15	1.65	SB-MP 142.0 L3

Specification: Target = 1.6 mm
Specification: Correction = 3.2 mm

Assessment of Tack Coat Appl. Rates

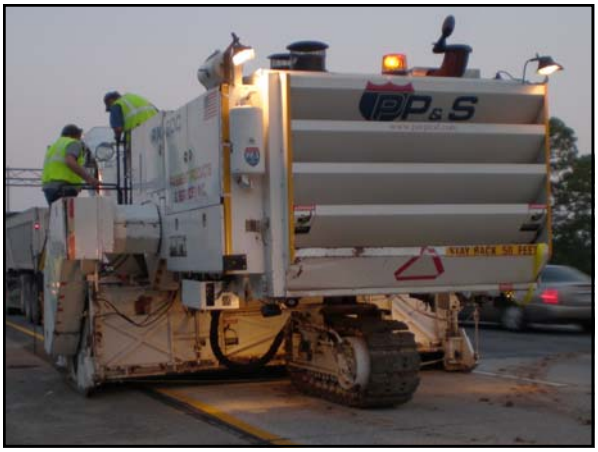
Pad Assembly	Design Rate (gal/yd^2)	Actual Rate (gal/yd^2)
1	0.08	0.066
2	0.08	0.059
3	0.06	0.061
4	0.06	0.059

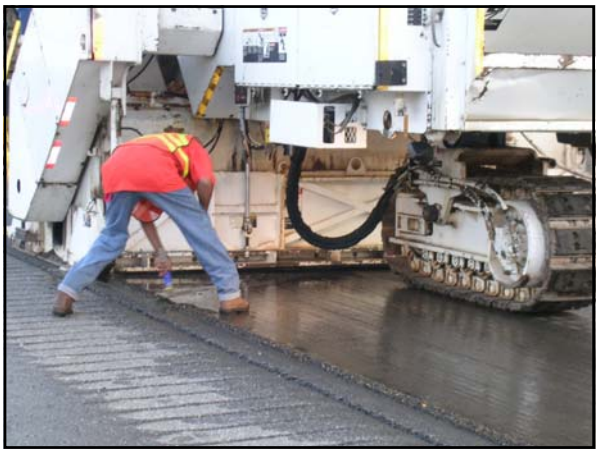
Bond strength between the milled surface and the OGFC (PEM) overlay

	Bond Strength, psi (avg of 6 cores)	
Age after paving	7 weeks	7 months
Section 1 (0.06 gal/yd^2)	63.0	118.6
Section 2 (0.08 gal/yd^2)	85.6	125.2

(a)Specimen diameter: 6 inches,
(b)Rate of loading: 2 in/min,
(c) Testing temperature: 77°F
(d) Confining stress: No
(e) Mode of loading: strain controlled,

Issues

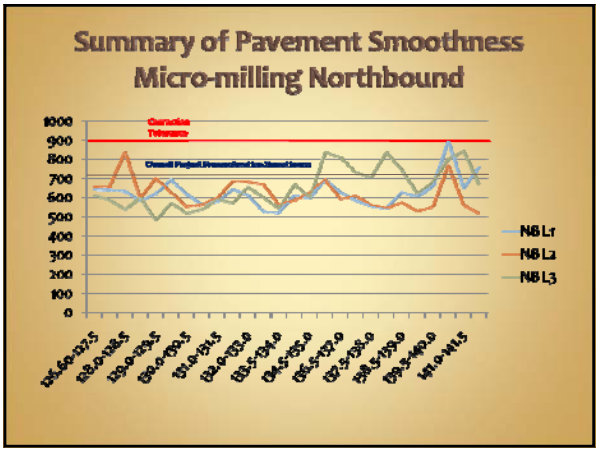


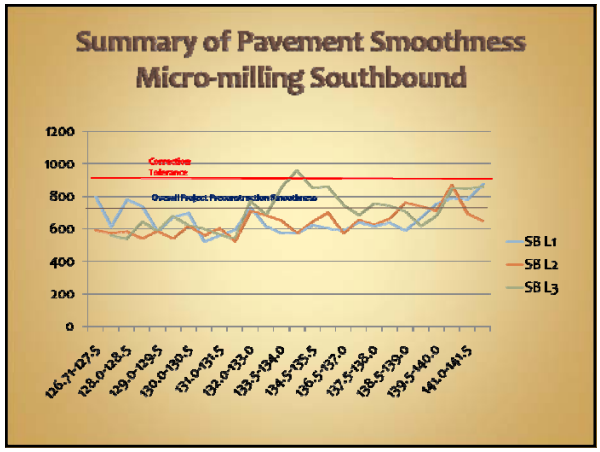


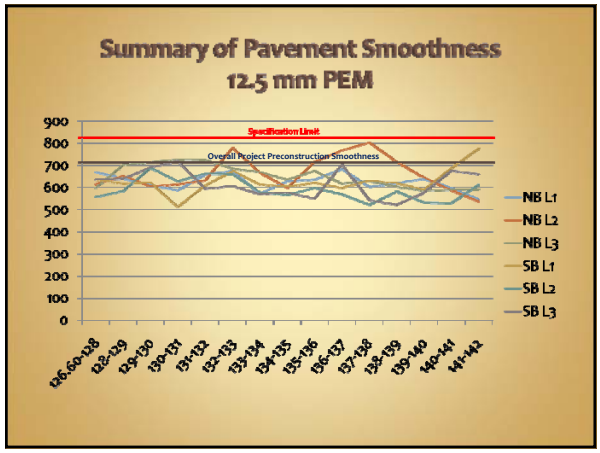

Other Issues (mix related) besides milling……..


Which led to re-milling

The milling contractor (sub) is Pavement Products and Services (PP&S) Co., 107 Piedmont Road, Piedmont, Greenville, SC







Conclusions and Recommendations

1. Results from the research indicated that the requirements are not too restrictive and are achievable and cost effective with the micro-milling technology currently available.

2. No slippage failure was observed on the entire PEM surfaces of this project about 14 months after the construction.

Conclusions and Recommendations (continued)

3. Careful project selection is essential with pavement evaluation and rigorous in-place material testing (screening test)

4. Tremendous potential for savings. The significant cost savings (over $5,000,000 for this project) is realized

5. Construction time greatly reduced

Questions ?