

Micro-surfacing and Slurry Seal Coat Preventative Maintenance Treatment





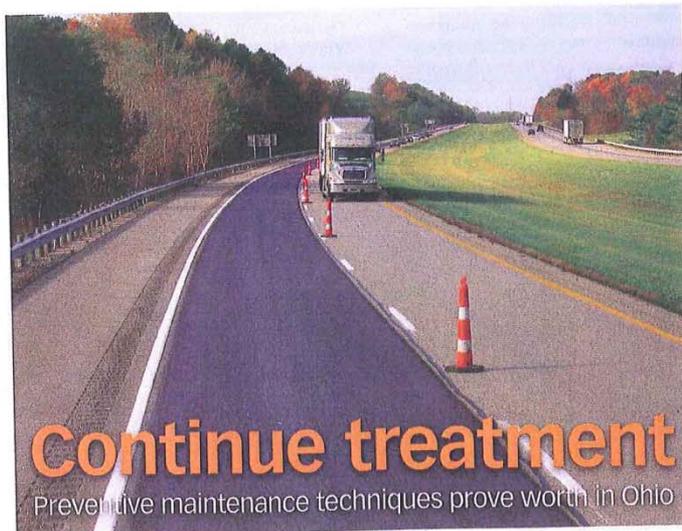
Micro-surfacing / Slurry Seal Coat

vs.

Traditional Chip Seal Coat

vs.

Thin Lift Overlay



Continue treatment

Preventive maintenance techniques prove worth in Ohio

By Jennifer Gallagher, P.E.
Contributing Author

Chip seal and microsurfacing are two of the many preventive maintenance treatments used in Ohio for the preservation of asphalt-surfaced pavements.

The primary intent in using these two treatments is to slow pavement deterioration and defer costly rehabilitation. In Ohio, chip seal is a sprayed application of a polymer-modified asphalt binder covered immediately by washed limestone or dolomite aggregate and rolled with a pneumatic-tire roller to seat the aggregate in the binder. Chip seals are used to provide a new wearing surface on low-volume roadways that is intended to eliminate raveling, retard oxidation, reduce the intrusion of water, improve skid resistance and seal cracks. Microsurfacing is a cold-applied paving mixture composed of polymer-modified asphalt emulsion, crushed aggregate, mineral filler, water and a hardening-controlling additive. A traveling pug mill is used to proportion, mix and apply a thin layer of the mixture to the pavement. No rolling is required, and the finished surface can generally be opened to traffic soon after placement. Like a chip seal, microsurfacing can be used as a

blanket cover on pavements suffering from loss of skid resistance, oxidation, raveling and surface permeability. In addition, microsurfacing can be used to fill ruts and improve rideability by removing minor surface irregularities.

Of late, many highway agencies, including the Ohio Department of Transportation (ODOT), are increasing their investment in chip seals and microsurfacing as a means of preserving the system and postponing more costly rehabilitation efforts. Underlying this shift in focus is the widely accepted assumption that these efforts are consistently cost-effective. Nationally, it is estimated that a total of some 950 million sq yd of chip seals and about 1 million tons of microsurfacing are placed each year. In fact, despite the widespread use of chip seals and microsurfacing nationally, very little performance monitoring has been performed to quantify their cost-effectiveness on pavements of different levels of distress.

Thorough understanding of how well these treatments are performing is critical to the nature and extent of their continued use in the future. Currently, there is a lack of objective information on fundamental issues such as the expected improvement in pavement condition resulting from the use of chip seal and microsurfacing, the extent to which the treatments

Preventive Maintenance Treatments

Decision Factors

1. 7 to 10 year life extension (future demands)
2. Costs (life cycle analysis)
3. Level of service
4. Existing Roadway Conditions
(most critical factor)

Micro-surfacing or Slurry Seal Coat

Slurry Seal Coat is parent product

Slurry Seal Coat

CQS-1H Emulsified Asphalt

- newer pavement surface
- single lift
- \$2.00 per gallon

Micro-surfacing

CQS-1HP Emulsified Asphalt

- older roadways
- stacking allows scratch/wear
- polymer additive
- \$2.50 per gallon

Micro-surfacing Advantages

1. Rut filling
2. Depressed transverse crack repair
3. More “user-friendly”
4. Preferred by counties and cities







Basic Product Composition

- Emulsified Asphalt (CQS-1H or CQS-1HP)
- Aggregate (Type II or Type III)
- Water (Potable)
- Mineral Filler (Cement)
- Additives (Retardant)

SIEVE SIZE	TYPE II – % PASSING	TYPE III – % PASSING	STOCKPILE TOLERANCE
3/8"	100	100	-
#4	90 -100	70-90	± 5%
#8	65 – 90	45-70	±5%
#16	45 – 70	28-50	±5%
#30	30 – 50	19-34	±5%
#50	18 – 30	12-25	±4%
#100	10 – 21	7-18	±3%
#200	5 – 15	5-15	±2%

After the target gradation has been submitted (which is the gradation that the mix design is based on) the percent passing each sieve shall not vary by more than the stockpile tolerance and still remain within the gradation band.

The aggregate will be accepted at the job location or stockpile. The stockpile shall be accepted based on five gradation tests according to AASHTO T 2. If the average of the five tests is within the gradation tolerances then the material will be accepted. If the tests show the material to be out, the contractor will be given the choice to either remove the material or blend other aggregates with the stockpile material to bring it into specifications. Materials used in blending must meet the quality tests before blending and must be blended in a manner to produce a consistent gradation. This may require a new mix design. Screening shall be required at the stockpile if there are any problems created by having oversize materials in the mix.

The contractor shall perform a gradation test every 500 tons of material produced. The gradation tests shall include the sand equivalency test.

Deleterious Substances

To limit the permissible amount of clay-like fines in an aggregate, a sand equivalency of 60 or higher is required when tested by AASHTO T 176. The sand equivalency test shall be performed during the gradation tests during the production of the stockpile.

Soundness

The aggregate shall have a weighted loss of not more than 15% when the sodium sulfate test is used or not more than 25% when the magnesium sulfate test is used. Soundness shall be tested once during production of stockpile, in

Aggregate Types

	Type II	Type III
Design Specs	12 to 20 lbs/sy	18 to 30 lbs/sy
Actual	16 to 17 lbs/sy	24 to 25 lbs/sy
Scratch Course	Up to 20 lbs/sy	Up to 28 lbs/sy
	Preferred rut fill & cracks	Increased skid resistance
	Lower cost	Higher cost







09/13/2009



MAYO

MAYO

MAYO

MAYO

MAYO

SUBWAY

SUBWAY

3 731 5411

Sept. 13, 2010

Micro-Surfacing Mix Evaluation – Mandan Job, Dralle Pit AggregateGradation Test Results:

Sieve Size	Agg 1853A %Passing	ISSA Type III Specification
3/8"	100	100
#4	85	70-90
#8	62	45-70
#16	42	28-50
#30	28	19-34
#50	15	12-25
#100	9	7-18
#200	8.2	5-15

Sand Equivalency = 71%

Test Results on Micro-Surfacing Mix:

<u>Ingrdient</u>	<u>Dosage, % by mass dry aggregate</u>
AGG-1853A (Type III)	100.0
Type 1 Portland Cement (Type 10)	1.0
Potable water	13.0
CQS-1H-P (W-99)	13.0

<u>Test</u>	<u>Result</u>	<u>Specification (ISSA A-143)</u>	<u>Test Method</u>
1. Wet Cohesion, kg-cm			
- Setting Time, 0.5 hr, (10.0°C, outside)	21	12 Min.	ISSA TB-139
- Traffic Time, 1.0 hr, (10.0°C, outside)	20	20 Min.	ISSA TB-139
2. Lateral Displacement, %	1.2	5 Max.	ISSA TB-147A
3. Wet Stripping, % Coated	>95	90 Min.	ISSA TB-114
4. Wet Track Abrasion Test			
- 1 Hour Soak, g/m ² Loss	217.4	538 Max.	ISSA TB-100
- 6 Day Soak, g/m ² Loss	Pending	807 Max.	
5. Mix Time at 25°C, s	160	Controllable to a minimum of 120 s	ISSA TB-113



CALIBRATION PROCEDURE

Obtain mix design from emulsion supplier.

Emulsion Calibration

- A. If at all possible calibrate the emulsion pump on the rock belt counter.
- B. Use a second container capable of holding 600 to 700 gallons, such as a distributor or mobile support unit.
- C. Before pumping from the slurry truck into the second container, obtain an empty weight of the container. Fill hose before taking first weight. Pump from the slurry truck into the second container for a minimum of 50 counts of the rock belt. Divide the net weight pumped by the number of counts to obtain weight per count.
- D. Run three tests and average the results. If there is a large variance between the three results, re-run the emulsion calibration until the variance is less than 5%.
- E. Do not pump the emulsion back and forth between the slurry machine and the test unit as air will become entrained into the emulsion leading to incorrect results.

Cement or Fines Calibration

- F. Use a small pan to obtain a cement or fines sample from the machine, calibrating to the cement counter.
- G. Weigh the pan prior to collecting the sample from the machine.
(Scale range: 0-30 lbs.)
- H. Collect three samples for a minimum of 10 counts of the cement counter and determine the weight per count for each test sample. Determine the average weight per count for the three test runs.

Aggregate Calibration

- I. Test the moisture of the aggregate.
- J. Calculate the moisture factor. Moisture factor is the percent (in decimal format) of moisture in the aggregate + 1.00.

Example: Moisture is 5%, therefore the moisture factor . . .
 $0.05 + 1.00 = 1.05$ Moisture factor
- K. Select three gate openings as per graph.
- L. Run at least 2 tons of material per gate setting recording the net weight conveyed and the number of counts of the rock belt for three test samples, each a minimum of 50 counts.

ND LTAP Micro/Slurry Workshop

Presented By: Thomas J. Wood

Transportation Learning Network

TLN.learnflex.net

Partners: NDLTAP & UGPTI



U.S.S. MAYO





08/16/2010



08/16/2010





08/17/2010

S. MAYO









CAVALIER
PHONE
MAYO
SAB-BASE
NORTH DAKOTA

08/17/2010









International Slurry Surfacing Association

Slurry Systems Workshop 2006

PROGRAM

January 31 - February 3, 2006
Las Vegas, Nevada

Workshop Locations:

Equipment Trailing and Demo.....	Overflow Parking Lot
All indoor sessions except Hand Mix.....	Salons A - B
Hand Mix Tables.....	Salon D - E
Exhibits — Indoor.....	Salon C
Exhibits — Outdoor.....	Parking Lot <u>behind parking garage</u>
Registration.....	Grand Ballroom Foyer
Breaks and Breakfasts.....	Inner Hallway
Luncheons.....	Salons F - G
Receptions.....	Salons F - G

The Slurry Systems Workshop is made possible by ISSA and the ISSA Development Committee and especially by the generosity of its Sponsors.

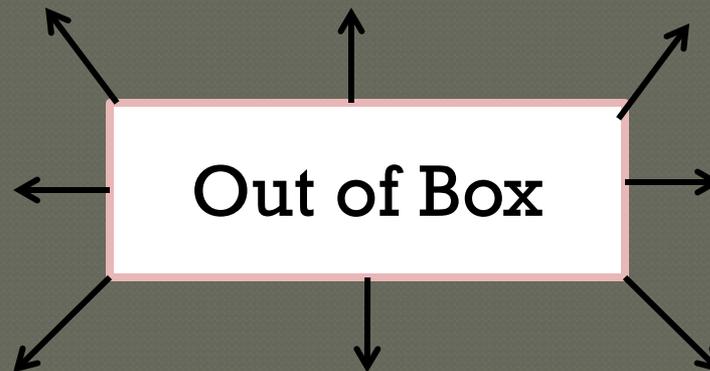
ISSA

- ❑ Non-profit trade associations working together to promote the concept of pavement preservation specializing in micro-surfacing and slurry seal
- ❑ Annual workshop – 4 day comprehensive training in Las Vegas
- ❑ Website: www.Slurry.org



Experience & Knowledge → Improved Results

1. Survey Markings – Preparation
2. Surface Prep – Critical
3. Clean-up – Speed and Frequency
4. Joints – Difficulty
5. City Work – Challenges
6. Traffic Control Issues -







08/17/2010



EXIT
← 155









09/13/2009



SOUTH EAST
28152

ZINK'S
AUTO BODY REPAIR
Collision & Restoration
WHEELS, OIL, FLUIDS
& Tires • 435-1111
SERVING

6TH ST E

09/13/2009







Slurry Seal Coat and Micro-surfacing Costs

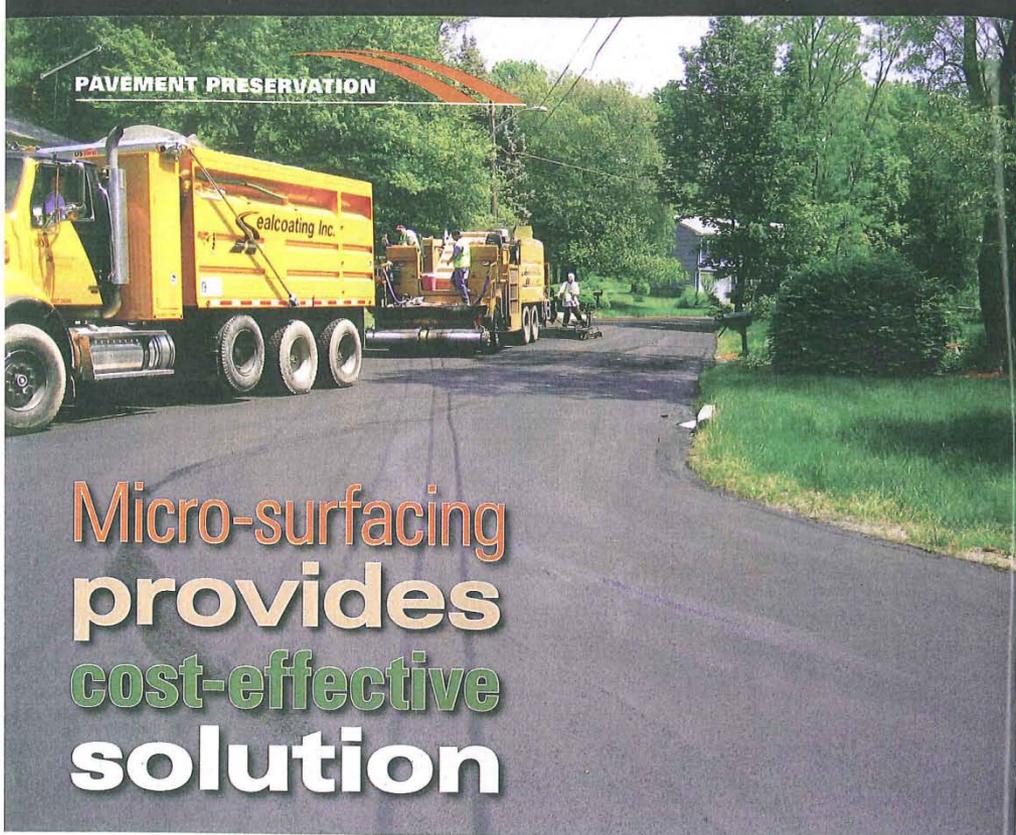
Type II Aggregate	\$30,000 - \$32,000 per mile
Type III Aggregate	\$36,000 - \$40,000 per mile
Municipal Micro-surfacing	\$3.50 - \$4.00 per square yard

Cost Factors

- Availability of Aggregate
- Size of Job
- Complexity of Job
- Traffic Control
- Production – radiuses/tapers



- 
- North Dakota Contractor (local)**
 - Began 2001- 10 years experience**
 - Over 500 miles of micro/slurry**
 - 26 projects past 3 years**



PAVEMENT PRESERVATION

Micro-surfacing provides cost-effective solution

With limited budgets, three Massachusetts municipalities stretch their road maintenance dollars to maintain quality roads

By Greg Udelhofen, editor

Like many road agencies across the county, Massachusetts' Town of Wilmington, the City of Methuen and the Town of Sutton must address their road maintenance needs with the limited dollars available to do so. With the help of Hingham, MA road contractor, Sealcoating Inc., the Department of Public Works for those three communities rely heavily on a preservation approach in an effort to keep their road networks in good order at a price that allows them to maximize their investment.

Don Onusseit, Wilmington's Public Works Superintendent, Jay Bonanno, Methuen's Highway Department Superintendent, and Mark Brigham, Sutton's Public Works Superintendent, all have become strong proponents of

micro-surfacing road preservation primarily because it's a cost-effective approach to extending the life of good quality roads, but more importantly because it works.

Onusseit, who's been taking care of Wilmington's 115 lane miles for the past 10 years, says preservation is key to maintaining the roads under his jurisdiction with the approximate \$500,000 annual budget he has to do so. While there is occasional full rehabilitation work required on some roads that have completely deteriorated, Onusseit is trying to follow a 20-year program that targets every lane mile of the road network for some type of improvement.

"We have some roads with particular deficiencies, whether its drainage, or lack of curbs and sidewalks, but

QUESTIONS?

