Arizona AGC Pavement Preservation Series

Micro Surface and Slurry Seal Guide for Application and Construction

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Micro Surface and Slurry Seal Guide for Application and Construction

Foreward

The Arizona AGC Pavement Preservation guides are collections of best practices and recommendations for the state of Arizona. Microsurfacing and Slurry Seals are important pavement preservation tools, and when constructed properly they increase the life of a pavement. Following these guidelines and using a reputable AGC member contractor will also contribute to the overall success of the project.

There will be instances where conditions or materials dictate the need to deviate from these guides. It is important that contractors, suppliers, and agencies work together and use common sense to modify these recommendations as needed.

The Arizona Chapter of the Associated General Contractor's Pavement Preservation committee developed this guideline to identify "best practices" to be used during the application of microsurfacing and slurry seals.

The committee is comprised of contractors, material suppliers, aggregate producers and agency personnel. Special thanks to our partners in the Arizona Department of Transportation: Bill Hurguy, State Materials Engineer and Janet Doerstling Pavement Materials Testing Manager for their contributions...

Micro Surface and Slurry Seal Guide for Application and Construction

Overview

- Introduction
- Surface Conditions and Preparation
- Materials
- Equipment
- Placement Practices
- Construction Procedures
- Method of Measurement
- Summary
- Checklists

Introduction

This document is provided as a guide for suppliers, contractors, agencies and owners.

Microsurfacing and Slurry seals are cost effective preservation treatments used to maintain and extend the service life of pavements and roadways. These applications extend the life of pavements by preventing moisture intrusion into the base course and sub-grade. Additional benefits include increased skid resistance and improved aesthetics. When properly constructed, microsurfacing and slurry seal applications are cost effective tools that provide improved life cycle benefits.

Although microsurfacing and slurry seals are generally similar, microsurfacing is designed to facilitate a quicker return to traffic, heavier application rate, rut filling, and support higher traffic volumes.

This guide contains best practice information to improve consistency. Many variables affect the successful application of microsurfacing and slurry seals. These variables will be discussed in more detail:

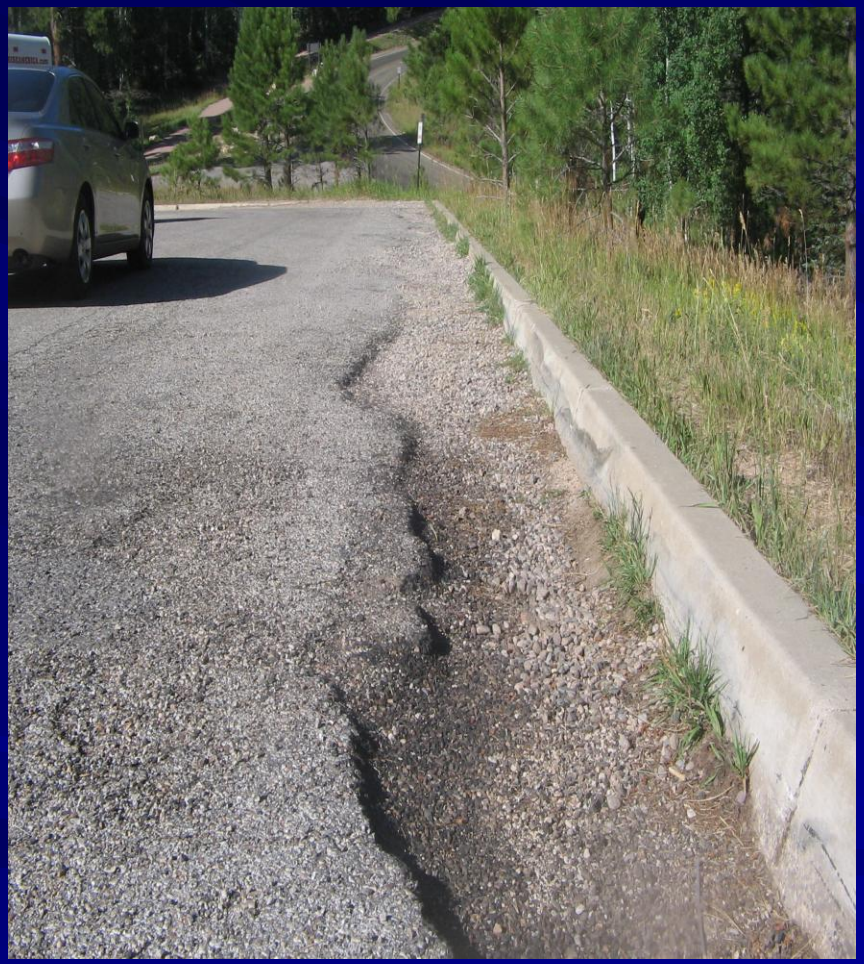
- Existing Surface Conditions
- Surface Preparation
- Materials
- Equipment
- Placement Practices
- Construction Procedures

Surface Conditions and Preparation

- Surface Conditions
  - Limitations
  - When Micro Surface or Slurry Surface
- Preparation

Surface Conditions

Surface Conditions - Limitations



Surface Conditions – Micro or Slurry

Surface Preparation

Surface Preparation

Materials

- Aggregate
  - Type I
  - Type II
  - Type III
- Aggregate Considerations
- Emulsions
- Mix Design

Materials - Aggregate

- For high performance microsurfacing and slurry seals, quality aggregate is mandatory. Some of the key indicators of quality aggregate are: proper gradation, particle shape, cleanliness, soundness, and resistance to abrasion.

Materials – Aggregate Type I

- Type I aggregate has the smallest size gradation. It is primarily used to address minor surface defects such as surface voids and cracks. It is also used when protection from the elements is the main reason for resurfacing. Type I aggregates are commonly used for airfields and parking lots.

Materials – Aggregate Type II

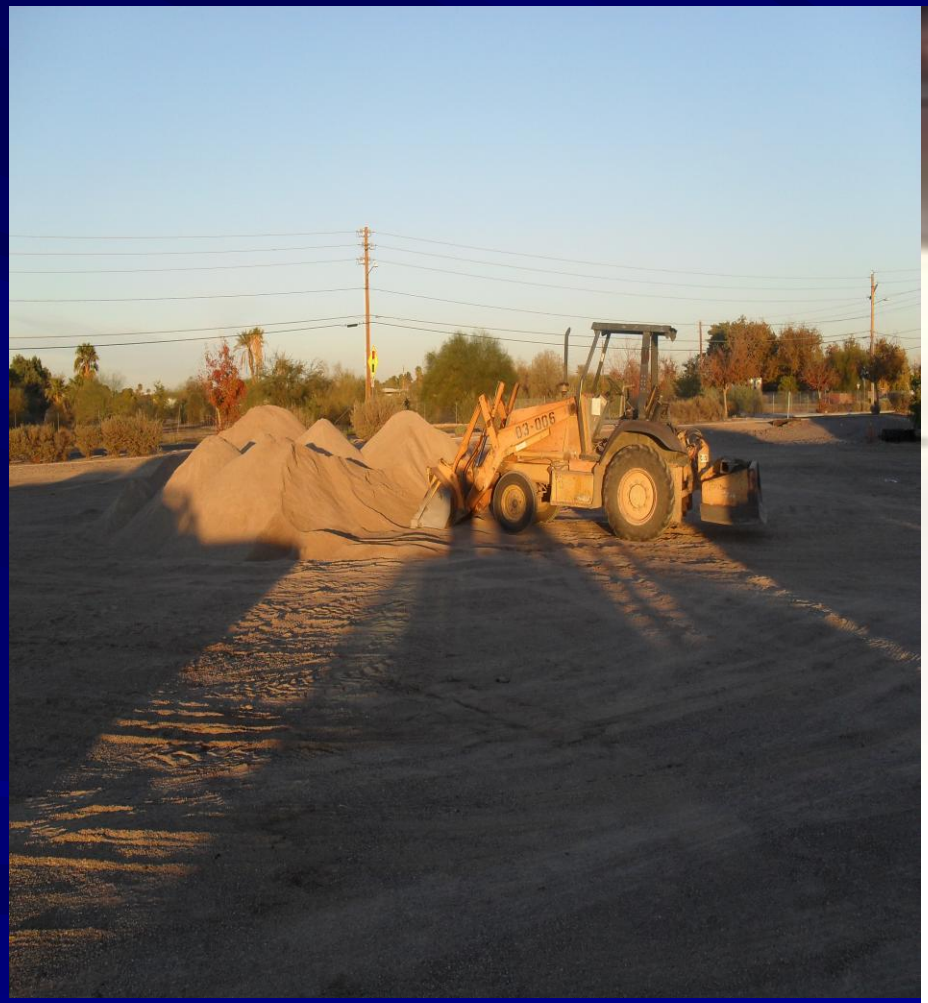
- Type II aggregate is used to fill surface voids and correct moderate surface defects. It is typically used on pavements with medium-textured surfaces that require correction of weathering and raveling, while producing an adequate wearing surface for medium to heavy traffic.

Materials – Aggregate Type III

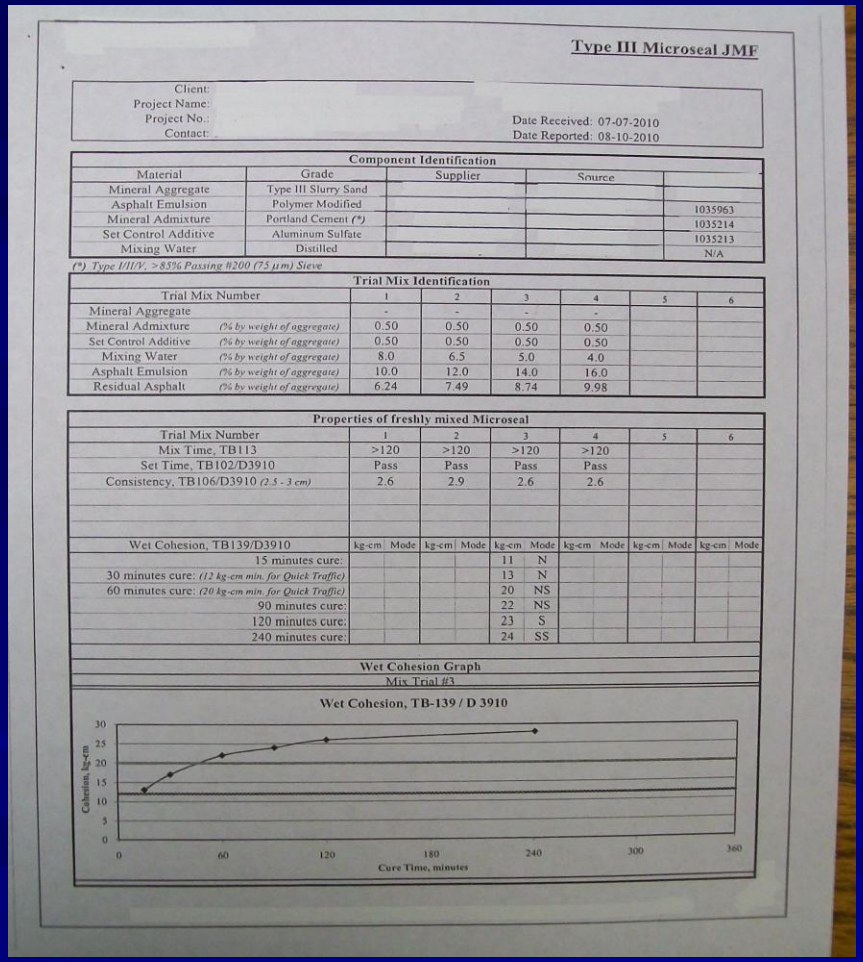
- Type III aggregate (the largest gradation) is used to improve friction, and skid resistance. Durability is also improved due to increased mat thickness. It is best-suited for higher-traffic pavements such as collectors, arterials and major highways. When Type III aggregates are used in microsurfacing, stability is also increased, making the gradation ideal for rut filling and reestablishing profiles with minor surface irregularities.

Materials – Aggregate Considerations

Materials – Emulsions



Materials – Mix Design



Type III Microseal JMF

Client:
Project Name:
Project No.:
Contact:

Date Received: 07-07-2010
Date Reported: 08-10-2010

Component Identification

Material	Grade	Supplier	Source	
Mineral Aggregate	Type III Slurry Sand			
Asphalt Emulsion	Polymer Modified			1035963
Mineral Admixture	Portland Cement (*)			1035214
Set Control Additive	Aluminum Sulfate			1035213
Mixing Water	Distilled			N/A

(*) Type I/II/V, >85% Passing #200 (75 µm) Sieve

Trial Mix Identification

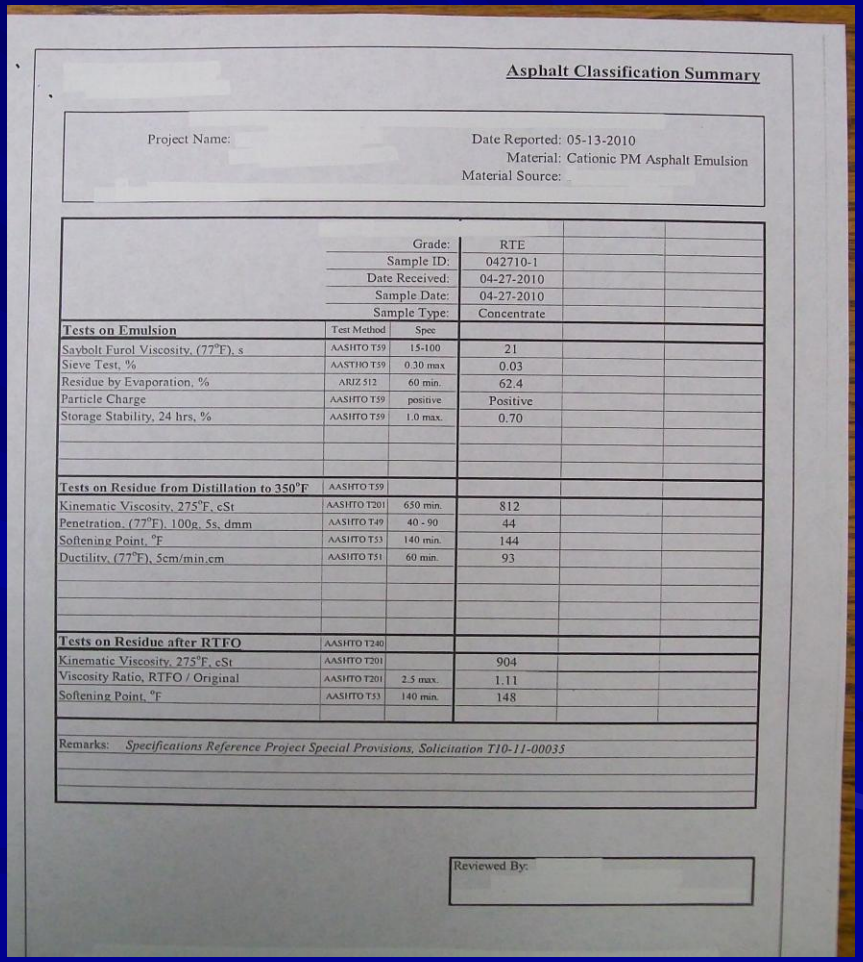
Trial Mix Number		1	2	3	4	5	6
Mineral Aggregate		-	-	-	-		
Mineral Admixture	*(% by weight of aggregate)*	0.50	0.50	0.50	0.50		
Set Control Additive	*(% by weight of aggregate)*	0.50	0.50	0.50	0.50		
Mixing Water	*(% by weight of aggregate)*	8.0	6.5	5.0	4.0		
Asphalt Emulsion	*(% by weight of aggregate)*	10.0	12.0	14.0	16.0		
Residual Asphalt	*(% by weight of aggregate)*	6.24	7.49	8.74	9.98		

Properties of freshly mixed Microseal

Trial Mix Number	1	2	3	4	5	6
Mix Time, TB113	>120	>120	>120	>120		
Set Time, TB102/D3910	Pass	Pass	Pass	Pass		
Consistency, TB106/D3910 *(2.5 - 3 cm)*	2.6	2.9	2.6	2.6		

Wet Cohesion, TB139/D3910	kg-cm	Mode	kg-cm	Mode	kg-cm	Mode	kg-cm	Mode	kg-cm	Mode	kg-cm	Mode
15 minutes cure:					11	N						
30 minutes cure: *(12 kg-cm min. for Quick Traffic)*					13	N						
60 minutes cure: *(20 kg-cm min. for Quick Traffic)*					20	NS						
90 minutes cure:					22	NS						
120 minutes cure:					23	S						
240 minutes cure:					24	SS						

Wet Cohesion Graph
Mix Trial #3



Asphalt Classification Summary

Project Name:

Date Reported: 05-13-2010
Material: Cationic PM Asphalt Emulsion
Material Source:

			Grade:	RTE		
			Sample ID:	042710-1		
			Date Received:	04-27-2010		
			Sample Date:	04-27-2010		
			Sample Type:	Concentrate		
Tests on Emulsion	Test Method	Spec				
Saybolt Furol Viscosity, (77°F), s	AASHTO T59	15-100		21		
Sieve Test, %	AASTHO T59	0.30 max		0.03		
Residue by Evaporation, %	ARIZ 512	60 min.		62.4		
Particle Charge	AASHTO T59	positive		Positive		
Storage Stability, 24 hrs, %	AASHTO T59	1.0 max.		0.70		
Tests on Residue from Distillation to 350°F	AASHTO T59					
Kinematic Viscosity, 275°F, cSt	AASHTO T201	650 min.		812		
Penetration, (77°F), 100g, 5s, dmm	AASHTO T49	40 - 90		44		
Softening Point, °F	AASHTO T53	140 min.		144		
Ductility, (77°F), 5cm/min,cm	AASHTO T51	60 min.		93		
Tests on Residue after RTFO	AASHTO T240					
Kinematic Viscosity, 275°F, cSt	AASHTO T201			904		
Viscosity Ratio, RTFO / Original	AASHTO T201	2.5 max.		1.11		
Softening Point, °F	AASHTO T53	140 min.		148		

Remarks: *Specifications Reference Project Special Provisions, Solicitation T10-11-00035*

Reviewed By:

Equipment

- Mixer
- Spreading Equipment
- Calibration

Equipment – Mixer

Equipment – Spreading Equipment

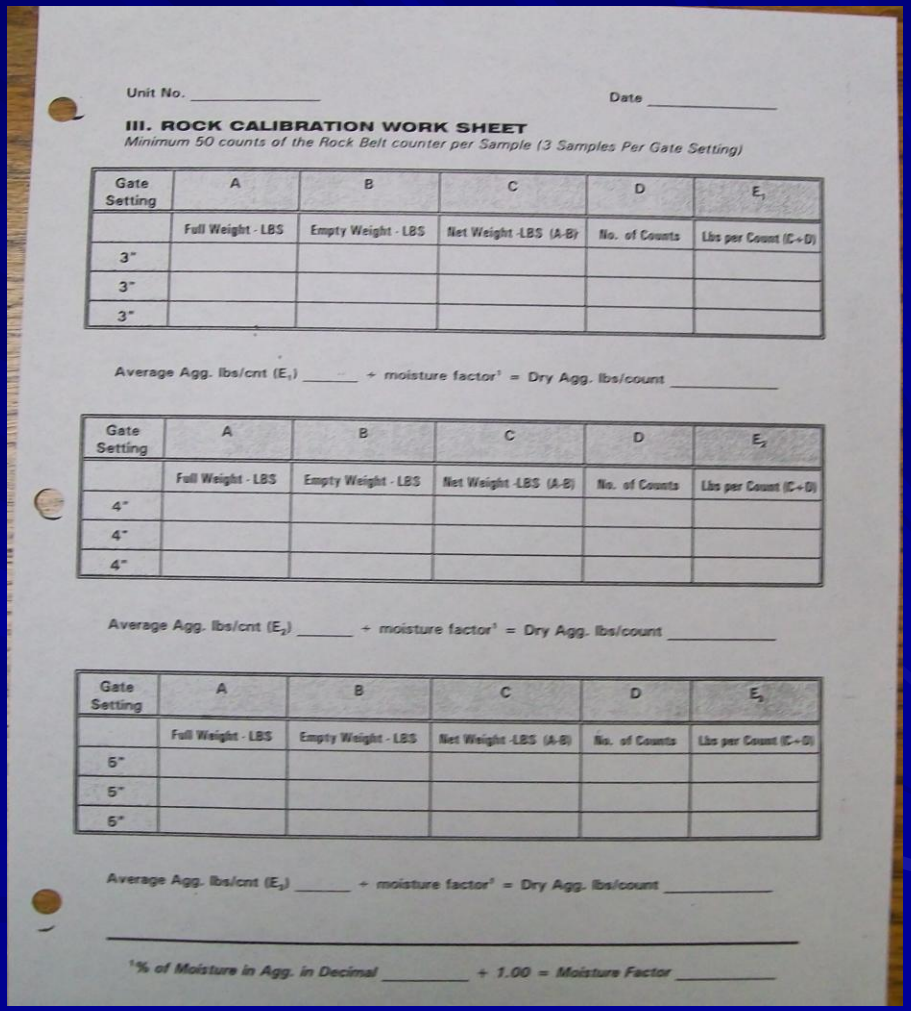
Equipment – Spreading Equipment

Equipment - Calibration

Each mixing unit shall be calibrated at least once per year for each aggregate source and type, or as required by the agency.

The calibration shall include a metered verification for each material used.

No machine should be allowed to work on the project until the calibration has been completed and/or accepted.



Unit No. _____ Date _____

III. ROCK CALIBRATION WORK SHEET

Minimum 50 counts of the Rock Belt counter per Sample (3 Samples Per Gate Setting)

Gate Setting	A	B	C	D	E_1
	Full Weight - LBS	Empty Weight - LBS	Net Weight -LBS (A-B)	No. of Counts	Lbs per Count (C÷D)
3"					
3"					
3"					

Average Agg. lbs/cnt (E_1) _____ + moisture factor[1] = Dry Agg. lbs/count _____

Gate Setting	A	B	C	D	E_2
	Full Weight - LBS	Empty Weight - LBS	Net Weight -LBS (A-B)	No. of Counts	Lbs per Count (C÷D)
4"					
4"					
4"					

Average Agg. lbs/cnt (E_2) _____ + moisture factor[1] = Dry Agg. lbs/count _____

Gate Setting	A	B	C	D	E_3
	Full Weight - LBS	Empty Weight - LBS	Net Weight -LBS (A-B)	No. of Counts	Lbs per Count (C÷D)
5"					
5"					
5"					

Average Agg. lbs/cnt (E_3) _____ + moisture factor[1] = Dry Agg. lbs/count _____

[1]*% of Moisture in Agg. in Decimal* _____ + 1.00 = *Moisture Factor* _____

Placement Practices

Construction Procedures

- General Considerations
- Rolling
- Sweeping
- Traffic Control

Construction Procedures - General Considerations

- **Prior to Application Surface must be cleaned**
- **Microsurfacing and Slurry seals should be applied when the surface temperature is 45° F and rising.**
- Slurry seal should not be performed if wind speeds are greater than 30 mph or rain is imminent.

Construction Procedures - Rolling

- Rollers are not typically needed.
- The rollers should carry a minimum loading of 2,000 pounds on each wheel, with a minimum tire pressure of 90 psi or as recommended by the equipment manufacturer.

Construction Procedures - Sweeping

Construction Procedures - Traffic Control

- Before the project starts. You must have a approved Traffic Control Plan (TCP).
- Safety is everyone's responsibility. Do your part.

Traffic Control

Method of Measurement

- There are two different types of measurement;

- By the Ton
- By the Square Yard

Summary

- Complete all needed repair work and allow adequate curing time prior to the placement of the application.
- Microsurfacing and slurry seals should be applied when the surface temperature is 50° F or higher and the ambient temperature is 45°F and rising.
- Materials should be tested prior to and during all phases of construction to assure specification compliance.
- Use and follow a current mix design for each project.

Checklist Construction Techniques/Application

	YES	NO
1. Is traffic control in compliance with approved plan?	_____	_____
2. Have pavement markers been considered?	_____	_____
3. Is the ambient temperature at 45°F and rising?	_____	_____
4. Is the pavement clean and dry?	_____	_____
5. Is there a chance of rain during the daily production?	_____	_____
6. Has the equipment been calibrated?	_____	_____

Checklist Materials & Construction Techniques/Application

	Yes	No
1. Is the area clean and dry?	_____	_____
2. Is the ambient asphalt temperature 45 degrees and rising?	_____	_____
3. Is area free of debris, cars, people, or equipment?	_____	_____
4. Is proper traffic control in place prior to starting application?	_____	_____
5. Have you had a Safety/Tail Gate Meeting?	_____	_____

Questions?