Mississippi PG3 Training

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NCPP

National Center for Pavement Preservation

MICHIGAN STATE UNIVERSITY

Best Practices for *Micro-Surfacing* Applications

MICHIGAN STATE UNIVERSITY

Micro-Surfacing

- Laboratory designed mixture of asphalt emulsion, aggregate, mineral filler, water and other additives accurately proportioned, mixed and uniformly spread over a properly prepared surface.
- Type 2 and Type 3
- Mixed and spread in a mobile operation as thin wearing surface
- Mix design is required
- CQS-1HP (3% Polymer)

Benefits of Micro-Surfacing

- Extending Pavement Service Life
- Decreasing Pavement Permeability
- Improving Surface Friction
- Correcting Moderate Bleeding/flushing (in Chip Seals)
- Leveling and Rut Filling (Type III)

Micro Surfacing (CQS-1HP)

- Always Cationic
- Always Quick set
- Always Polymer modified
- Continuous paver or truck mount
- Two Gradations of aggregate (II & III)
- Faster Return to Traffic
- Night Work
- Stone stacking ability
- Can repair larger deviations

Table 7: Component Materials and Ranges for Microsurfacing

COMPONENT MATERIALS	SUGGESTED LIMITS
Residual Asphalt	5.5 – 10.5% by dry weight of aggregate
Mineral Filler	0.0 - 3.0% (Based on dry weight of aggregate)
Polymer Content	Minimum of 3.0% solids based on bitumen weight content
Additives	As needed
Water	As required to produce proper mix consistency

After ISSA A105 (2020)

Table 9: Application Rates for Microsurfacing

AGGEGATE TYPE	LOCATION	SUGGESTED APPLICATION RATE
Type II	Urban and Residential Streets Airport Runways Scratch or Leveling Course	10 - 20 lb./yd2 (5.4 - 10.8 kg/m2) As Required
Type III	Primary and Interstate Routes Wheel Ruts Scratch or Leveling Course	15 - 30 lb./yd2 (8.1 - 16.3 kg/m2) As Required (See Appendix B) As Required

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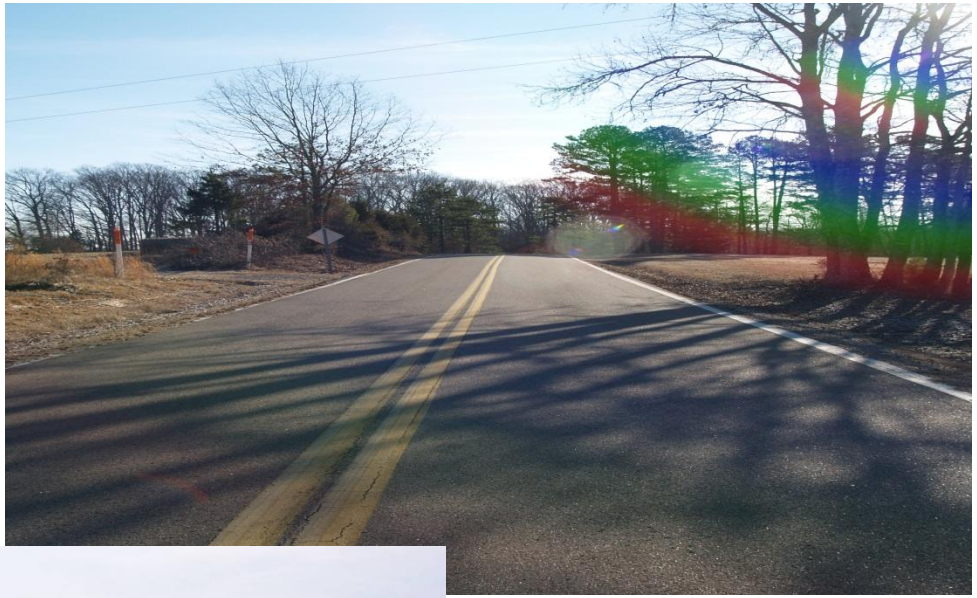


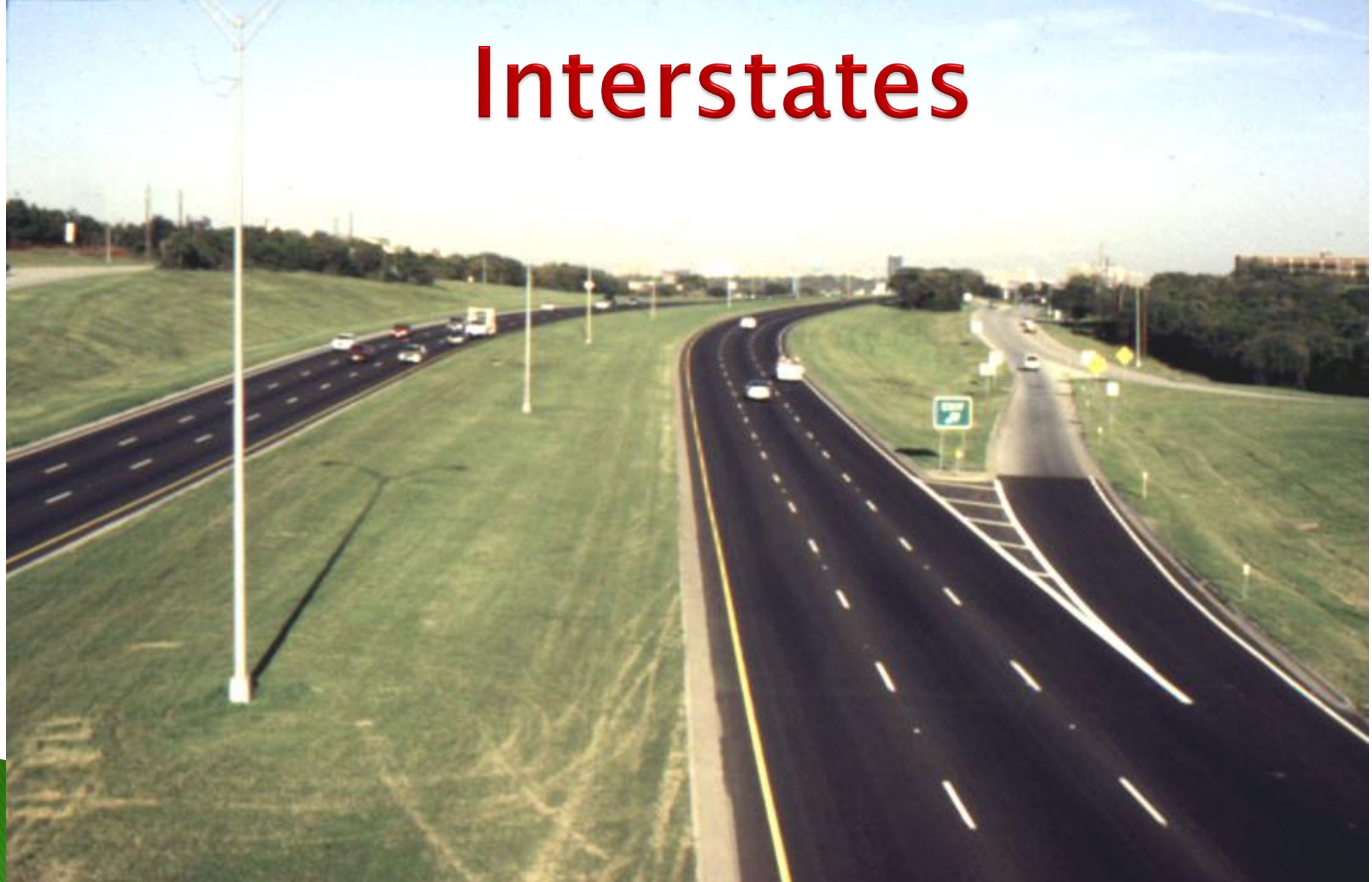
Where Can Micro Be Used?

Airports

Airports

Expressways

Interstates



Shoulders

Micro Best Practices

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- Seal cracks > ¼”Micro Surfacing is not a crack relief layer. Adequate time should be left for the seal to cure, and excessive buildup should be kept to a minimum.
- Mix Design is important
- Check aggregate stockpile on job prior to project startup
- Calibrate continuous paver
- As with any treatment treat vegetation prior to paving
- Ruts >1/2” need a rut box (up to 1.5” in multiple lifts)
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Micro Best Practices (Cont'd)

- When paving: Mix getting out of the spreader box? Can the contractor perform handwork? (60"-120")
- Sand in turnout areas.
- Base failures, major pavement damage, curb and gutter problems and utility issues should be addressed.
- The pavement should be free of loose aggregate and soil, vegetation and oil spots before paving begins.
- Pavement markings should be removed, particularly thermoplastic marking in excess of 4". Conventional paint with reflective glass beads embedded does not require removal unless there is significant buildup from multiple applications.
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- **Breaking and setting characteristics**–The mixture should cure within a reasonably defined period to allow return to traffic without raveling, displacement, or flushing.
- **Break**–The time when the slurry system transitions from a workable fluid state to an unworkable solid state. After the break, the mixture can no longer be mixed or finished.
- **Set**–the time after placement when the emulsified asphalt has coalesced to the point that no free emulsified asphalt is available for dilution or washing away by water and an absorptive paper towel would not be stained when depressed lightly into the surface of the mix
- **Traffic readiness**–the time when the cohesive strength (the bonds between asphalt coated aggregate particles) of the mixture has developed sufficiently to support slow-moving, straight-rolling traffic without damage to the system

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The Shoe Test

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- The shear strength and bond can be checked subjectively by placing your full weight flatly on the sole of your shoe on the placed treatment. If the sole can be placed on the new treatment for two seconds without picking up aggregate, then the pavement can be opened to rolling traffic without significant negative effects.
- If you can place your weight on the heel of one shoe on the placed treatment and twist the heel (about 180°) with only minor surface marks and without the large aggregate being displaced, the mixture can probably be opened to turning traffic without significant damage. However, sharp turns, especially by heavy vehicles, can damage micro surfacing for some time after application, particularly in hot weather.

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- Heavy duty micro
- High Polymer Micro (CSS-1EP)
- Double the polymer (6% vs. 3%)
- Aids in prevention of power steering burns and snowplow damage

When should I use high polymer micro???

- High Volume roads
- Roads with lots of turning movements where the surface is vulnerable early in the curing period.
- Intersections
- To Reduce raveling
- To Address rutting
- Enhances durability
- Restore friction
- Extends service life 7-9 years (1-2 years more than conventional micro)

Address rutting

Rut Fill Highway 82 in Alabama

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Address rutting

907-418.03.6--Rut Filling and Leveling Course. When required, before the final surface course is placed, preliminary micro-surfacing materials shall be required to fill ruts, utility cuts, depressions in the existing surface, etc. Ruts greater than 1/2" in depth shall be filled independently with a rut filling spreader box either 5-foot or 6-foot in width. For irregular or shallow rutting 1/2" or less in depth, a leveling course may be used as directed by the Engineer. The spreader box used for the leveling course shall be the same as used for the surface course; however, a steel or high density strike-off shall be used in lieu of a flexible rubber. Using a rut fill spreader box, each individual rut fill shall be crowned to compensate for traffic compaction at a rate of 1/8" per 1" of rut depth. Rut filling shall be placed and opened to traffic a minimum of 24 hours prior to surfacing. All materials, mixture composition, equipment, and construction procedures and requirements shall be as specified above.

REPROFILING RUTTED WHEELPATHS WITH MICRO-SURFACING

For each inch of applied micro-surface mix
add 1/8" to 1/4" crown to each rutfill
to compensate for return traffic compaction.

Original Pavement Cross Section

Ruts in Wheelpaths

RUTS 1/2" & OVER MUST USE THE RUT BOX

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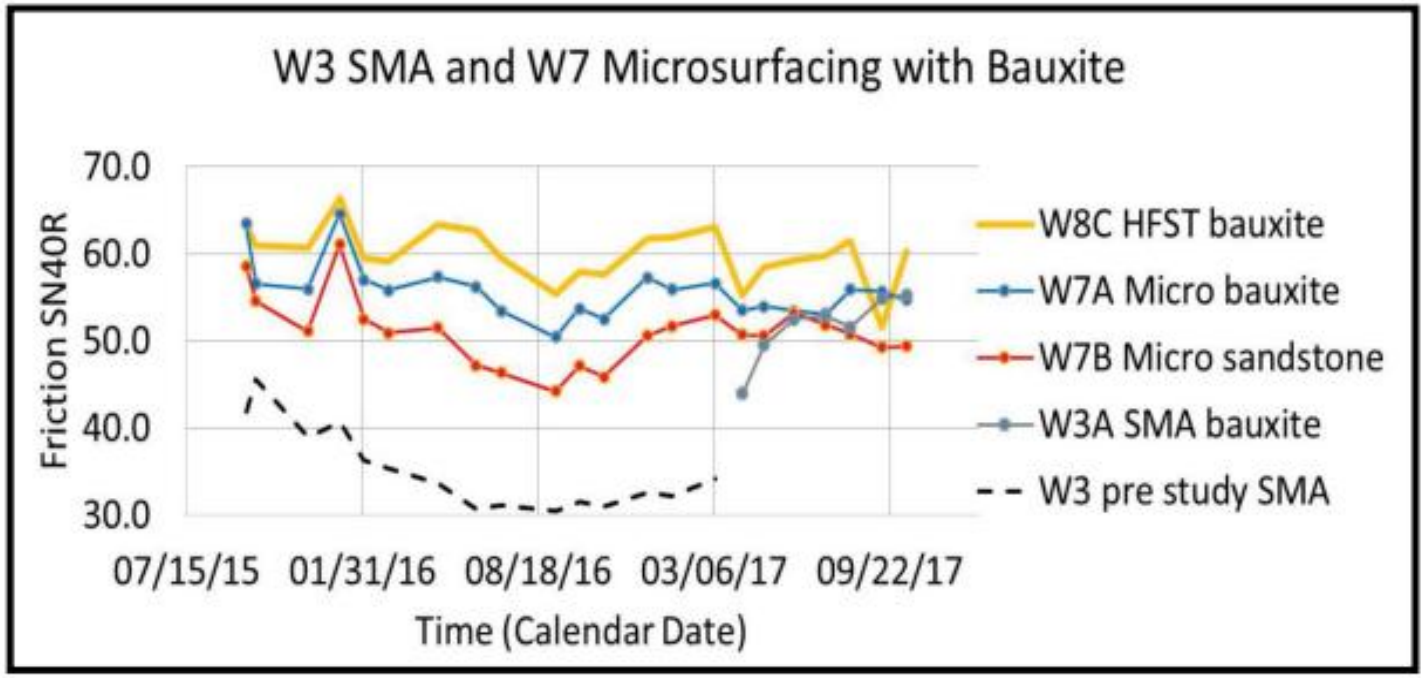
High friction surface treatments (HFSTs)

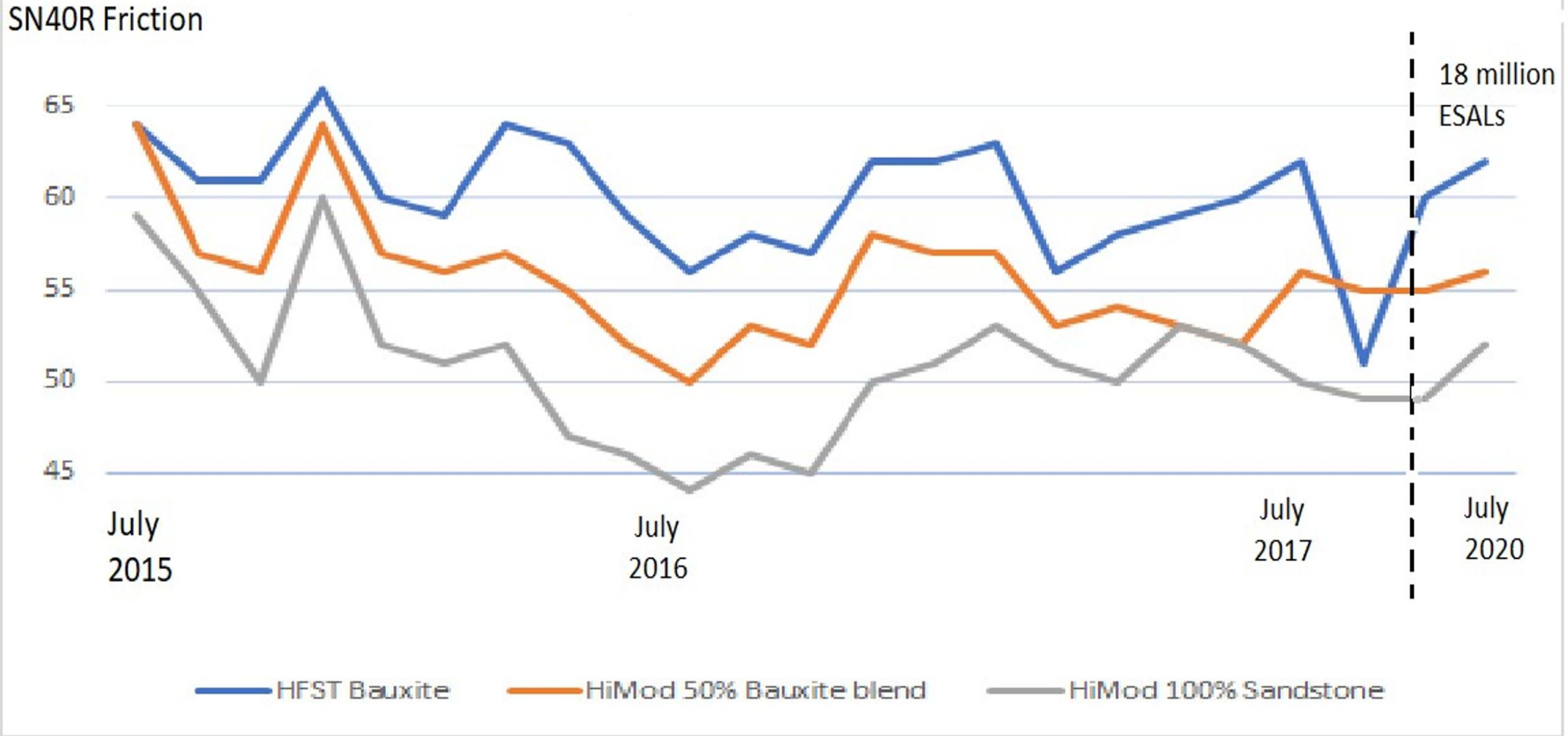
Bauxite as 50% of the aggregate blend, was compared to a standard HFST (polymer binder resin)

NCAT Test Track during testing.



NCAT Friction Summary Chart shows eFlex + 50% bauxite (W7A) in the 55 range after two years with 10,000,000 ESALs completed.

HIGH FRICTION SURFACE TREATMENT



Micro surfacing should not be used to:

- Fill potholes
- Improve the structural integrity of the existing pavement
- Improve traffic capacity

Figure 1 shows PCI values from 0–100 and their corresponding pavement condition rating.

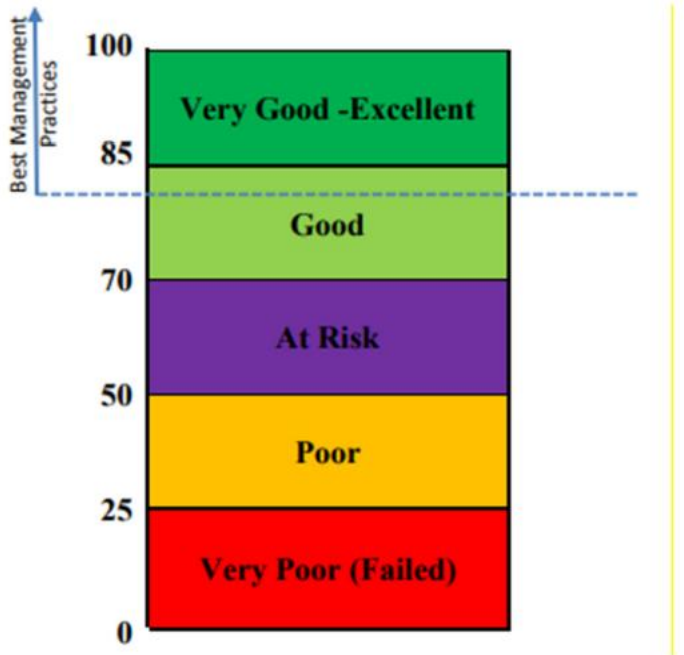


Figure 1: StreetSaver Pavement Condition Index Classifications [22]

Materials

Materials

Laboratory designed mixture of asphalt emulsion, aggregate, mineral filler, water and other additives accurately proportioned, mixed…

Materials

907-418.02--Materials. The materials to be used and the specifications for them are as listed below.

907-418.02.1--Aggregate. Mineral aggregate used in the micro-surfacing material shall meet the quality requirements of Table 1 and grading requirements of Table 2.

Table 1
Aggregate Quality Requirements

Test	Test Method	Requirement
Sand Equivalent, min	T 176	65
Los Angeles Abrasion, %, max[a]	T 96	30
Magnesium Sulfate Soundness, max loss, %, 4 cycles[a]	T 104	25

[a] The abrasion and soundness test is to be run on the parent aggregate.

AGGREGATE

Type I (1/8”)

Type II (1/4”)

Type III (3/8”)

Table 2
Aggregate Grading Requirements

Stockpile Tolerance %	Sieve Size	Type II Percent Passing	Type III Percent Passing
±0	3/8"	100	100
±5	No. 4	90 – 100	70 – 90
±5	No. 8	65 – 90	45 – 70
±5	No. 16	45 – 70	28 – 50
±5	No. 30	30 – 50	19 - 34
±4	No. 50	18 – 30	12 - 25
±3	No. 100	10 – 21	7 - 18
±2	No. 200	5 – 15	5 - 15

The gradation of the aggregate stockpile shall not vary by more than the stockpile tolerance, as indicated in Table 2, from the mix design gradation.

The specification gradation band for the No. 4, No. 8, No. 16 and No. 30 sieve screens shall be divided into thirds, no result shall move from the top third range to the bottom third range, or vice versa, on successive sieves to avoid any gap grading in the aggregate.

For example:

Sieve Size	Type II Spec	Type II Lower Range	Type II Middle Range	Type II Upper Range	Type III Spec	Type III Lower Range	Type III Middle Range	Type III Upper Range
No. 4 Sieve	90 – 100	90-93	93-97	97-100	70 – 90	70-77	77-83	83-90
No. 8 Sieve	65 – 90	65-73	73-82	82-90	45 – 70	45-53	53-62	62-70
No. 16 Sieve	45 – 70	45-53	53-62	62-70	28 – 50	28-35	35-43	43-50
No. 30 Sieve	30 – 50	30-37	37-43	43-50	19 - 34	19-24	24-29	29-34

A Type II aggregate with a result of 98% passing the No. 4 screen shall not be lower than 73% on the No. 8 screen.

The two successive sieve requirement can be waived with proof of the aggregate being successfully used in prior projects and at the discretion of the Engineer.

Aggregates shipped to the project shall be uniform and shall not require blending or pre-mixing at the storage area before use. Additionally, the aggregate shall remain within the master gradation band. Mineral filler shall not be used to satisfy the requirements as set forth in Table 2.

Figure 1: Gradation, ISSA Type II

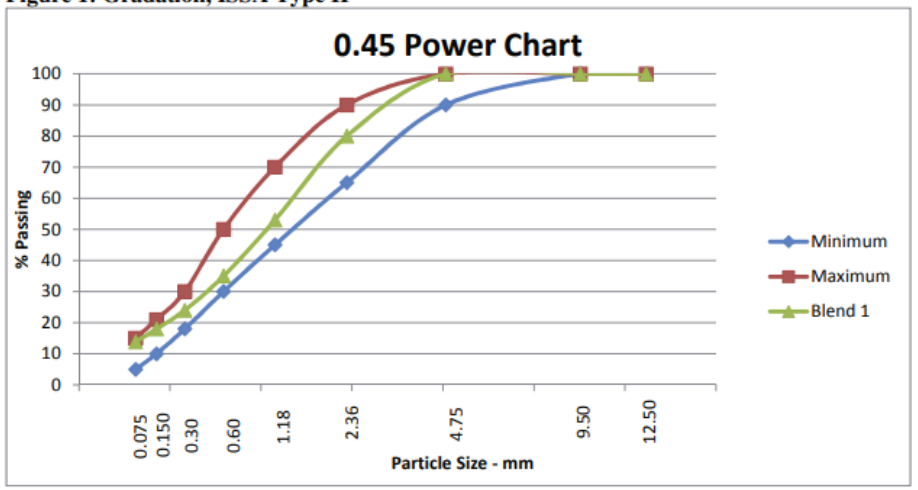
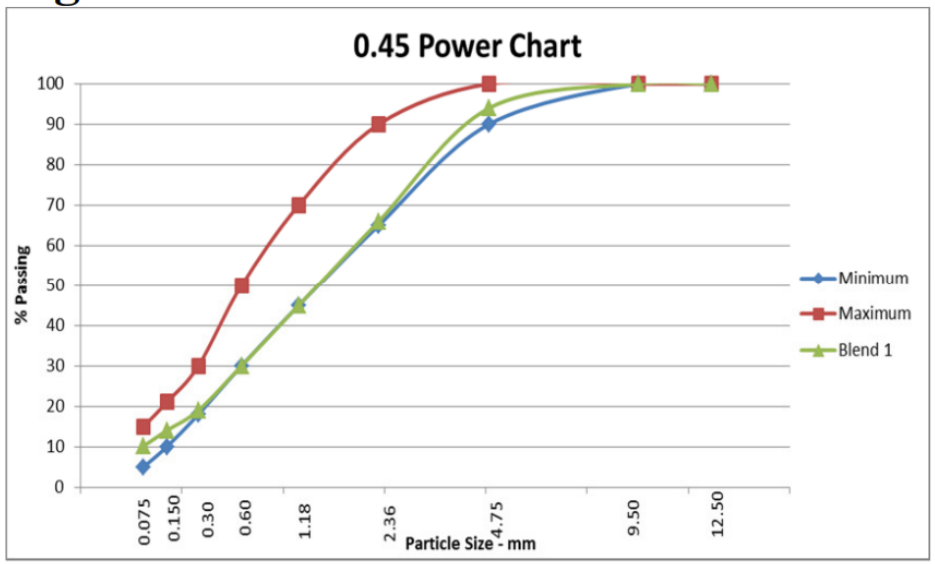


Figure 1: Gradation



907-418.02.10--Stockpiling and Storage.

907-418.02.10.1--Aggregate Storage. The mineral aggregate shall be handled in such a manner as to prevent segregation, mixing of the various materials or sizes, and contamination with foreign materials. The grading of aggregates proposed for use and as supplied to the project shall be uniform. Suitable equipment of acceptable size shall be furnished by the Contractor to maintain the stockpiles and prevent segregation of aggregates. The aggregate shall be passed over a scalping screen immediately prior to transfer to the micro-surfacing mixing machine to remove oversized material. In addition the scalping screen unit, when payment for micro-surfacing is to be by the ton of aggregate and gallon of asphalt emulsion, shall be equipped with certified scales capable of providing an automated ticket printout for each truck load of material delivered to the micro-surfacing machine. Each ticket shall include the project number, ticket number, truck number, date and batch weight of material loaded.

907-418.02.10.2--Storage of Bituminous Material. The bituminous storage shall be adequate to meet the requirements of the production rate. All equipment used in the storage and handling of bituminous material shall be kept in a clean condition at all times and shall be operated in such a manner that there will be no contamination with foreign matter.

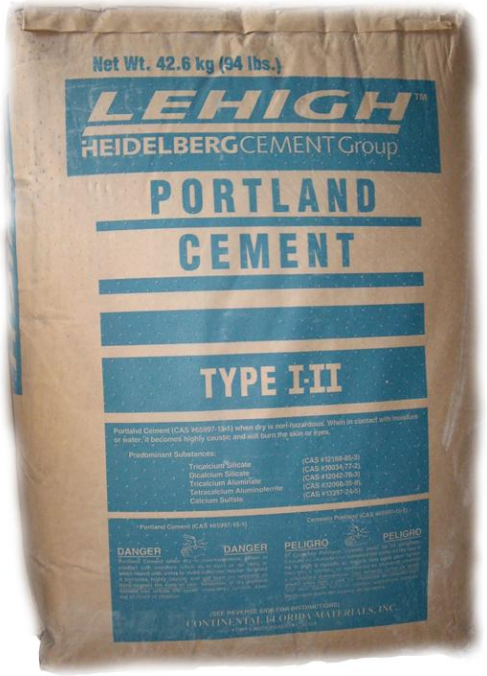
STOCKPILES

Good Stockpile Maintenance is Necessary

MINERAL FILLER

907-418.02.2--Mineral Filler. The mineral filler shall be Portland Cement or Hydrated Lime meeting the following requirements.

Portland Cement ..... Section 701
Hydrated Lime ..... Subsection 714.03



EMULSION (CSS-1EP)

MIXTURE OF OIL AND WATER ALONG WITH A POLYMER AND A SURFACTANT

907-418.02.3--Cationic Asphalt Emulsion. The emulsified asphalt shall be a cationic type CQS-1P meeting AASHTO M316 or CSS-EP meeting the following requirements in Table 3.

Table 3
Emulsion Requirements

Property	Test Procedure (AASHTO)	Specification Min	Specification Max
Emulsion Properties			
Viscosity, Saybolt-Furol, @ 122°F, SFS	T59	15	150
Sieve Test, %	T59		0.1
Residue by Evaporation, %	T59	62	
Residue Properties From Low Temperature Evaporation	**AASHTO R-78[1]**		
MSCR @ 70°C, Recovery @ 3.2 kPa, %	T350	80	
MSCR @ 70°C, J_{nr} @ 3.2, 1/kPa	T350		0.50

[1] After recovering the residue from AASHTO R-78, the sample may be annealed prior to testing to remove any excess moisture and provide for a consistent sample. The annealing can be accomplished by placing 20 grams of residue in a 6 oz. metal container (approx. 3-inch diameter) and heating to 163°C for no more than 15 minutes. The sample should be stirred with a spatula every 5 minutes. The sample can then be poured directly into a 25mm DSR silicone mold for evaluation.

907-418.02.5--Tack Coat. Normally, tack coat is not required unless the surface to be covered is concrete or is extremely dry and raveled. The emulsified asphalt should be the same grade and type as used for the micro-surfacing. The tack coat shall be placed using a standard distributor capable of evenly applying the emulsion. The tack coat shall be allowed to cure sufficiently before the application of micro-surfacing. If the tack coat is required, it will be noted on the plans or in the contract documents.

WATER

907-418.02.6--Water. The water for the micro-surfacing mixture shall be potable and free from any contaminants detrimental to the mixture.

ADDITIVE

907-418.02.7--Approved Additives. The emulsion manufacturer shall provide approved additives as required to control the set time of the mixture in the field. Approved additives shall be on the Department's APL.

MIX DESIGN

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907-418.02.8--Composition of Mixture. The Mix Design shall be prepared by an AASHTO-accredited laboratory and must be submitted to the engineer prior to beginning the work. The Mix Design shall be supplied by the Contractor. As a minimum, the design shall include the following: aggregate test properties, aggregate target gradation, results of Table 4 design requirements, design asphalt residue and mineral filler percentages based on dry weight of the aggregate. At least 10 days prior to construction, the Contractor shall submit to the Central Laboratory representative samples of each ingredient to be used in the micro-surfacing mixture for design verification. The samples shall include information relative to sources, type of materials and project number. No micro-surfacing work shall begin nor shall any mixture be accepted until the Laboratory has approved the micro-surfacing design. Acceptance of the design by the Engineer is solely for the purpose of quality control and in no way releases the Contractor from the responsibility to perform acceptable work under this specification.

MIX DESIGN

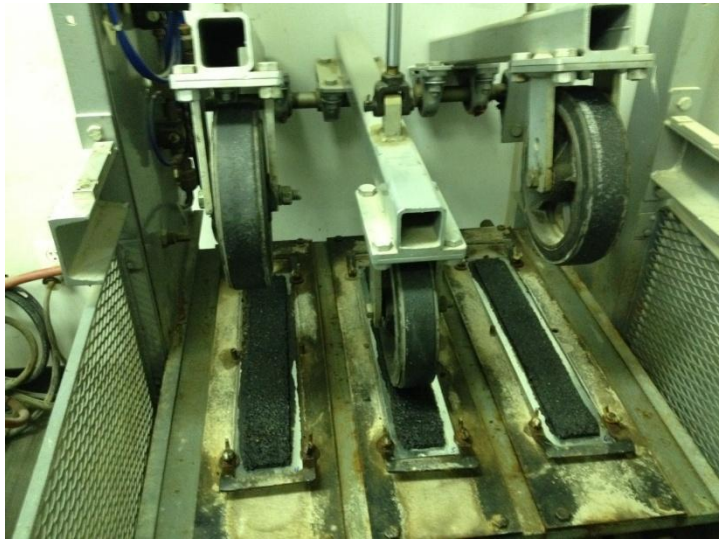
The micro-surfacing material shall be a uniform mixture of aggregate, emulsified asphalt, mineral filler, water and other additives as required to control the set time in the field. The emulsion and aggregate shall be compatible so that a complete, uniform coating of the aggregate shall be obtained in the mixing unit. The mixture shall have sufficient working life to allow for proper placement at the existing ambient temperature and humidity. The Engineer shall require the mixture to be redesigned if replacement of a constituent, or change in gradation, is needed to produce an acceptable mixture. The constituents shall be proportioned to produce a uniform mixture meeting the requirements of Table 4. Reference to ISSA TB means International Slurry Surfacing Association Technical Bulletin.

Table 4
Mix Design Specifications

	Mixture Control Tolerance	Type II	Type III
Range for Residual Asphalt, %[a]	+/- 0.50	6.5 – 9.5	6.0 – 9.0
Range for Mineral Filler, %[a]	+/- 0.50	0.5 – 3.0	0.5 – 3.0
Test	**Test Method**	**Value**	
Wet Track Abrasion Loss, Maximum 1 Hour Soak	TB 100	38 g/ft^2	
Wet Track Abrasion Loss, Maximum 6 Day Soak	TB 100	75 g/ft^2	
Lateral Displacement, Maximum %	TB 147	5	
Excess Asphalt by LWT, Maximum	TB 109	50 g/ft^2	
System Compatibility, Minimum	TB 144	11 grade points	
Mixing Time, Seconds @ 77°F, Minimum	TB 113	180	
Set Time, 30 Minutes, Minimum	TB 139	12 kg-cm	
Early Rolling Traffic Time, 60 Minutes, Minimum	TB 139	20 kg-cm	
Water Resistance, 30 Minutes	TB 102	No Discoloration	
Wet Stripping Test, % Coating, Minimum	TB 114	90	
System Compatibility	TB 115	Pass	
Cantabro Mass Loss[b], %, Maximum	TX 245-F	2.0	
Indirect Tensile Stiffness Modulus[b], MPa, Minimum	EN 12697-26 Annex C	10,000	
Bulk Specific Gravity[b]	AASHTO T-166	2.100 – 2.400	

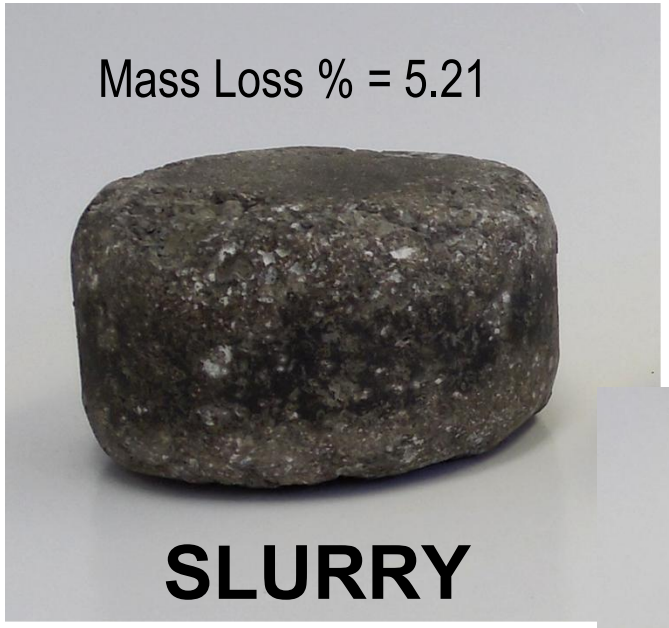
[a] Percent residual asphalt and percent mineral filler shall be based on weight of dry aggregate. Should these tolerances fail to be met, immediate adjustments will be made to bring the gradation and percent residual asphalt back within tolerances or the work will not be allowed to continue.

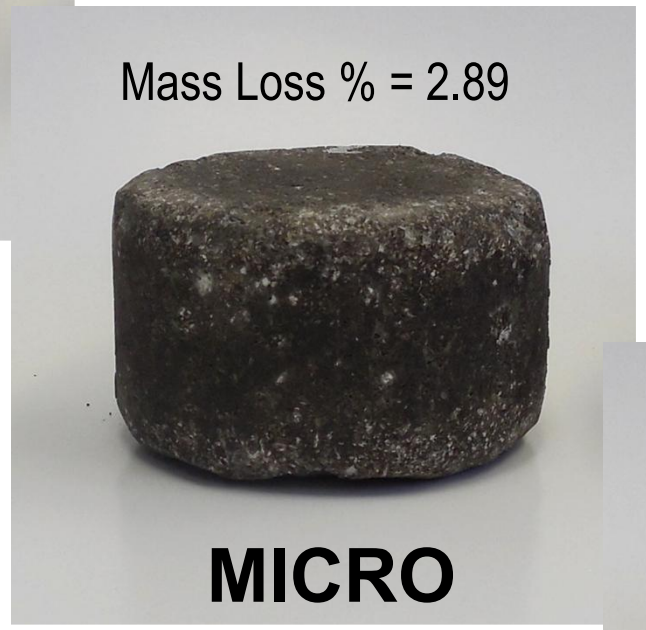
Wet Track Abrasion

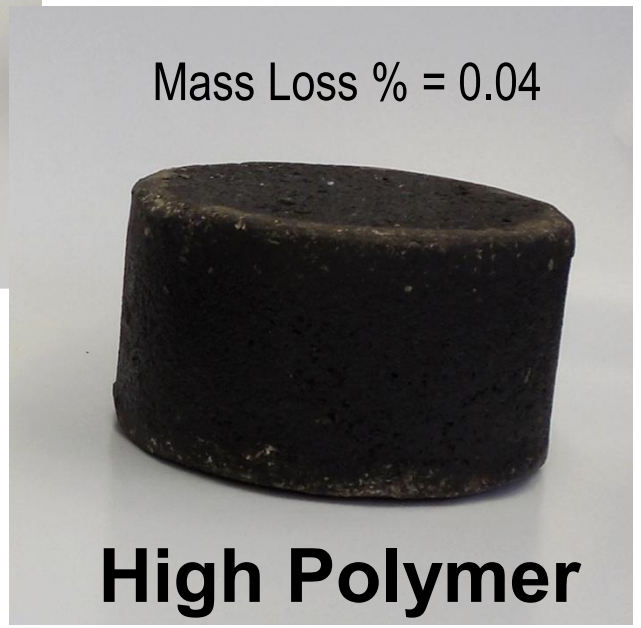


Loaded Wheel Test

Cantabro Mass Loss


Mass Loss % = 5.21
SLURRY


Mass Loss % = 2.89
MICRO


Mass Loss % = 0.04
High Polymer

IV Discussion.

Standard trial mixes, 30 and 60 minute cohesions with 0/#4 aggregate gradation were performed to determine mixing and setting characteristics. The effects of *0 to 3% Type I/II Portland cement* on cohesion values determined filler requirements to be between *0.5% and 1.5% cement.*

Based on cumulative test results and field experience, the optimum asphalt emulsion content of *12.0 to 14.0% at 64%* AC residue is selected. At *64%* AC residue the optimum asphalt cement content is *7.68 to 8.96%* by weight of aggregate.

If this material is used for Rut Filling applications or multi-lift applications, 11.5% emulsion and 1.5%±0.25% Type I/II Portland Cement should be used. Traffic should be applied to the lower application prior to placing the top lift.

V Job Mix Recommendation

Aggregate	**100 %**	
Mineral Filler	**1.0 ± 0.25%**	**of weight of dry aggregate**
Asphalt Emulsion	**12 to 14%**	**of weight of dry aggregate**
Water	**4 to 14*%**	**of weight of dry aggregate**
Additive	**** %	**of weight of dry aggregate**

- Mineral Filler is Type I/II Portland Cement

* **As needed for good mix consistency.**

** **As needed for Mix Time and Break control.**

Aggregate	82.66 tons
Emulsion	19,959 lbs
Mineral Filler	1,386 lbs
Water	1,726 gals
Additive	0.0 gals
Distance	2,332 yds
Square Yards	9,246
Emulsion	11.98 %
Mineral Filler	0.80 %
Water	12.44 %
Additive	0.05 %
Application Rate	17.9 lbs/yd
Emulsion Setpoint	12.00 %
Mineral Filler Setpoint	0.90 %
Aggregate Moisture	3.00 %
Box Width	144.000 inches
Average Box Width	142.52 inches
Additive Weight	0.00 lbs/gallon

The ratio of emulsion, water, additive and application rate calculations are derived from the dry material.

Dry Material = Aggregate + Mineral Filler

EQUIPMENT

EQUIPMENT

EQUIPMENT

907-418.02.9--Equipment. The Engineer shall approve all equipment, tools, and machines used in the performance of this work. No work shall be attempted with equipment that is malfunctioning. The Engineer may order that the work be discontinued if sufficient equipment and tools are not in use to place the materials satisfactorily.

907-418.02.9.1--Mixing Equipment. The paving mixture shall be blended by a self-propelled, positive, non-slipping aggregate delivery system (belt over chain) micro-surfacing mixing machine which shall be a continuous flow mixing unit able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, field control additives and water to a revolving multi-blade, twin shafted mixer and discharge the mixed product on a continuous flow basis. The mixture shall be thoroughly blended so that no uncoated aggregate is visible upon discharge from the mixing unit. The machine shall be equipped with self-loading devices which provide for the loading of all materials while continuing to lay micro-surfacing, thereby minimizing construction joints. The machine shall be equipped with opposite side driving stations to optimize longitudinal alignment. The machine shall be equipped to allow the operator to have full hydrostatic control of the forward and reverse speed during the application of the micro-surfacing material. Continuous-run equipment will be required to ensure continuity of mix and reduction of start-up joints.

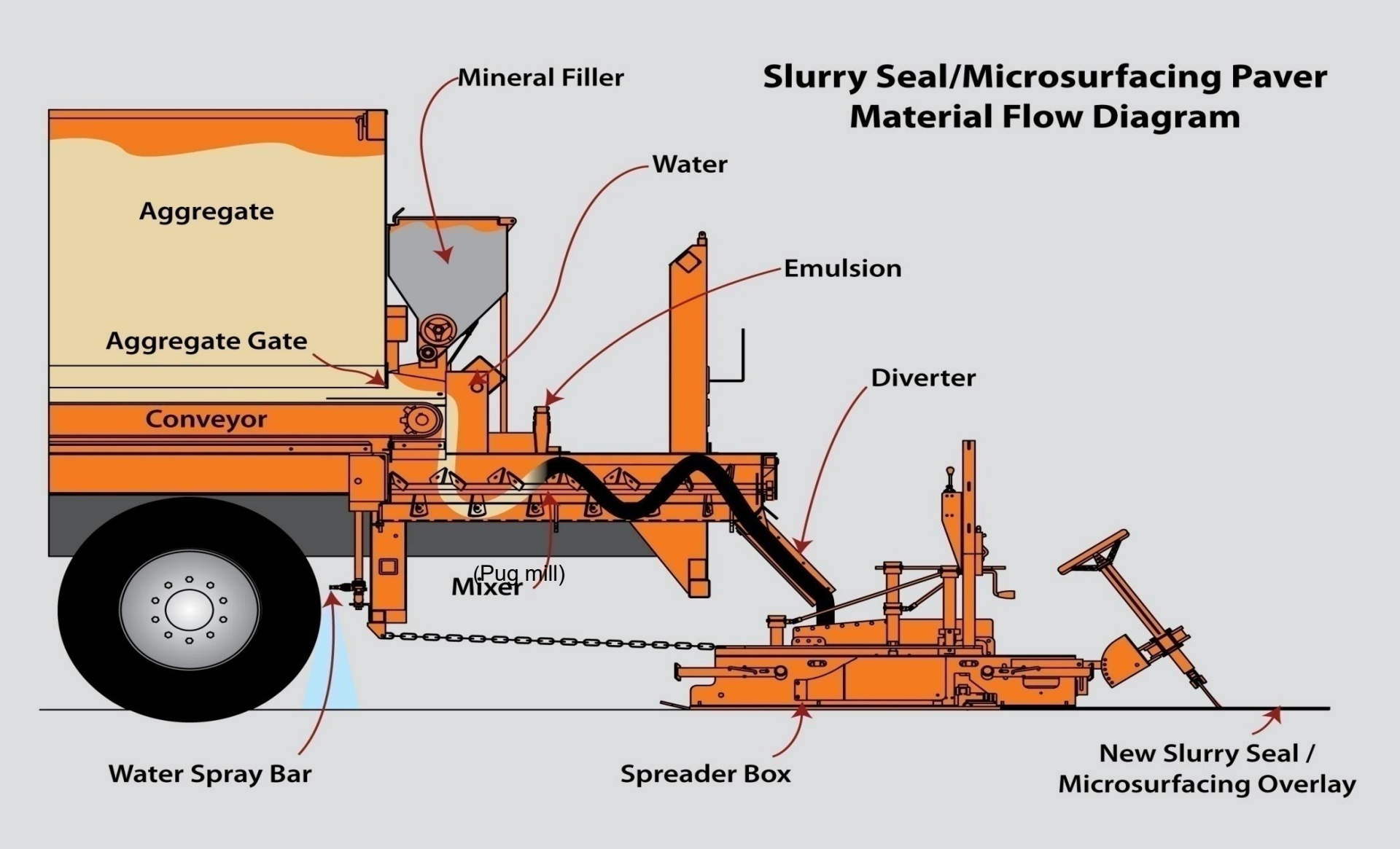
In some cases and with the Engineer's approval, truck mounted units may be used for short narrow roadways, crossovers and irregular areas. If truck mounted units are allowed, they shall be equipped with a positive, non-slipping aggregate delivery system (belt over chain) and have the capability of applying a minimum of 10 tons of aggregate without recharging the aggregate bin.

Continuous Run Machine

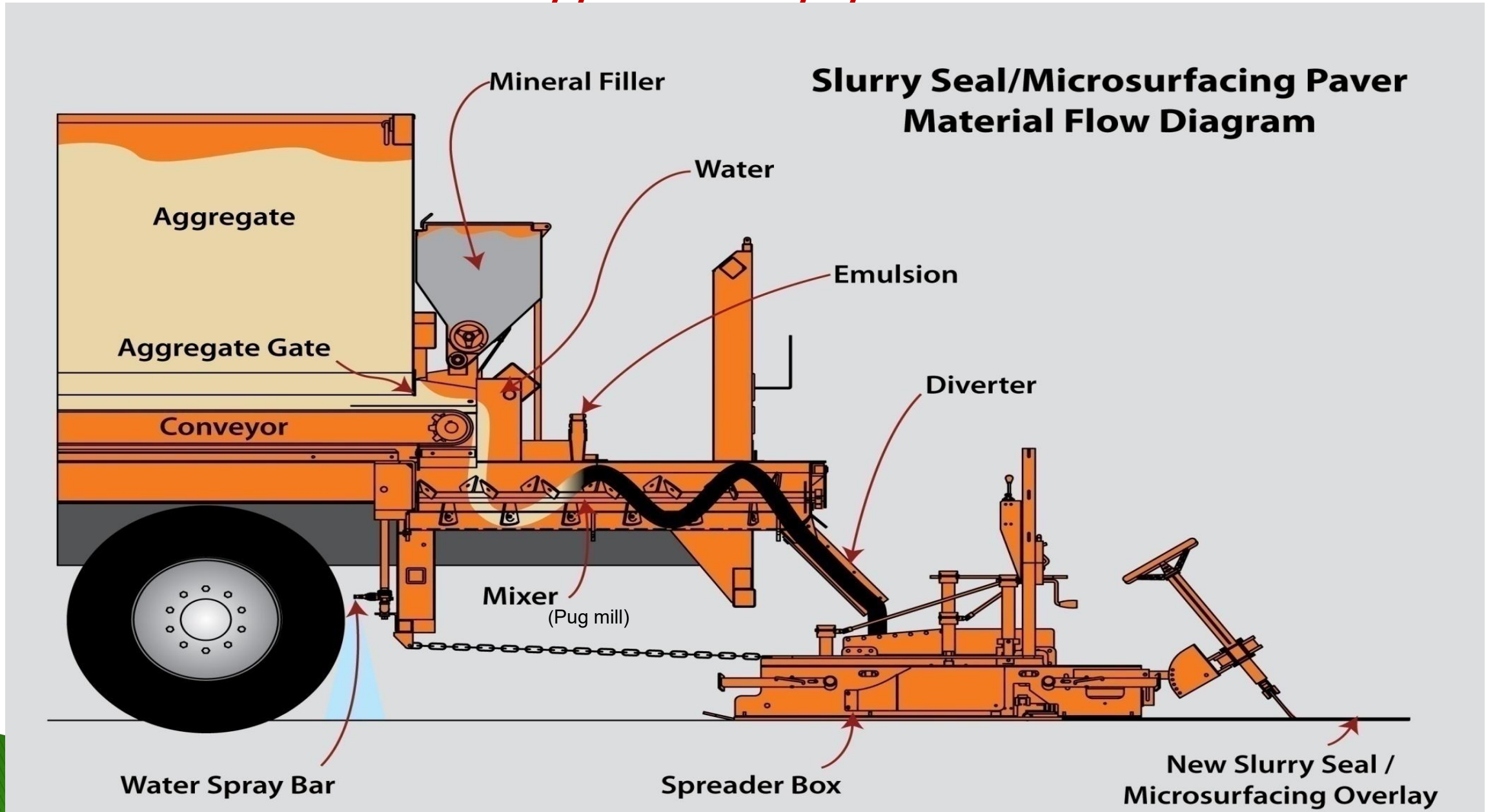
Truck Mounted Unit


MACK

Application Equipment



Application Equipment



Multi-Bladed Pug mill

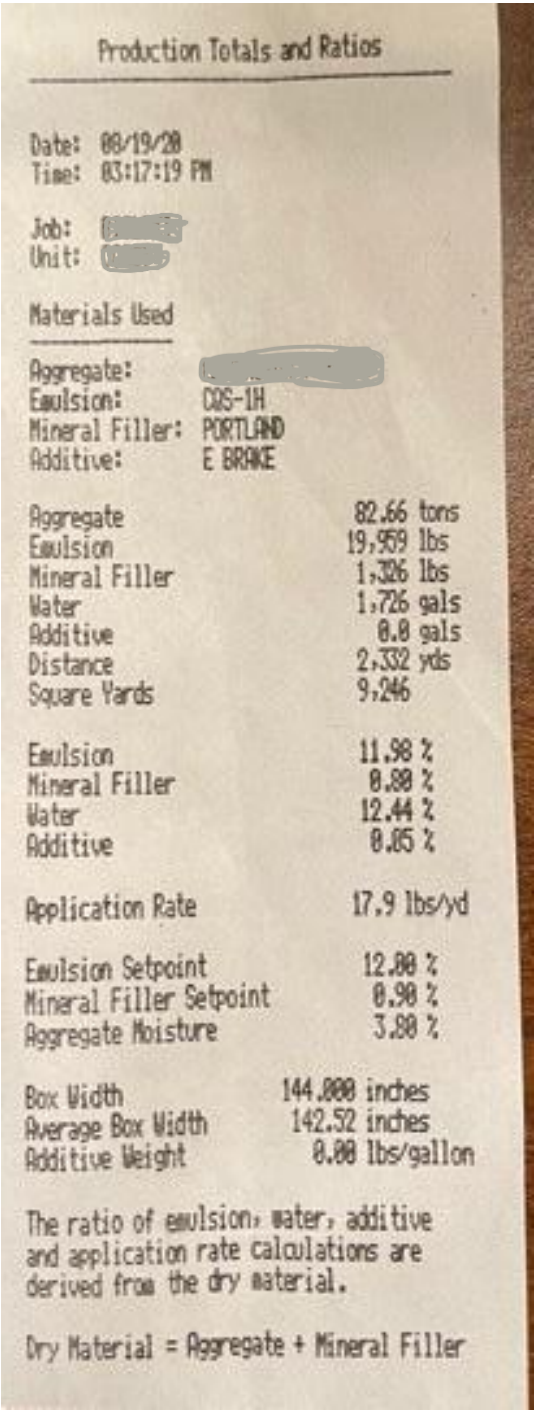
Application Equipment

capability of applying a minimum of 10 tons of aggregate without recharging the aggregate bin.

1. Water Pressure System. The mixing machine shall be equipped with a water pressure system and nozzle type spray bar to provide a water spray ahead of and outside the spreader box when required.

2. Calibration & Proportioning Devices. The machine shall be equipped with individual volume or mass controls or other gauging devices for measuring and proportioning each material added to the mix. Each material control device shall be calibrated, properly marked, and positively interlocked. The aggregate feed to the mixer shall be equipped with a revolution counter or similar device so that the amount of asphalt emulsion, aggregate and mineral filler used may be determined at any time. Each mixing unit shall be calibrated prior to commencement of the work. The calibrations shall be performed and verified in the presence of the Engineer or the Engineer's representative. Once calibrated, the aggregate and emulsion flows shall not be changed without the approval of the Engineer. The water and additive may be adjusted in the field to control the mix properties to produce an acceptable mix. With the Engineers approval, previous calibration documentation covering the exact materials to be used may be acceptable provided they were made within the last three (3) months.

3. Emulsion Pump. The emulsion pump shall be a heated, positive displacement type pump.



Production Totals and Ratios

Date: 08/19/20
Time: 03:17:19 PM

Job: [redacted]
Unit: [redacted]

Materials Used

Aggregate: [redacted]
Emulsion: CQS-1H
Mineral Filler: PORTLAND
Additive: E BRAKE

Aggregate	82.66 tons
Emulsion	19,959 lbs
Mineral Filler	1,326 lbs
Water	1,726 gals
Additive	0.0 gals
Distance	2,332 yds
Square Yards	9,246
Emulsion	11.98 %
Mineral Filler	0.80 %
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Application Rate	17.9 lbs/yd
Emulsion Setpoint	12.00 %
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Aggregate Moisture	3.00 %
Box Width	144.000 inches
Average Box Width	142.52 inches
Additive Weight	0.00 lbs/gallon

The ratio of emulsion, water, additive and application rate calculations are derived from the dry material.

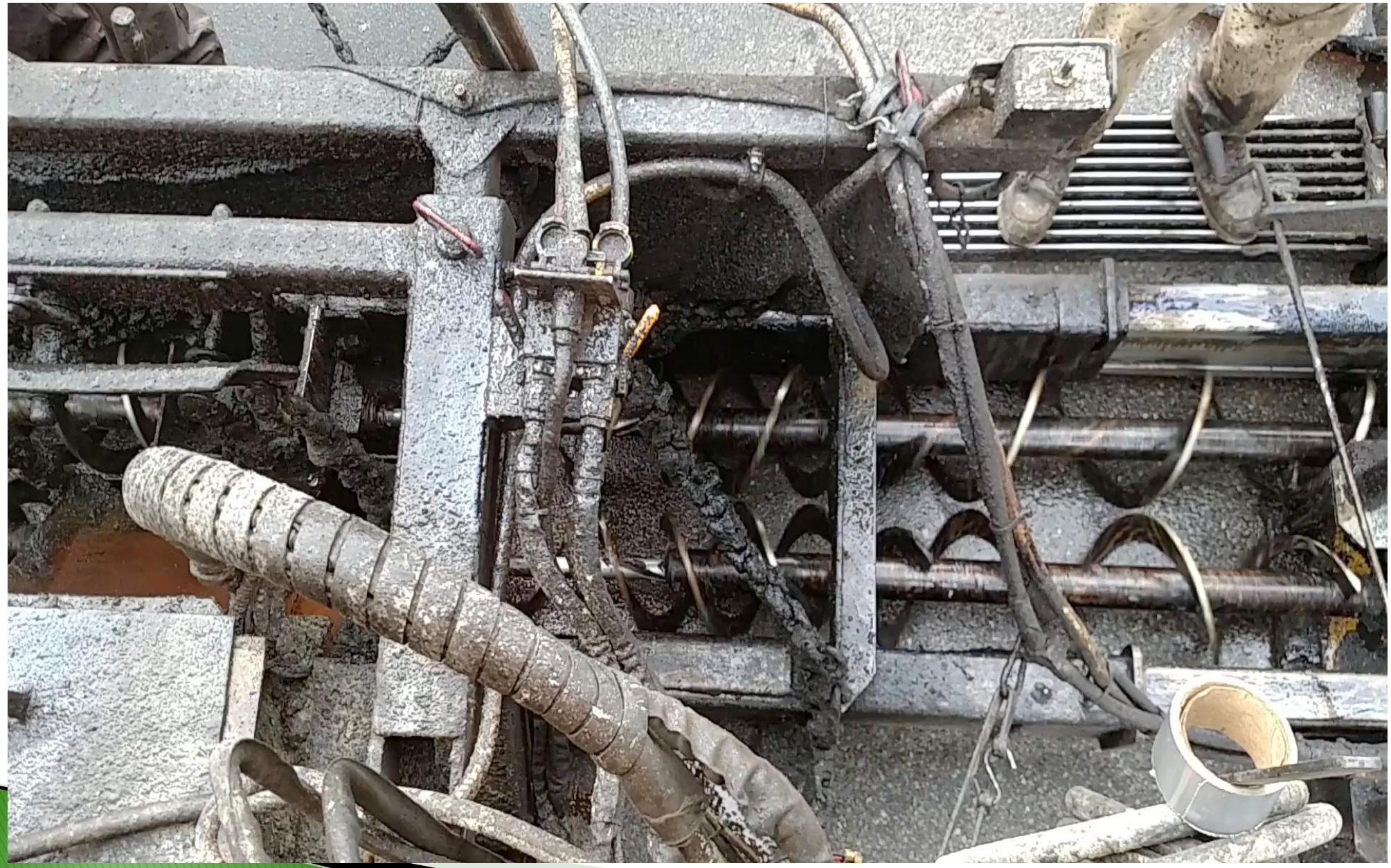
Dry Material = Aggregate + Mineral Filler

Application Equipment

Attached to the machine shall be a hydraulically adjustable (adjustable while applying mixture) type spreader box with a positive screed adjustment for yield control. The box shall be attached to the mixer, equipped with ribbon flights mounted on an adjustable shaft to continually agitate and distribute the material throughout the box. The box will be equipped with curb bumpers and replaceable runners with a minimum of 5-foot long end runners. The box shall be equipped with a sufficient walkway to provide access to either side of the spreader box without walking through the freshly applied material. The box must be capable of laying mix to a width of 14 feet. The equipment shall provide sufficient turbulence to prevent the mix from setting in the box or causing excessive build-up or lumps. To prevent the loss of mixture from the box, the Contractor shall attach flexible seals, front and rear, in contact with the road. The full width application box shall be equipped with a secondary strike-off located approximately 2 to 3 feet behind the primary strike-off to minimize transverse corrugations. The secondary strike-off shall have elevation and width adjustments similar to the primary strike-off. It shall have a pivot point where it can be tilted for texturing or raised completely off of the surface. The use of burlap drags or other drags necessary to obtain the desired surface texture, shall require approval by the Engineer. Drags having excessive build-up shall be replaced. Drags shall be kept in a completely flexible condition at all times.

907-418.02.9.2--Auxiliary Equipment. Suitable surface cleaning equipment, barricading equipment, hand tools and other support equipment shall be provided by the Contractor as necessary to perform the work.

Application Equipment



Application Equipment

Application Equipment

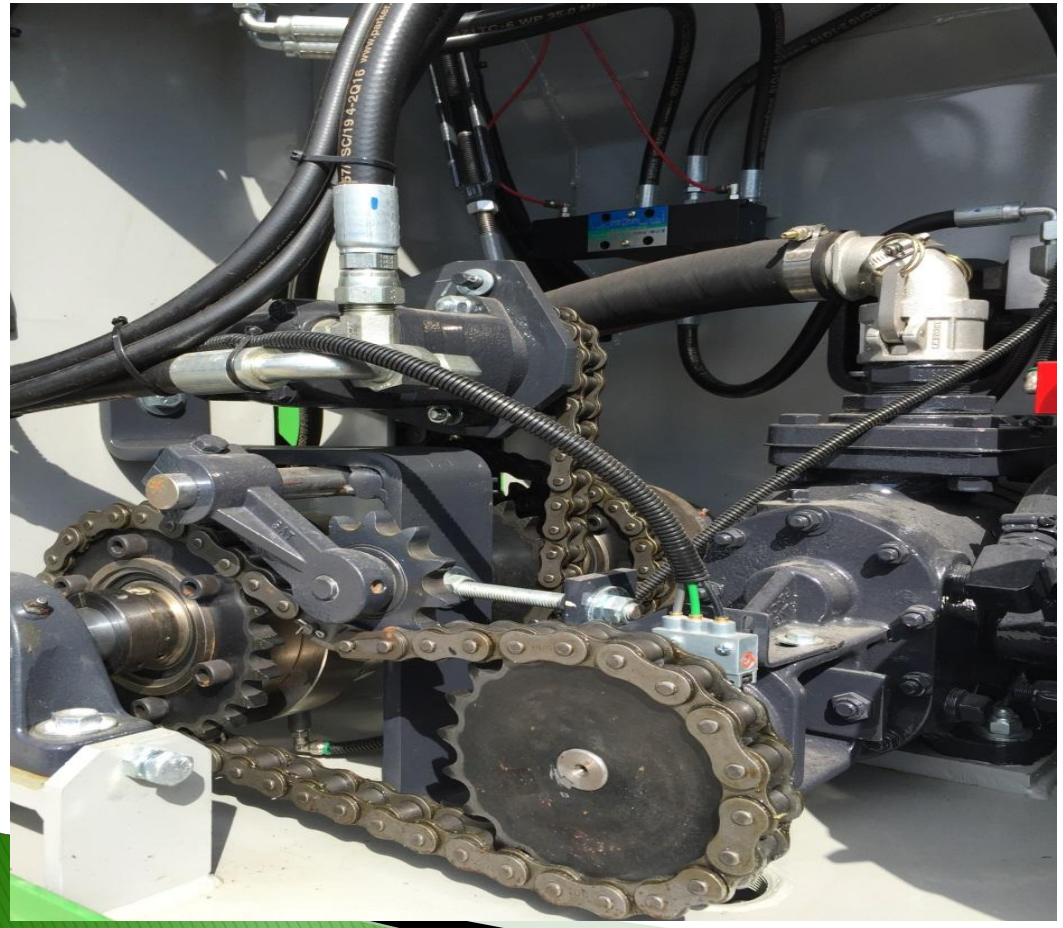
Truck Mounted Paver

Application Equipment

Continous Paver

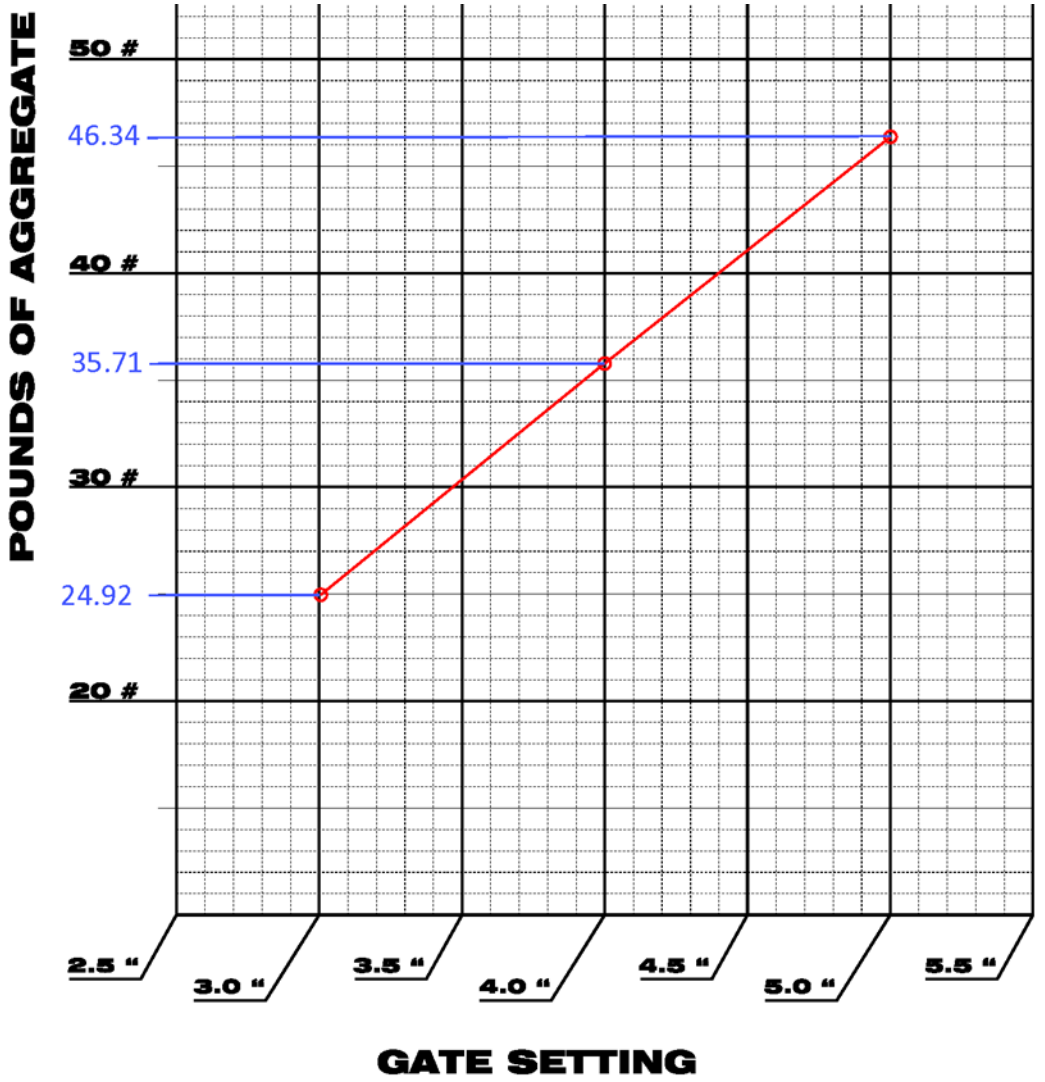
Paver Types –

- Mechanical

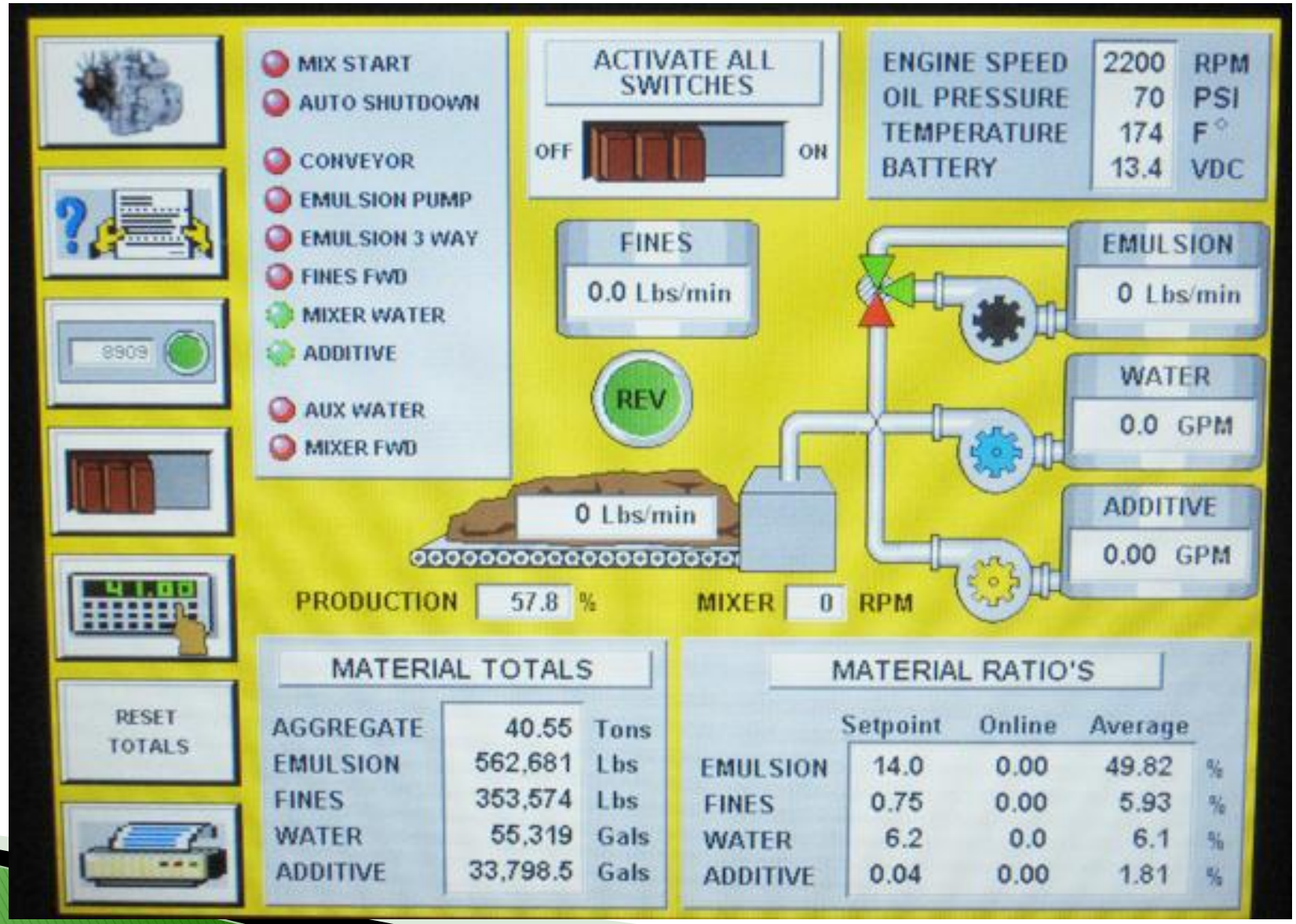


- Electronic – All Hydraulic Drive

Mechanical Paver



Electronic Paver Mix Control



Application

907-418.03.4--Application. The paving mixture shall be spread on the prepared surface in such a way to leave a uniform finished surface. Care shall be taken when filling ruts to restore the designed profile of the pavement cross section. Excess crowning or overfilling of the rut area will not be permitted. The Contractor shall use squeegees and lutes to spread the mixture in areas inaccessible to the spreader box and areas requiring hand spreading. A sufficient amount of material shall be carried at all times in all parts of the spreader box to ensure complete coverage.

Adjustments to the additive will be permitted if necessary to provide a slower setting time when hand spreading is needed. If hand spreading is necessary, the mixture shall be poured in a small windrow along one edge of the surface to be covered and then spread uniformly by a hand squeegee or lute. A smooth, neat seam shall be provided where two passes meet. Excess material shall immediately be removed from ends of each run.

Application

907-418.03--Construction Requirements. It shall be the responsibility of the Contractor to produce, transport and place the specified materials in accordance with these specifications and as approved by the Engineer. The finished micro-surfacing shall have a uniform texture free from excessive scratch marks, tears or other surface irregularities. The cured mixture shall adhere fully to the underlying surface. Based upon a visual examination or test results the Engineer may reject any work due to poor workmanship, loss of texture, raveling or apparent instability.

907-418.03.1--Seasonal and Weather Limitations. No micro-surfacing shall be performed from December 1 and March 1.

The micro-surfacing mixture shall be spread only when both the pavement surface and the ambient temperature is at least 50°F and rising and the weather is not foggy or rainy and there is no forecast of temperatures below 32°F within 48 hours from the time of placement. The Contractor shall supply a surface temperature thermometer.

Application


hudson

Surface Preparation

907-418.03.2--Surface Preparation. The area to be surfaced shall be thoroughly cleaned of vegetation, loose aggregate, lane striping, thermoplastic pavement markings, raised pavement markers and soil. Manholes, valve boxes and other service entrances shall be protected from the surfacing material. Crack sealant material shall be allowed to cure for a minimum of 30 days on pavement surfaces that have been crack sealed before application of the micro-surfacing. Unless otherwise directed by the Engineer, pre-wetting of the surface will be required. Water shall be sprayed ahead of and outside of the spreader box at an acceptable rate to dampen the surface without any free flowing water ahead of the spreader box.

907-418.03.3--Tack Coat. The tack coat, when required, shall be diluted at the rate of one part emulsion and three parts water and shall be applied with an asphalt distributor. The application rate shall be 0.05 to 0.15 gallons of diluted emulsion per square yard. When required, tack coat will not be measured for separate payment; costs shall be included in other items bid.

Surface Preparation

What prep work is required before a slurry / micro project?

- Crack Treatments
- Structural Leveling
- Full Depth Repairs
- Tree Trimming
- Herbicide Treatment

- Surface Cleaning
- Structure and Casting Protection
- Pavement Marking Removal
  - Thermoplastic and Buttons
  - Paint is not generally removed unless it is very thick.
- Gutter Protection
- Railroad Crossing Protection

Early or Initial Stage

Final Stage

Surface Preparation, What to Watch For

- Crack Sealing
  - Sealant should be kept flush with minimal over banding. Thick over bands will get caught by the box runners.
  - It is best to seal at least 30 days prior to surfacing.
- Patching
  - Make sure patches are kept at or below the road surface. Remember – Micro surfacing does a great job of filling low areas. Bumps will be Bumps.
  - Cold Mix patches should “cure” at least 30 days prior to Micro surfacing.
- Micro milling
  - MnDOT and other states are having good success by Micro milling ahead of Micro surfacing.
  - Smooths the road and the texture increases adhesion of the Micro surface.

Surface Preparation, What to Watch For

- Cleaning
  - One of the most important steps in the process but often the first to be overlooked.
  - Watch out for:
    - Field Entrances
    - Rock Shoulders
    - Areas around the loading site.

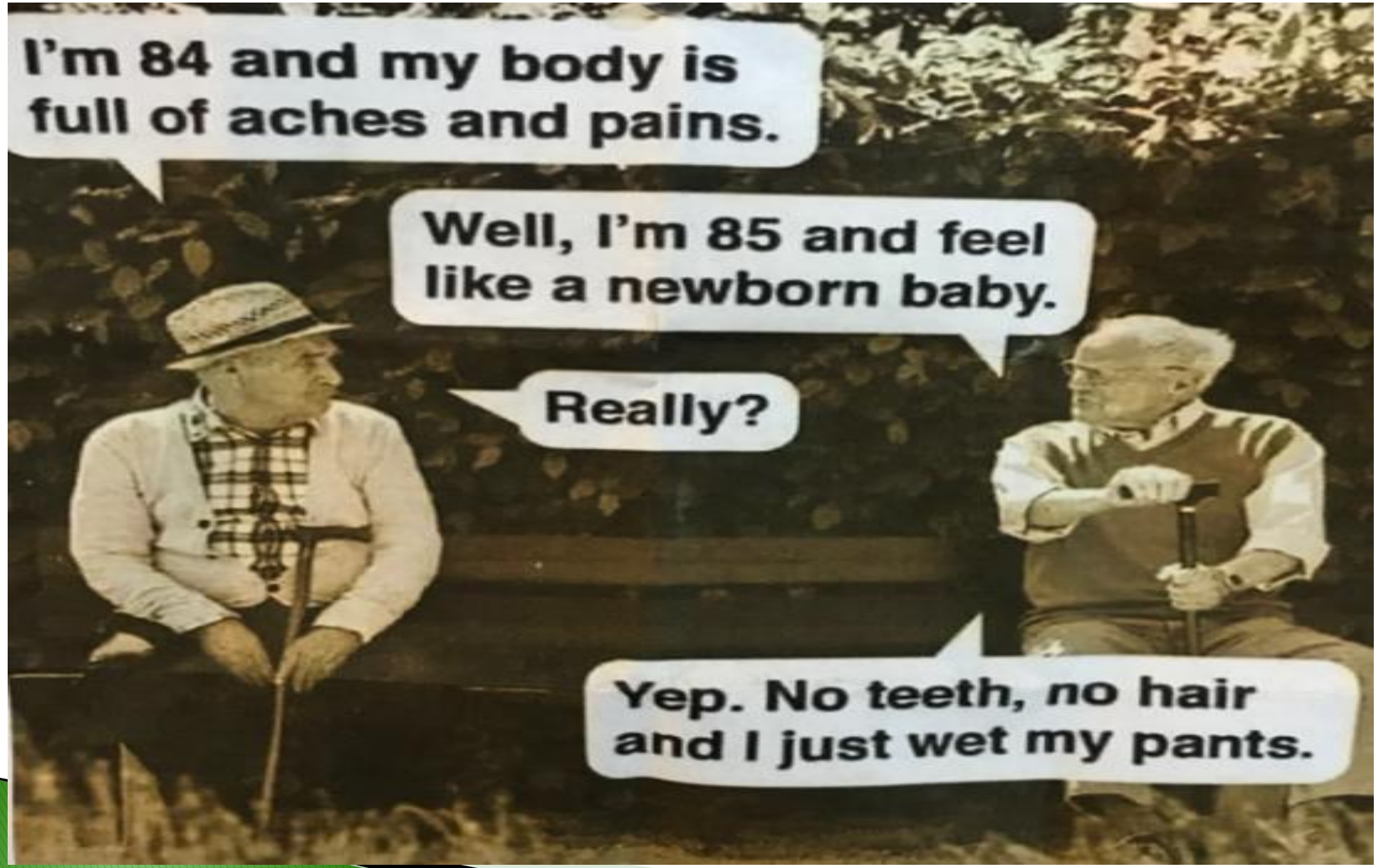
Traffic Control

907-418.03.5--Traffic Control. The emulsified asphalt shall be formulated in such a way to allow the paving mixture to cure at a rate which will permit straight rolling traffic on the pavement within one hour after application without damaging the pavement surface. The Contractor shall maintain traffic control as necessary to prevent damage to the mixture. Any such damage done by traffic to the mixture shall be repaired by the Contractor at the Contractor's expense.

Damage from Early Traffic:

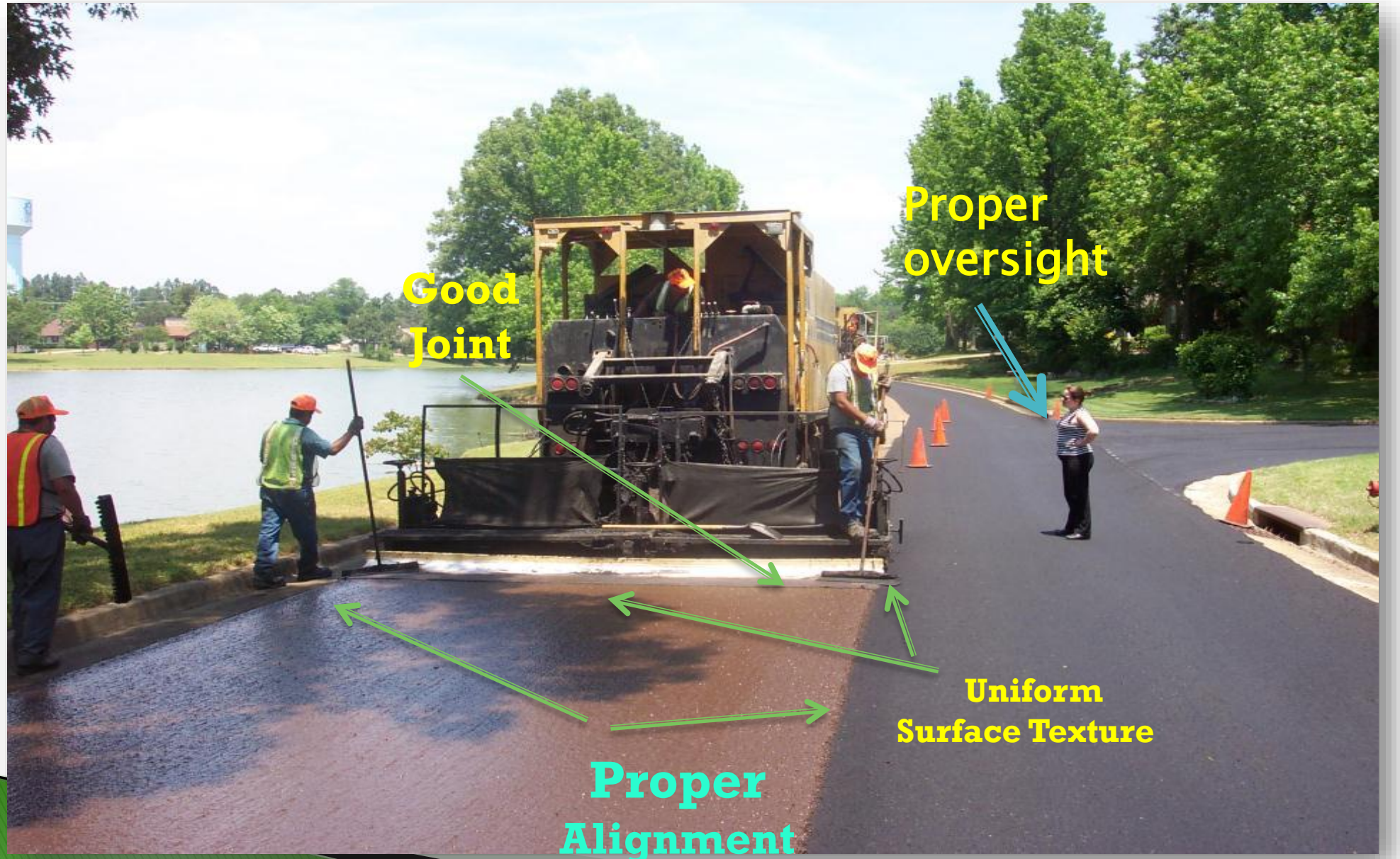
What Went Wrong?

What Went Wrong?


I'm 84 and my body is full of aches and pains.
Well, I'm 85 and feel like a newborn baby.
Really?
Yep. No teeth, no hair and I just wet my pants.

Let's Ask What Went Right!

Performing A Great Job



Let's Ask What Went Right!

Let's Ask What Went Right!

THE END

LET THE GOOD TIMES ROLL


302-116


STOP


Vestal
Asphalt
Inc.
MICRO-SURFACING
EMULSION

THE END!!

Questions!