5 Keys To A Quality Micro surfacing Project

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Quality Is The Goal

- 5 Keys
  - Equipment
  - Materials and Calibration
  - Surface Preparation
  - Paving Techniques
  - Problem Solving

Truck Mount Pavers

Continuous Paver

Paver Types

Mechanical –Air / Hydraulic

- A mechanical paver uses a Jackshaft to power the emulsion pump and aggregate belt.
- Jackshaft keeps the aggregate belt and the emulsion pump in the same ratio.
- Hydraulic systems are operated by air switches.

Electronic – Electric over Hydraulic

- An electronic paver uses computer controlled hydraulic motors to separately power the aggregate belt and emulsion pump.
- The computer maintains the ratio of the aggregate and emulsion.

Paver Types

Mechanical -Air / Hydraulic

- Mechanical paver has an adjustable aggregate gate that controls emulsion content.
- Paver is calibrated using air or electronic counter which count revolutions of the aggregate belt and emulsion pump.

Electronic – Electric over Hydraulic

- Electronic paver has a fixed aggregate gate.
- Emulsion content is controlled by the computer controller.
- Controller checks and adjusts speed of various motors to keep mix ratios constant.

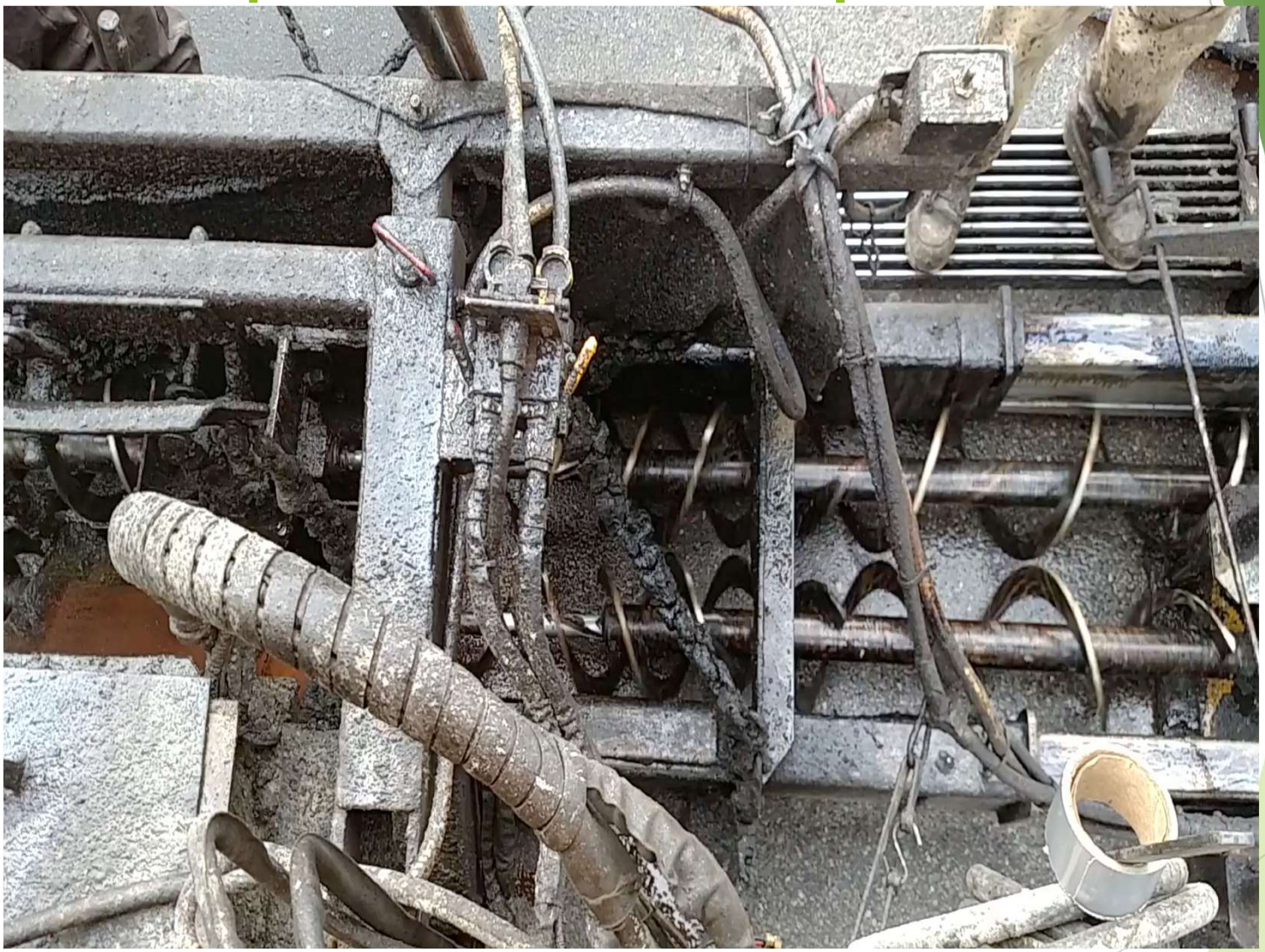
Continuous Paver- Video

Spreader Boxes

- Slurry Box
  - Slurry Only
  - No Augers
  - Front Auger
  - Dual Augers
- Hydraulic Spreader Box – Dual Augers
  - Slurry or Micro
  - Stop to Adjust Width
- Variable Width Spreader Box-Dual Augers
  - Slurry or Micro
  - Adjustable on the Go
- Rut Box

Slurry Box

Spreader Box Operation



Variable Width Spreader Box

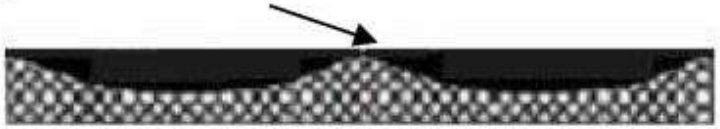
Rut Box

Rut Filling

Re-profiling Wheel Ruts
with
Micro surfacing

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

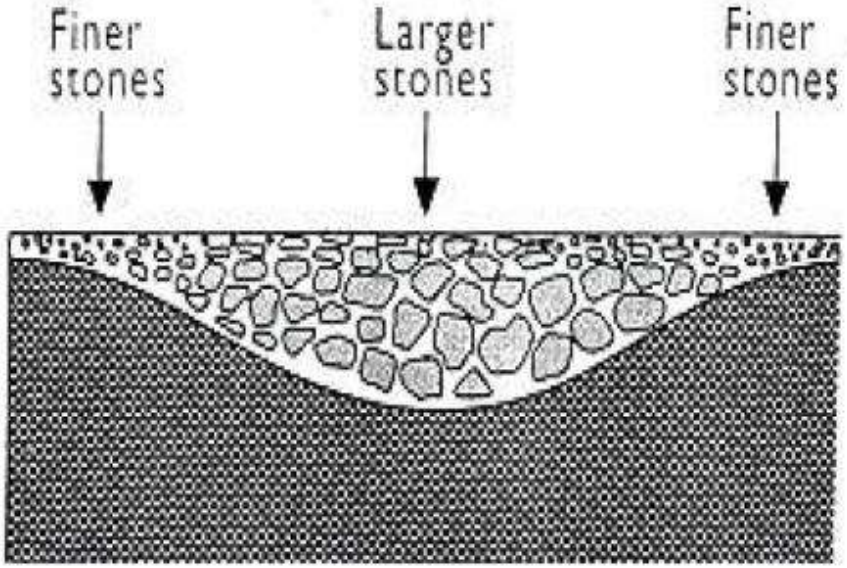
Original Pavement Cross Section



Ruts in Wheelpaths

Ruts ½" & Over
Must Use the Rut Box

Cross Section of a Rut



Equipment Inspection Items

- Cleanliness
  - Mixer cleaned nightly
  - Spreader Box cleaned at every stop (micro) and nightly.
- Aggregate Spillage
  - Under Feed Belt
  - Under Mixer
  - Front Hopper Rubber
- Liquid Leakage
  - Hydraulic Oil or Fuel
  - Emulsion

Equipment Inspection Items

- Spreader Box
  - Clean
  - Augers within ½ inch of roadway or as low as possible.
  - Augers not foaming or splashing mix
  - Front Rubber in Place
  - Side Rubbers in Place and tight.
  - Side Runners are level and not rocking.
  - Box Urethane is Tight with No Wrinkles

Materials and Calibration

- Micro surfacing is a chemical system. Each component has an important function in the system and when any component fails to meet the design parameters the system breaks down.
- Components Include:
  - Aggregate
  - Emulsion
  - Cement
  - Additives
  - Paver Calibration

Aggregate

- Gradation
  - Small deviations in the middle of the sieves (#16,#30,#50) are not a major issue.
  - Watch for the #8 and #4 going coarse. This may cause raveling and or a noisy ride.
  - The #200 is very important. The amount passing the #200 must stay within the JMF.
    - Not enough passing the Lbs.200 can cause the system to flush. Too much can cause the system to be too fast.
- Cleanliness
  - Watch that the loader operator stays out of the bottom of the pile, especially at the end of the job.
  - Low Sand Equivalent and High Methylene Blue Results can cause the mix to break too quickly.
    - Dirt or Base Rock can be a killer.

Emulsion

- Temperature
  - Micro surfacing works best when the temperature of the emulsion is between 80 and 110 F.
    - Emulsion under 75 F may separate or shear. It may separate during storage.
    - Emulsion over 125 F will probably cause the system to break quickly and be “out of control”.
- Separation
  - Small amounts of separated latex are ok but watch for large strings in the tanker.
  - Also watch for large strings of separated latex in the spreader box. In this case, contractor should shut down and ship the load back.

Cement

- Cement promotes a thicker/creamier mix and keeps the water from separating in the spreader box.
- Cement also starts the breaking process of Micro surfacing by causing a PH shift that makes the aggregate more attractive to the emulsion.
- The contractor may adjust his cement percentage (within the JMF) throughout the day. This changes can increase or decrease the break time.

Why Do We Calibrate?

- Slurry/Micro Pavers must be calibrated to make sure the mix matches the Mix Design.
- Must be calibrated using the aggregate and emulsion type to be used on the project.
- Must be re-calibrated if:
  - Material Change
  - Pump Repair or Change
  - Replacement of Conveyor Skirt Rubbers.
- Emulsion should be calibrated every job* or at least once per month.

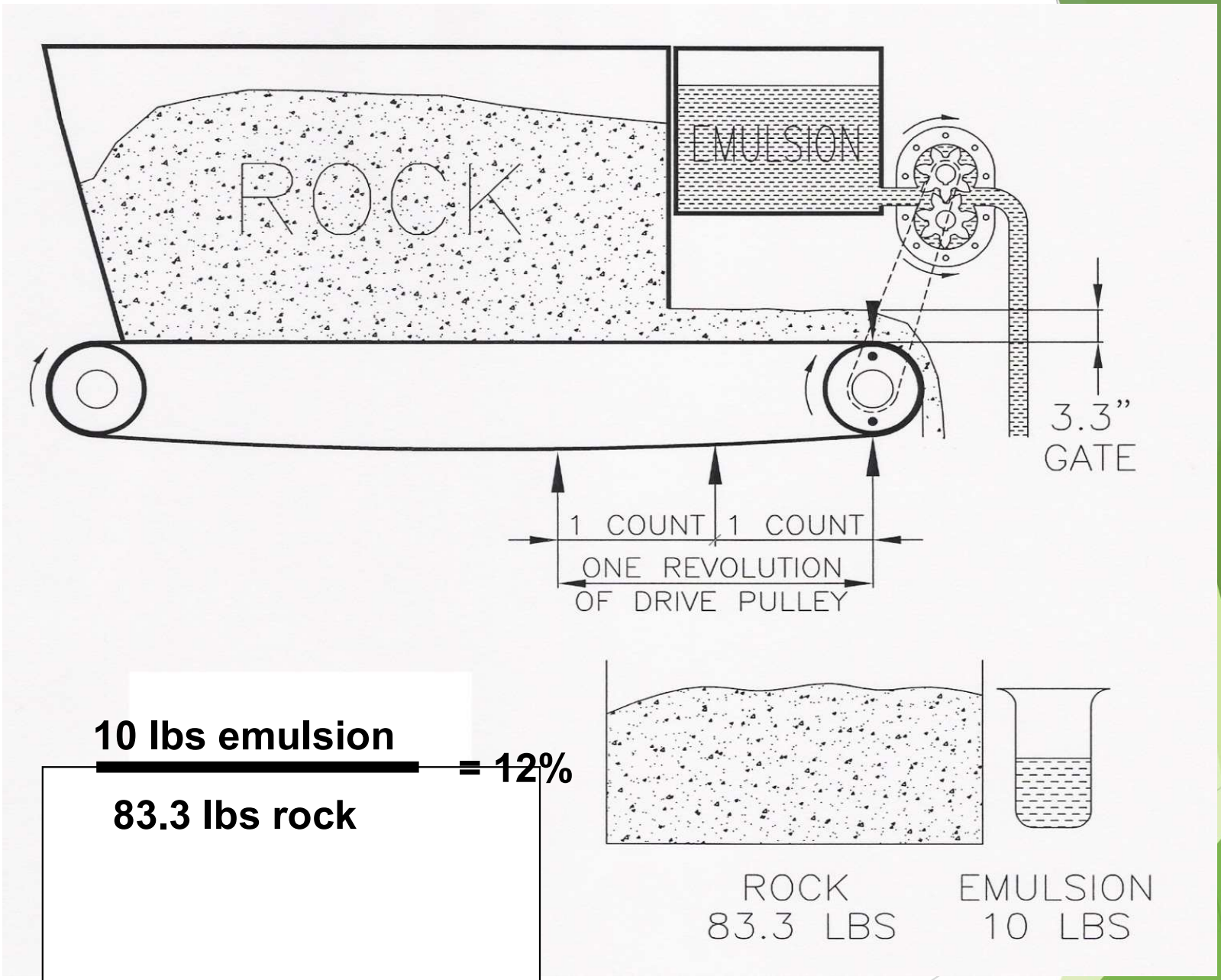
Paver Calibration

- Calibration converts Volumetric Batch Mix Design into a Continuous Feed Process.
- Aggregate and Emulsion are mechanically or electronically connected to maintain Mix Design Ratios.
- In some pavers the emulsion rate is fixed, and the aggregate is adjustable by raising or lowering a rock gate. In electronic pavers, the aggregate is fixed and the emulsion is adjusted by the computer.

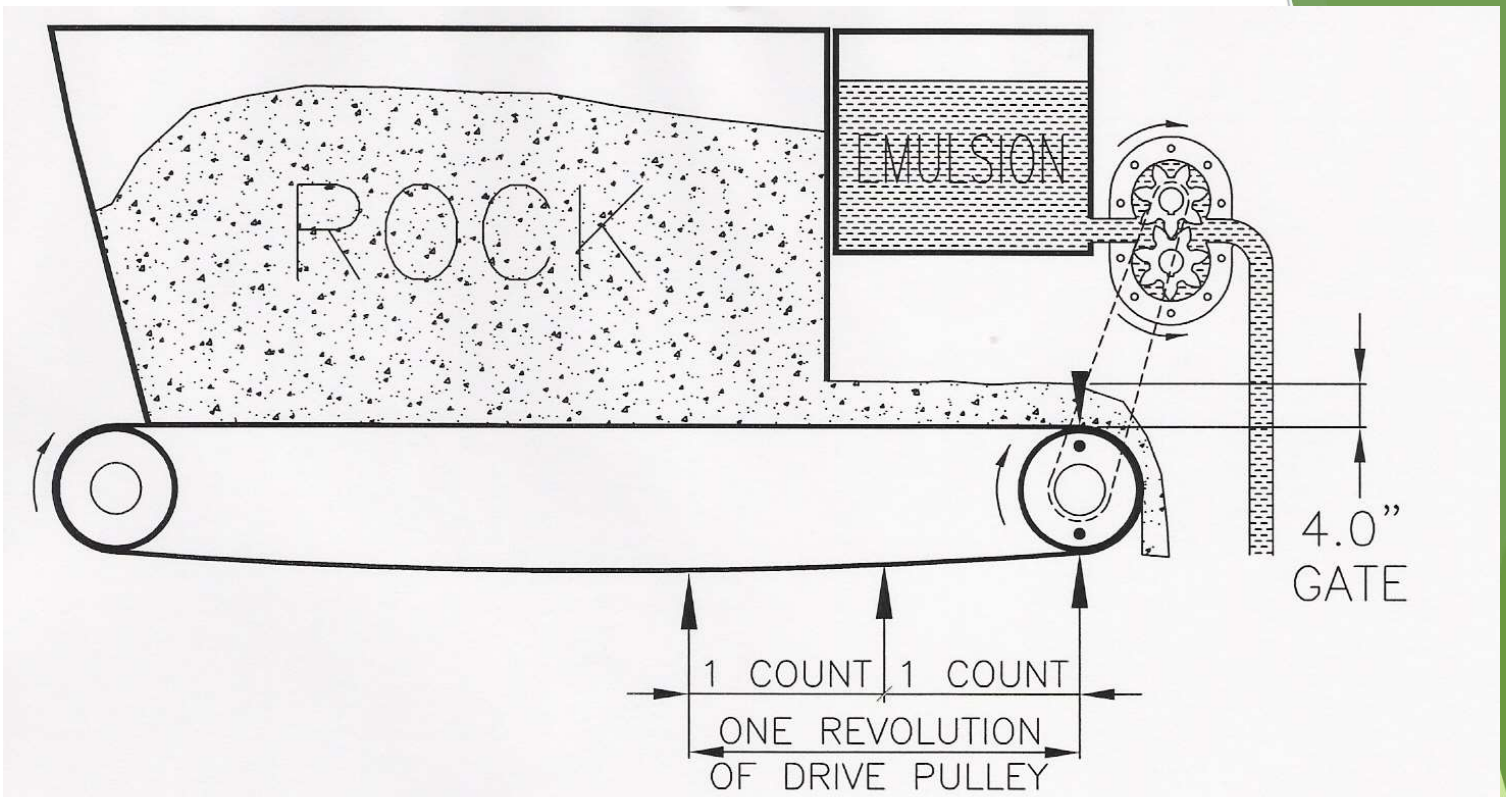
What is calibration?

- **Calibration is the process of measuring by weight the:**
  - Aggregate
  - Emulsion
  - Mineral Filler

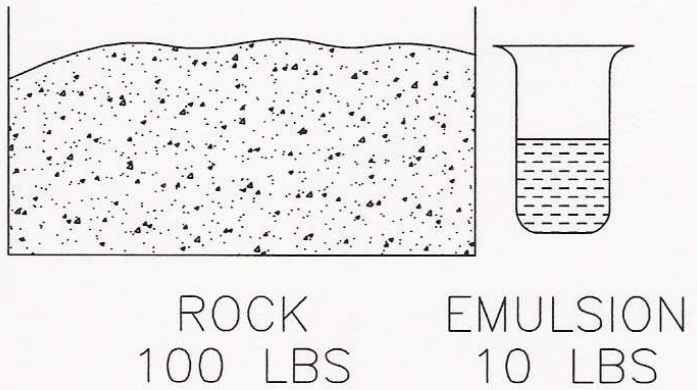
  Then correlating the weight to revolutions of the aggregate conveyor recorded by a counter. The goal is to obtain a weight per count.



$$\frac{\text{10 lbs emulsion}}{\text{83.3 lbs rock}} = 12\%$$



$$\frac{\text{10 lbs emulsion}}{\text{100 lbs rock}} = 10\%$$



Surface Preparation
What to Watch For

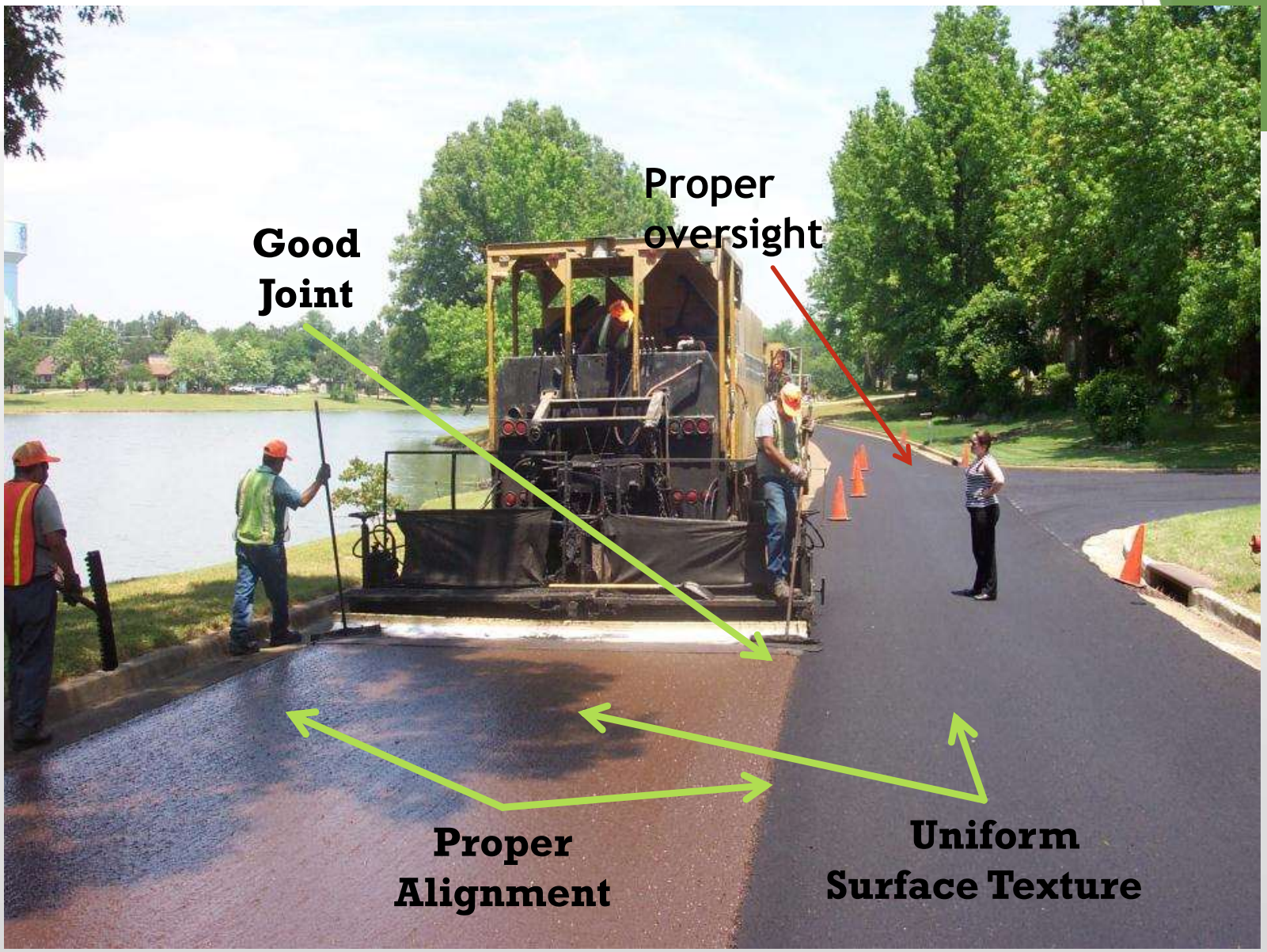
- Crack Sealing
  - Sealant should be kept flush with minimal over banding. Thick over bands will get caught by the box runners.
  - It is best to seal at least 30 days prior to surfacing.
- Patching
  - Make sure patches are kept at or below the road surface. Remember – Micro surfacing does a great 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
  - On 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.

Paving Techniques

Performing A Great Job



Longitudinal Joints

- Should be straight on tangent lines
- Uniformly follow the traffic lane
- Should be constructed as an overlap or butt joint
- If the overlap method is used it should be kept to a minimum (3” maximum)
- Should be smooth and neat in appearance
- Excessive buildup or uncovered areas should not be permitted

Transverse Joints

- Should be smooth and neat in appearance
- Hand work should be kept to a minimum
- Excessive buildup or uncovered areas should not be permitted
- Should be constructed as a butt joint
- Use of roofing felt may assist contractor in construction of acceptable transverse joints

Unacceptable transverse joint

Surface Texture

- Factors that influence final surface texture are:
  - Existing pavement surface texture
  - Mix consistency (accurate calibration)
  - Adherence to JMF
  - Type of screed rubber used
  - Spreader box maintenance
  - Use of drags or secondary strike off
  - Application rate
  - Speed of application machine (too fast may cause wash boarding)
  - Opening to traffic too early
  - Rolling (if required)

Surface Texture Uniformity

Surface Texture Uniformity

- Slurry systems have an aggressive surface texture and when applied properly can maintain a high friction surface for the duration of their useful life.

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