Best Practices

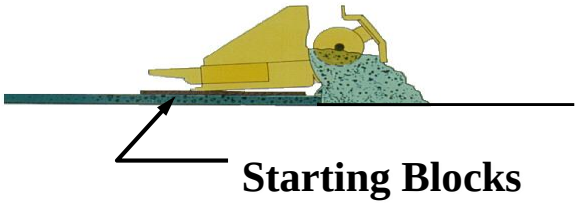
Session 8

Truck Drivers

- Part of the team – communicate so they understand roles and responsibilities
- Need to pay attention to people, traffic, surroundings and paver operator instructions
- Not traffic control personnel

Laydown – Paver Operation Best Practices

Starting Off



A good rule of thumb is to raise the screed 1/4” to 1/2” more for each 1” of compacted thickness.


Correct Level of Mix


Too Much Mix


Between Trucks keep mix in hopper


Segregation from Dumping

Fractured Aggregate

- Just as the name sounds, breaking down the aggregates and losing all structural integrity
- Possible Causes:
  - Drum straddled the joint
  - Amplitude was set too high
  - Too heavy of a roller
  - Used vibratory on a cold mat

How to prevent fractured agg?

- Make sure proper layer thicknesses are being used
- Don't "over roll" the mat
- Design mix with good structural integrity

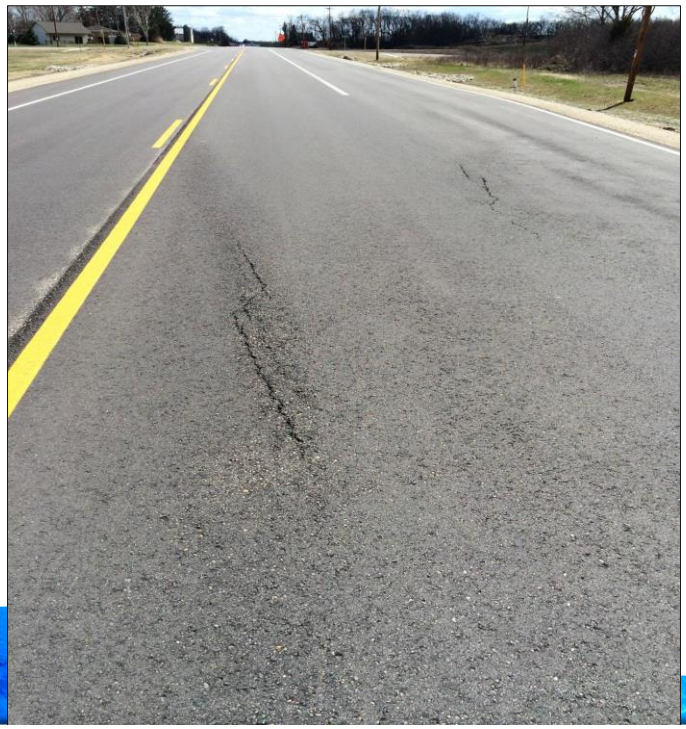
Roller Marks

- Probable Cause:
  - Tender Mix
- Possible Solution:
  - Check mix for excessive sand and/or residual moisture
- Probable Cause:
  - Edge marks from weight shift in curves
- Possible Solution:
  - Roll uphill

Roller Marks (Continued)

- Probable Cause:
  - Bumps/Indentations
- Possible Solutions:
  - Proper starting and stopping techniques
  - Precompacted mix below lift being compacted
  - Yielding underlayer or subgrade
  - CABC not compacted properly

Roller Marks

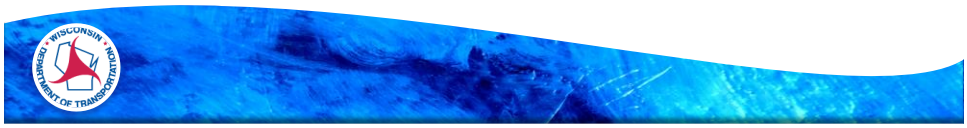


Impact Marks

- Ripples in the mat, surface waves, checking
- Possible Causes:
  - Used vibratory on a cold mat
  - Too light of a finish roller to get out marks
  - Fluctuating head of material at the paver
  - Improper operation of the screed
  - Improper angle of attack

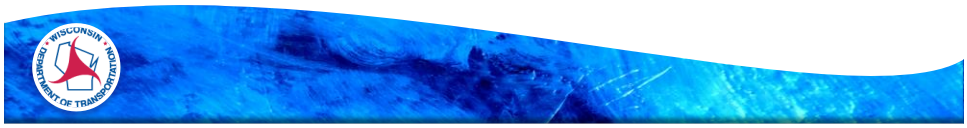
How to prevent impact marks?

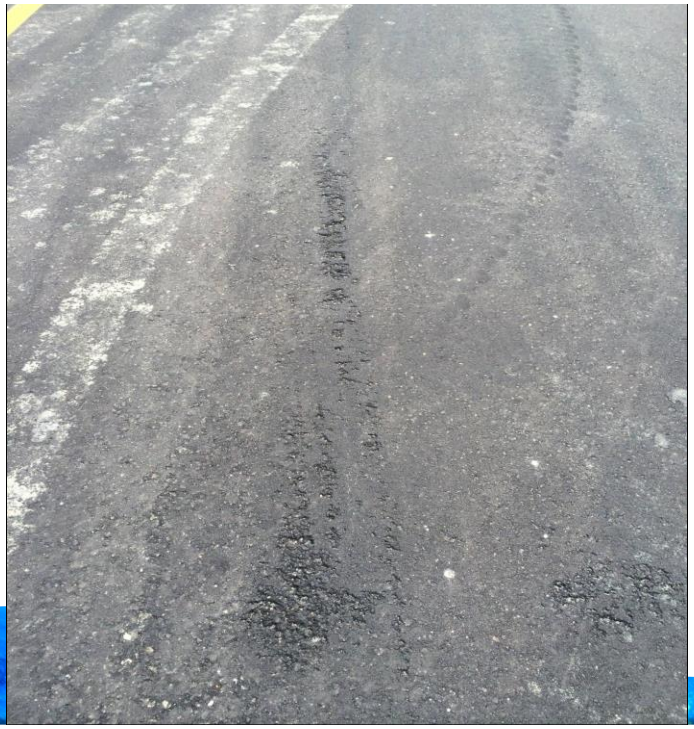
- Don't roll too fast
- Vibratory should be at a high frequency
- Slowly turn or stop (smooth transition)
- Too much play in the screed
- Proper mix design for application



Dry Drums

- Lack of water causes material pick-up
- Things to remember:
  - Use clean water (don't want to plug the sprayers)
  - Change filters
  - Check nozzles for placement along with the distribution mats (for even water spread)





Reflective Cracking

- Cracks that form directly above a PCC joint. They're caused when there is movement of the slabs beneath the HMA.
- This doesn't necessarily have to occur over PCC, it can be any underlying cracks-but PCC is the most common.

How to prevent reflective cracking?

- Rubblize existing concrete pavement
- Remove existing base

Rutting

- Paths “carved” into an asphalt pavement
- Tends to happen early in the mix life
- Possible causes:
  - Inadequate compaction of subgrade or aggregate base
  - Too low density, high air voids in mix
  - Improper mix design structure

Rutting

Rutting

How to prevent rutting?

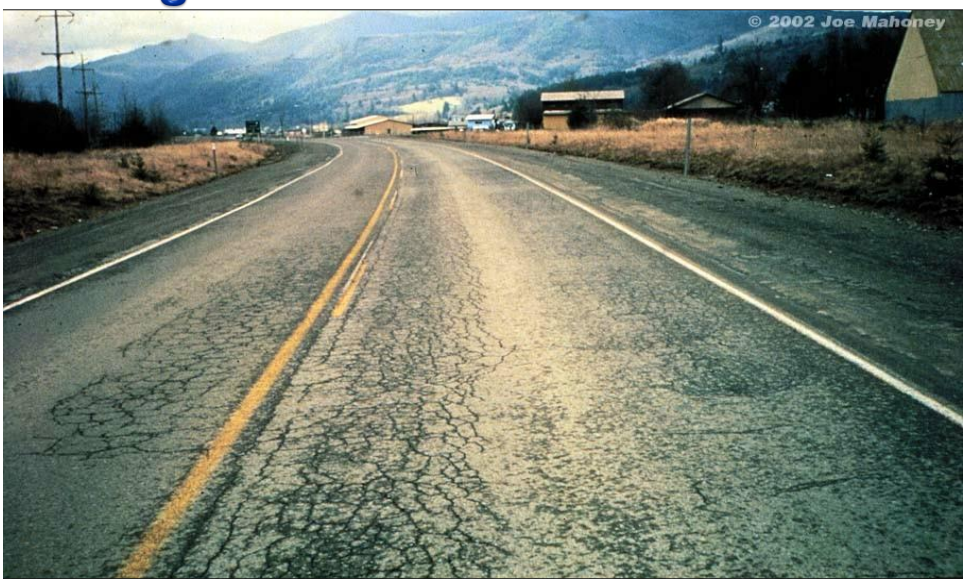
- Increase internal friction of the mix (design issues)
- Choosing proper compaction equipment
- Clean the underlying mat and use the proper amount of tack
- Slow down the vibratory rollers

Fatigue Cracks

- Premature cracking of an asphaltic mat due to material underneath the pavement
- Tends to happen late in pavement life
- Possible causes:
  - Improper design or compaction of base agg.
  - Excessive compaction of thick asphalt layer
  - Density too high
  - Air voids too low-causes mat to crack instead of bend

Fatigue Cracks

Fatigue Cracks



How to prevent fatigue cracks?

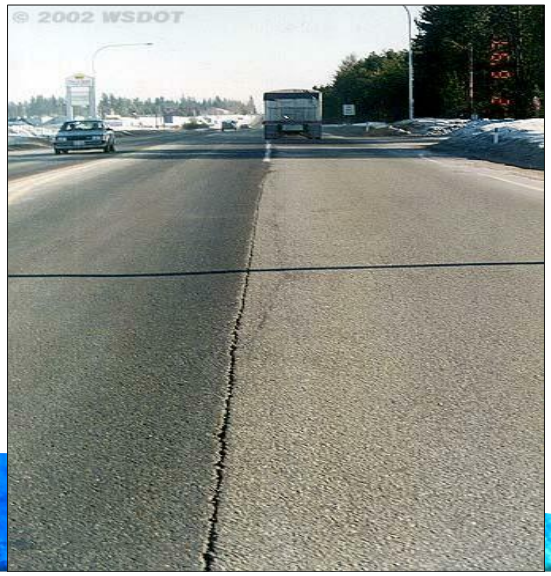
- Decrease the vibratory amplitude
- Operate in static mode
- Make sure material is designed for the proper traffic loading
- This typically is a problem that occurs long after construction of the project has been completed

Longitudinal Cracks

- Type of fatigue cracking that runs parallel to the centerline or pavement direction.
- Cracking from the top down
- Possible Causes:
  - Poor joint construction or location
  - Reflection cracking from underlying layer (different from joint reflective cracking)

Longitudinal Cracks

Longitudinal Cracks



How to prevent longitudinal cracks?

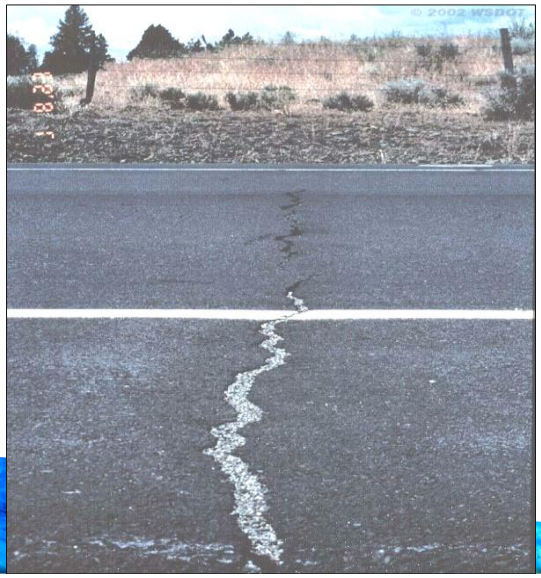
- Use proper compaction techniques for joint construction
- Achieve proper compaction requirements

Transverse Cracks

- A type of thermal cracking where cracks occur across entire width of pavements. This also is top down cracking
- Possible Causes:
  - Shrinkage of HMA surface due to low temps.
  - Asphalt hardening
  - Reflective cracking from layer underneath (not joint reflective cracking)

Transverse Cracks

Transverse Cracks



How to prevent transverse cracks?

- Choose proper binder for project area
- Proper lift thicknesses
- Possible modifiers, fabrics, or interlayer to help prevent cracking

Bleeding

- Film of binder on the surface of the mat. Usually very sticky, but apparent loss of skid resistance. This occurs when the liquid binder fills in the aggregate pockets (air voids) during hot weather.
- Possible causes:
  - Excessive ac content
  - Excessive tack application
  - Low air voids (over-compaction)

Bleeding

Bleeding

How to prevent bleeding?

- Proper mix design binder %
- Don’t over-compact the mix
- Don’t over-work the mix
- Don’t over-tack the project

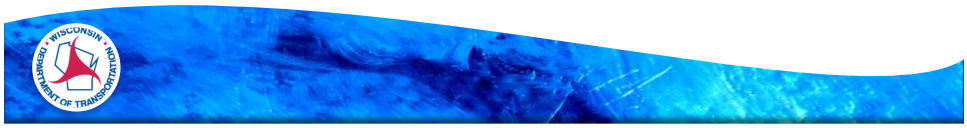
Raveling

- Loss of bond between aggregate and binder, occurs at the surface and then works its way down.
- Possible causes:
  - Dusty aggregates
  - Segregation
  - Inadequate compaction
  - Cold weather paving
  - Snowplows, tracked vehicles, or studded tires

Raveling

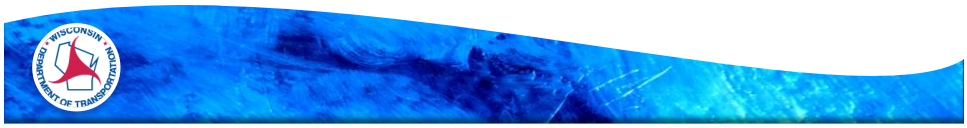
How to prevent raveling?

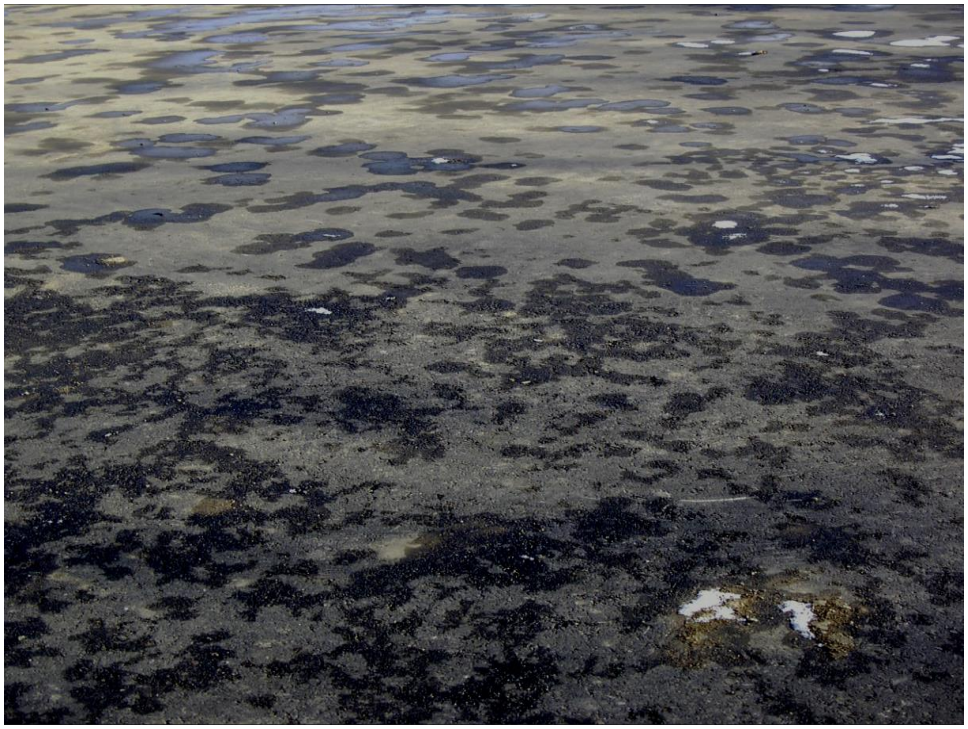
- Minimize segregation concerns
- Don’t pave in cold weather
- Use washed aggregates when possible
- Achieve proper density

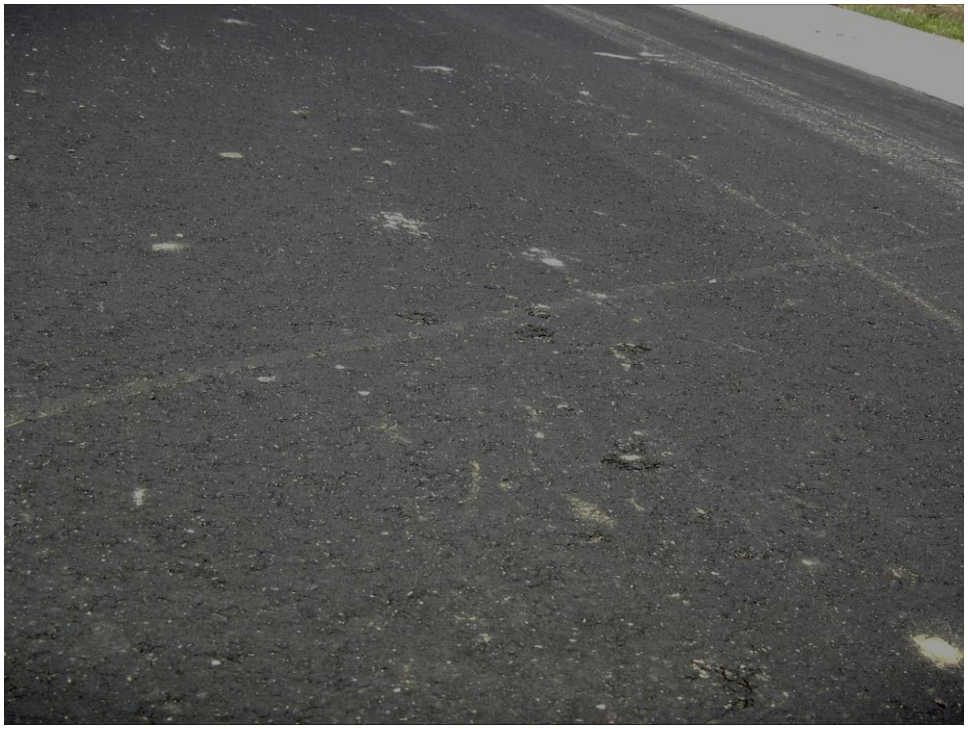


General Discussion

“What’s wrong with this picture”





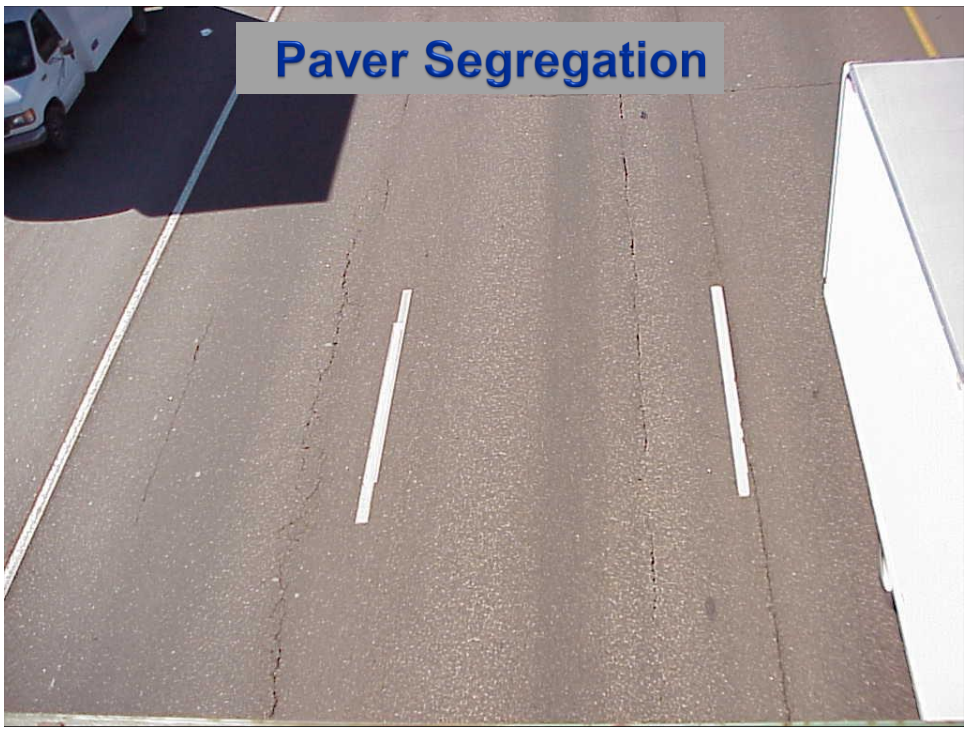


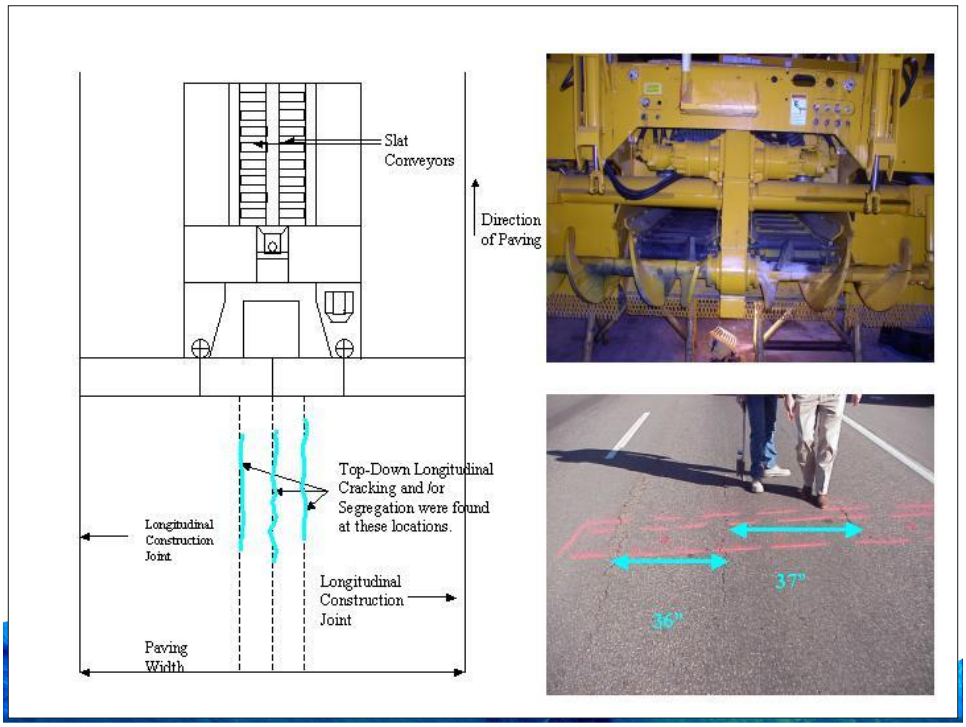

HUSKY

Mix spilled or left in front of paver can cause problems “down the road.”


Truck Load to Truck Load
Segregation

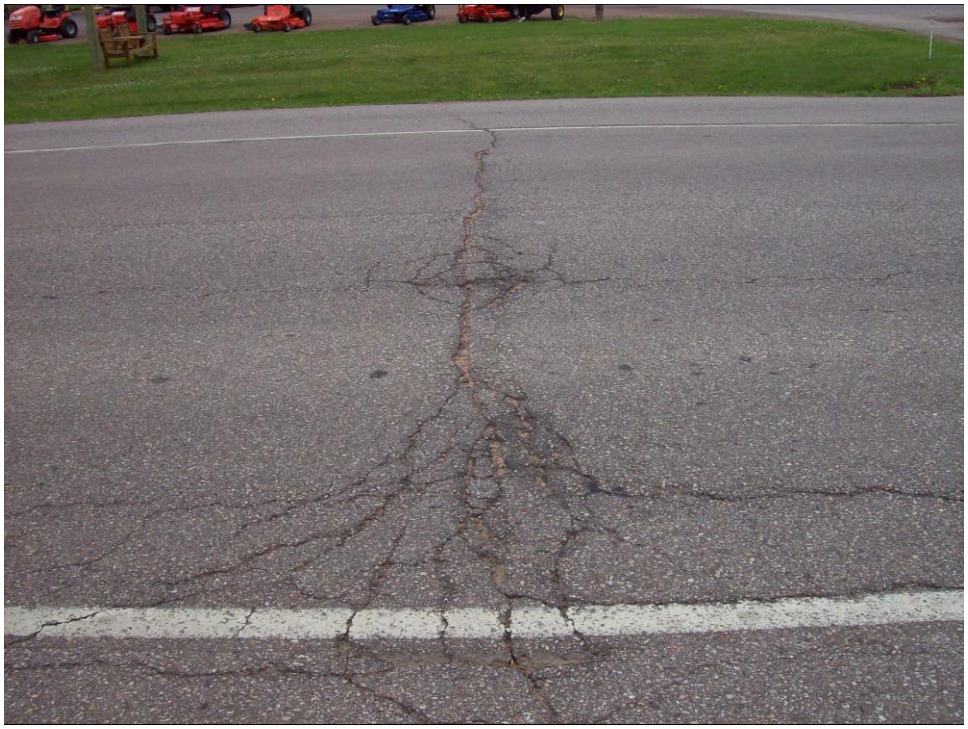

Leads to Potholes


Paver Segregation


Slat
Conveyors
Direction
of Paving
Top-Down Longitudinal
Cracking and /or
Segregation were found
at these locations.
Longitudinal
Construction
Joint
Longitudinal
Construction
Joint
Paving
Width
37"
36"


10.07.2009 10:45

Low Density at Joint (Age 1 yr)




10.07.2009 14:04


Drive a straight line!


Maintain proper overlap.
Allow for roll down.
83


Bump the joint, don't rake.
84

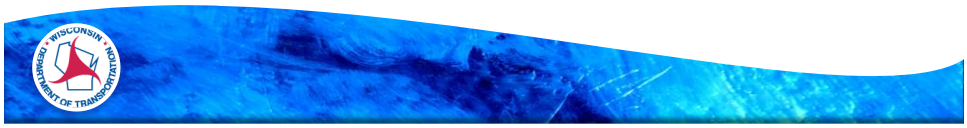
Difficult patch to construct and compact.

Use common sense!

Trouble Shooting

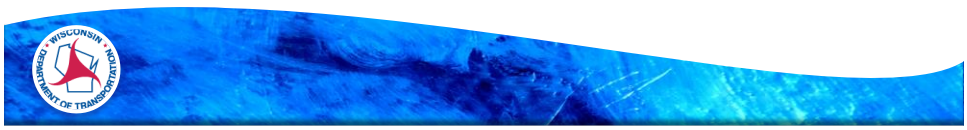
Segregation

- Probable Cause:
  - Running paver hopper low or empty between loads of material. Many times appears as a Chevron
- Possible Solution:
  - Keep material in the paver hopper. Don't run empty
  - Keep material above the bottom of the flow gates
  - Stop paver as rapidly as possible when exchanging truck & accelerate as quickly as possible to the previous paver speed



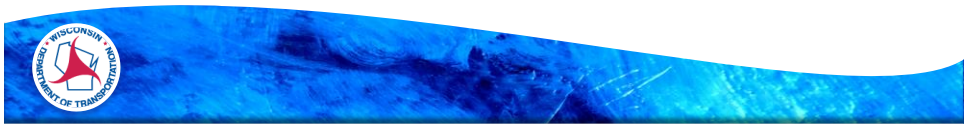
Segregation (Continued)

- Probable Cause:
  - Asphalt Plant
- Possible Solution:
  - Stockpiles
  - Loader Operator
  - Plant out of calibration
  - Operating silo loadout with an empty silo
  - Silo batcher dumping mix to outside of the silo



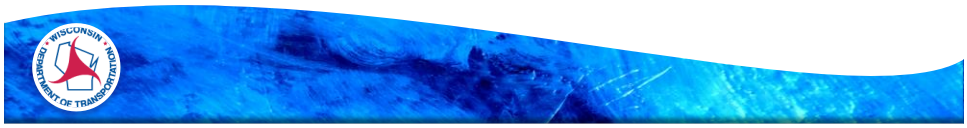
Segregation (Continued)

- Probable Cause:
  - Mix Design
- Possible Solution:
  - Mix gradation
  - AC Content
  - Absorptive Aggregate



Segregation (Continued)

- Probable Cause:
  - Trucking
- Possible Solution:
  - Loading the haul truck with multiple drops of mix from the silo with one of the first two drops of mix placed as close to the tailgate as possible



End-Of-Load Dip, Beginning-Of-Load Rise, Mat Thickness Consistency

- Probable Cause:
  - Inconsistent head of material
- Possible Solutions:
  - Keep paver moving at a fixed speed 80 - 90% of production time
  - Adjust height of flow gates to maintain uniform head of material across entire screed
  - Position material speed sensors so the material is kept at center of the auger shaft
  - Material spillage in front of the paver

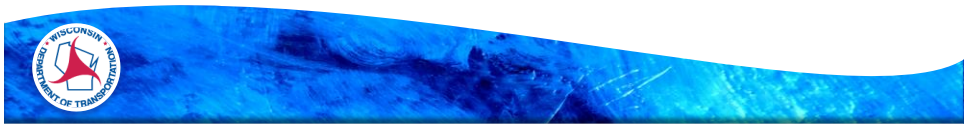
Mat Flaws: Dragging or Tearing of Mat & Screed Marks

- Probable Cause: Cold screed
- Possible Solutions: Heat screed

- Probable Cause: Mix temperature too low
- Possible Solutions:
- Increase mix temperature
- Tarp load during hauling

Mat Flaws: Dragging or Tearing of Mat & Screed Marks (Cont.)

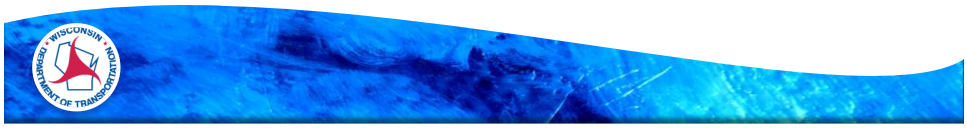
- Probable Cause: Stone size to large for lift thickness
- Possible Solution: Minimum paving depth should be 3 times the largest aggregate size in the mixture for SuperPave



Mat Flaws: Dragging or Tearing of Mat & Screed Marks (Cont.)

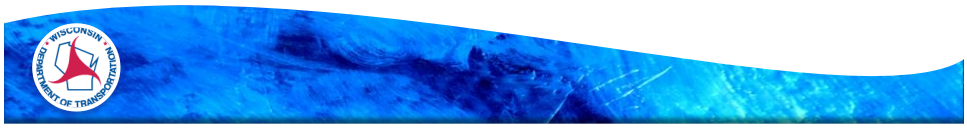
- Probable Cause: Tender Mix

- Possible Solutions:
- Revise mix proportion if high percentages of sands are used
- May have residual moisture in mix



Mat Flaws: Dragging or Tearing of Mat & Screed Marks (Cont.)

- Probable Cause:
  - Material spilled ahead of paver and pre-compacted by the paver
- Possible Solutions:
  - Proper truck beds and pans on the haul trucks
  - Hopper overflow guards on the paver
  - Folding paver hoppers while continuing to move forward, instead of while the paver is stopped



Mat Flaws: Dragging or Tearing of Mat & Screed Marks (Cont.)

- Probable Cause:
  - Hydraulic screed extensions not adjusted properly
- Possible Solution:
  - Adjust correctly