HMA Base Repair

RPR Spring Meeting
February 23, 2017
Ken Walschlager
TS  HOT MIX ASPHALT (HMA) BASE 25.0 MM FOR BASE REPAIRS

- Base repair will be required... Possibly consisting of removal and replacement of existing HMA and/or concrete pavement... at locations chosen by the ENGINEER.
Not this obvious…
Issues

Identifying Base repair

– Rutting
– Slipping
– Delamination
– Raveling
Rutting

AMERICA RIDES ON US

Asphalt.
Rutting

- Caused by poor aggregate structure
- Excessively low airvoids
- Excessively high AC content
- Poor/weak subgrade
- Traffic overloading (weight or volume)
- Treatment – Remove and Replace
Slippage

- Lack of Bonding
  - Shearing force
- Pavement too thin?
- Excessive Deflection
  - Deep fatigue cracking
  - Complete pavement removal
- Treatment – Remove and Replace
Raveling/Delamination
Raveling/Delamination

• Age?
  – Newer
    • Lack of A/C?
    • Poor compaction?
  – Older
    • Oxidation?
    • Too much shade?

• Treatment - Remove and Replace
Issues

Identifying Base repair

– Fatigue Cracking
– Block Cracking
– Longitudinal Cracking
– Transverse Cracking
– Reflective Cracking
– Edge Cracking
Alligator Cracking
Fatigue cracking

Block cracking
Low severity fatigue

High severity fatigue
Fatigue/Block Cracking

- Fatigue Cracking
  - Load related, design or traffic pattern change?
  - High deflection, weak or wet subbase?
  - Treatment - Remove and Replace
- Block Cracking
  - Age related, hardening of asphalt
  - Freeze/thaw shrinkage
  - Treatment - Crack sealant/filling
Longitudinal Cracking - wheel path

Poor Joint Density
Longitudinal/Transverse

• Longitudinal
  – Thermal Stress or traffic loads
  – Lower joint density/higher air voids
  – Can lead to raveling

• Transverse
  – Thermal related
  – Can be full depth

• Treatment – crack sealant, crack filler
Reflective/Edge Cracking

• Reflective
  – Caused by underlying cracks
  – Treatment – Crack seal or base repair.

• Edge Cracking
  – Lack of supportive shoulder
  – Overloading area
  – Treatment – Full depth widening
Base Repair?
Base Repair?
Base Repair?
Base Repair?
Where do you stop?
Mill first? Patch first?

**Mill first**
- Pros: Better see underlying area, Identify surface cracking or base failure
- Cons: Traveling public on milled surface, exposed manholes etc.

**Patch first**
- Some base failure may not be visible
- Some newly placed base material will be removed by milling operation
Right Equipment
Tack .05 gal/syd
.05 gal/syd crossview
Density

• Better Compaction results in…
  – Extended pavement’s life of service
  – Greater strength to support heavier loads
  – Increased resistance to rutting
  – Reduced permeability of water and air
  – Overall durability
 Proper Depth for Design

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<th>Nominal Mix Design</th>
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<th>12.5mm</th>
<th>19mm</th>
<th>25mm</th>
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<tr>
<td>Max Partical Size</td>
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<td>Minimum Depth</td>
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Proper Production

- Stockpiles built correctly and tested?
- Loader using correct methods?
- Plant calibrated?
- Right blend entered?
- Proper loading of haul trucks?
- Trucks equipped with tarps?
Proper Laydown

- Surface properly prepared/tacked?
- Mix dumped properly into buggy/paver?
- Hopper not run empty?
- Flow gates/auger speed set correctly?
- Proper head of material?
- Auger height correct/constant motion?
- Paver operated at constant speed?
- Depth as uniform as possible?
Proper Depth – it’s important

- Deep enough for aggregate structure

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Rollers

- Static
  - Double drum
  - 3 Wheeled
  - Pneumatic Tire
- Vibratory
- Oscillatory
- Combination Rollers
Paver/Roller Speed

- Do not out run your rollers.
  - 3.5 mph roller
    300ft/min – 3 wide to cover X 4 passes
    \[ \frac{300}{12} = 25 \text{ ft/min} \]
    85% rolling = 21 ft/min paver speed
    (140tph)
  - 300ft/min – 2 wide to cover X 4 passes
    \[ \frac{300}{8} = 37.5 \]
    85% rolling = 32 ft/min paver speed
    (211tph)
Rolling

- Turn towards the shoulder (away from traffic) stopping at an angle.
- Make sure vibration is turned off before stopping.
- Be sure not to turn wheel while stopped.
- Break down when asphalt is at its hottest.
- Cover entire mat with one pass before starting 2nd.
Rolling...

- Take previous stop marks out with next pass.
- As paver moved forward, roll up to paver with each pass to seal in heat.
- Roll handwork as soon as possible.
- Proper longitudinal joint construction.
  - Stay on hot mat
  - Know when to “pinch the joint”
- Cross-roll transverse joints.
Summary

• Good design
• Proper production
• Proper paving practices
• Good rolling techniques
• Stay watchful – things change…
Questions?

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