Development of Full Depth Patching Best Practices

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Full Depth Patching
Full Depth Patching BMP

- Current Document
- PIQ Feedback
  - Common Practice in Districts
- Where We’re Going
Why Best Practices Guide?

- SCDOT Pavement Preservation Certification Task Force
- Guidance
  - Project Evaluation
  - Construction
- Pavement Preservation Level 2 Classes
Full Depth Patching BMP

- Activities Prior
- Construction Activities
Activities Prior

- Condition Assessment
  - Ride the roads: “Windshield Survey”
  - Visual evaluation
How Do Asphalt Pavements Fail

- Rutting
- Fatigue
- Shoving
- Cracking
- Raveling
- Pothole
- Bleeding
How Do Asphalt Pavements Fail

Cracking

- **Thermal Cracking**
  - Temperature related
  - Light cracking = seal
  - Severe = remove & replace

- **Longitudinal Cracking**
  - Joints
    - Lowest density = low tensile strength
  - Wheelpath
    - Caused by heavy loads
  - Once longitudinal joint starts raveling, remove and replace
How Do Asphalt Pavements Fail

Cracking

- **Block Cracking**
  - Temperature related: Transverse & Longitudinal
  - Low traffic volumes
  - Lots of infiltrating surface water; once raveling occurs, remove & replace

- **Reflective Cracking**
  - Typically underlying concrete pavement
  - Evenly spaced
  - Crack mitigator or saw/seal

www.pavementinteractive.org
How Do Asphalt Pavements Fail

Cracking

- Fatigue Cracking
  - Alligator cracking
  - Pavement stressed to the limit of its fatigue life by repetitive axle loading
  - Loads too heavy for pavement structure

Fatigue
How Do Asphalt Pavements Fail

- **Slippage**
  - U-shaped
  - Caused by braking
  - Lack of bond; bad tacking

- **Raveling**
  - Loss of bond between liquid asphalt & aggregate particles
  - Becomes safety issue with loose debris
How is the roadway draining? Fix drainage issues?

“... experience has shown that if water passes through a road and fills the native soil, the road, whatever may be its thickness, loses support and goes to pieces.”
-- John MacAdam (1820)
Drainage: What Could Go Wrong?

- Stripping of asphalt
- Rutting of unbound layers and subgrade
- Potholes
- Alligator/fatigue crack deterioration
- Pumping of fines
Drainage: What Could Go Wrong?

- Longitudinal crack deterioration
- Reflective crack deterioration
- Transverse crack deterioration
- Slippage cracking
- Localized settlement (saturated soil)

More discussion later on
AC section w/ granular base in a bathtub
AC stripping and erosion
Drainage: Moisture-Related Damage

- All types of damage can occur simultaneously
- More damage when pavement is saturated (e.g., rainy seasons and spring thaw in northern climates)
- More damage when weakened pavement is subjected to heavy axle loads
Activities Prior: Drainage
Drainage, Drainage, Drainage!
Activities Prior

- **Existing Pavement Structure**
  - **Coring Available?**
    - Visually inspect core for distress
    - How deep are the cracks & are they top-down or full-depth?
    - Get correct depth: Select depth depending on existing structure and condition: 4” to 12” of Full Depth Patching
  - **Construction History**
Typical Asphalt Pavement Section

Asphalt Base Course (Full-Depth Asphalt)  Aggregate Base Course

Asphalt Surface Course
Asphalt Intermediate Course
Asphalt Base Course

Aggregate Base Course
Subgrade
Typical Patching Mixes

- Intermediate C – Common Mix Used
- Intermediate B Special – Trials Ongoing....
Coring
Investigate: Cores
Activities Prior

• Existing Pavement Structure
  • Coring Available?
    • Only a few districts have their own coring rig
    • Of those few, a couple use for pre-construction/investigation purposes
Activities Prior

- **Traffic Considerations**
  - Where were the traffic counts recorded, and how far are they from the distressed road/area?
  - Traffic counts & Estimated % Trucks for Pavement Structure.
    - Equivalent Single Axle Load (ESAL)
  - Compensate for truck traffic or heavy wheel load (factories, log trucks, schools)
Traffic Considerations
Activities Prior

- Mark the distressed area
  - Who is marking the distresses?
    - Varies from district to district
    - Some maintenance, some construction
  - Per 2007 SCDOT Spec Book:
    - Minimum 6.5 feet of full width, at least 25 feet between patches
    - *If a deep patch (> 6 inches), increase the width
Marking Distresses
Activities Prior

- Gather quantities
- Currently 15% or more distressed area, pavement calculator may recommend CMRB

Via www.millergroupusa.com
Construction

- Shoulders/ditch filled with vegetation? Remove and improve the drainage
- Mill/Cut/Taper back for ramp to get equipment in (how far?)
  - Let the revealed spot dry out, and determine if you need to go further (shovel or probe?)
- Remove debris/brush and broom the spot
- Tack the sides & the spot (suggested rate?)
- Place mix
Construction

- Remove debris
- Brush and broom the spot
- Tack the sides & the spot
  - Ensure enough tack to cover sides, but not too much to bleed through the pavement
- Place mix
  - 3” lifts required on top two lifts
  - 10” Patch – 4”/3”/3”
  - Ambient temperature requirements? None; but ground should not be wet or frozen...
Cracks? =>

09/14/2015
Construction

- How is it rolled? Vibratory & Pneumatic Rollers
- Is the patch straight-edged? Smooth ride, no dips or bird baths
- Milling is done after patching for smooth ride?
- How long do you leave it before another treatment?
  - Is the patch the final surface?
There’s never time to do it right; there’s always time to do it over.
Looking Down The Road

- For Rehabilitation Activities
  - Define Problem
  - Determine Cause
  - Identify Potential Solutions
  - Select Preferred Solution

- More emphasis on the front end!
Looking Down The Road

- Project Evaluation
  - Traffic
  - Subgrade Conditions
  - Environmental Conditions

- Pavement Evaluation
  - Existing Pavement Structure
  - Soil Conditions
  - Distress Survey
Looking Down The Road

- Distress Evaluation
  - Types: Not all distresses are created equal!
  - Severity

- Creation of Distress Identification Guide
Looking Down The Road

- Marking
- Quantity Preparation
- Construction

- Provide guidance to promote consistency and better practices for owner and contractor!

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