Development of Full Depth Patching Best Practices

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SCDOT

SOUTH CAROLINA
ASPHALT PAVEMENT
ASSOCIATION
EST. 1966

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

Fatigue

Cracking

Rutting

Shoving

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

Thermal

Longitudinal

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

Block

www.pavementinteractive.org

Reflective

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

Slippage

- Raveling
  - Loss of bond between liquid asphalt & aggregate particles
  - Becomes safety issue with loose debris

Raveling

Activities Prior

- 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!

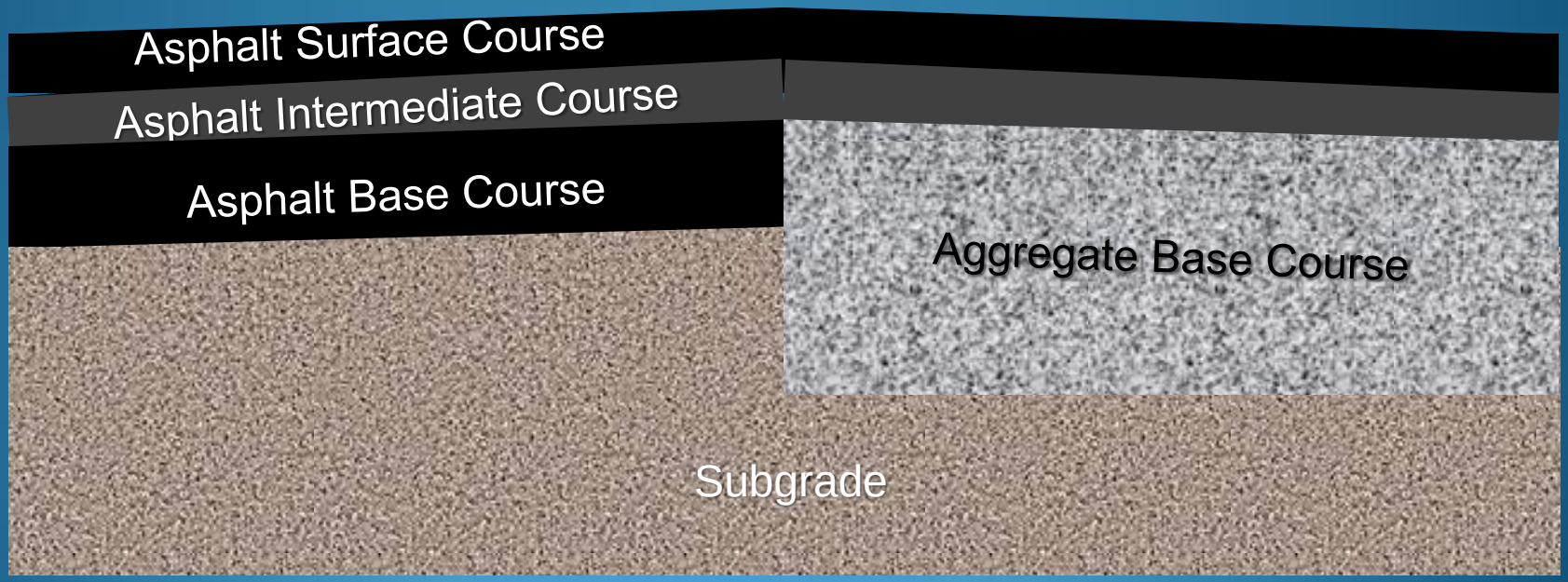
Activities Prior

- 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

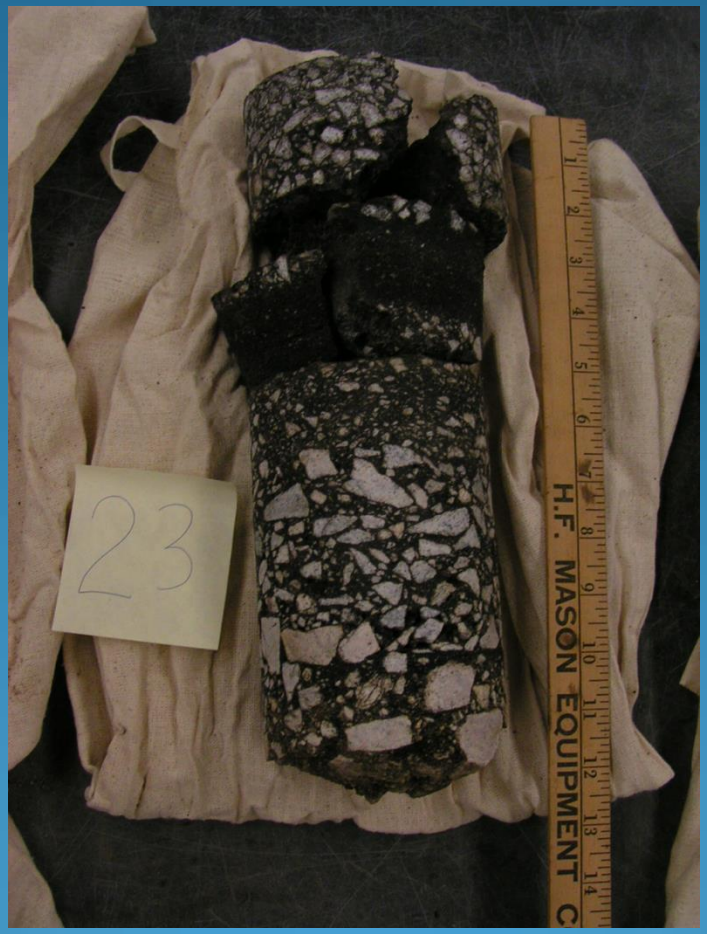


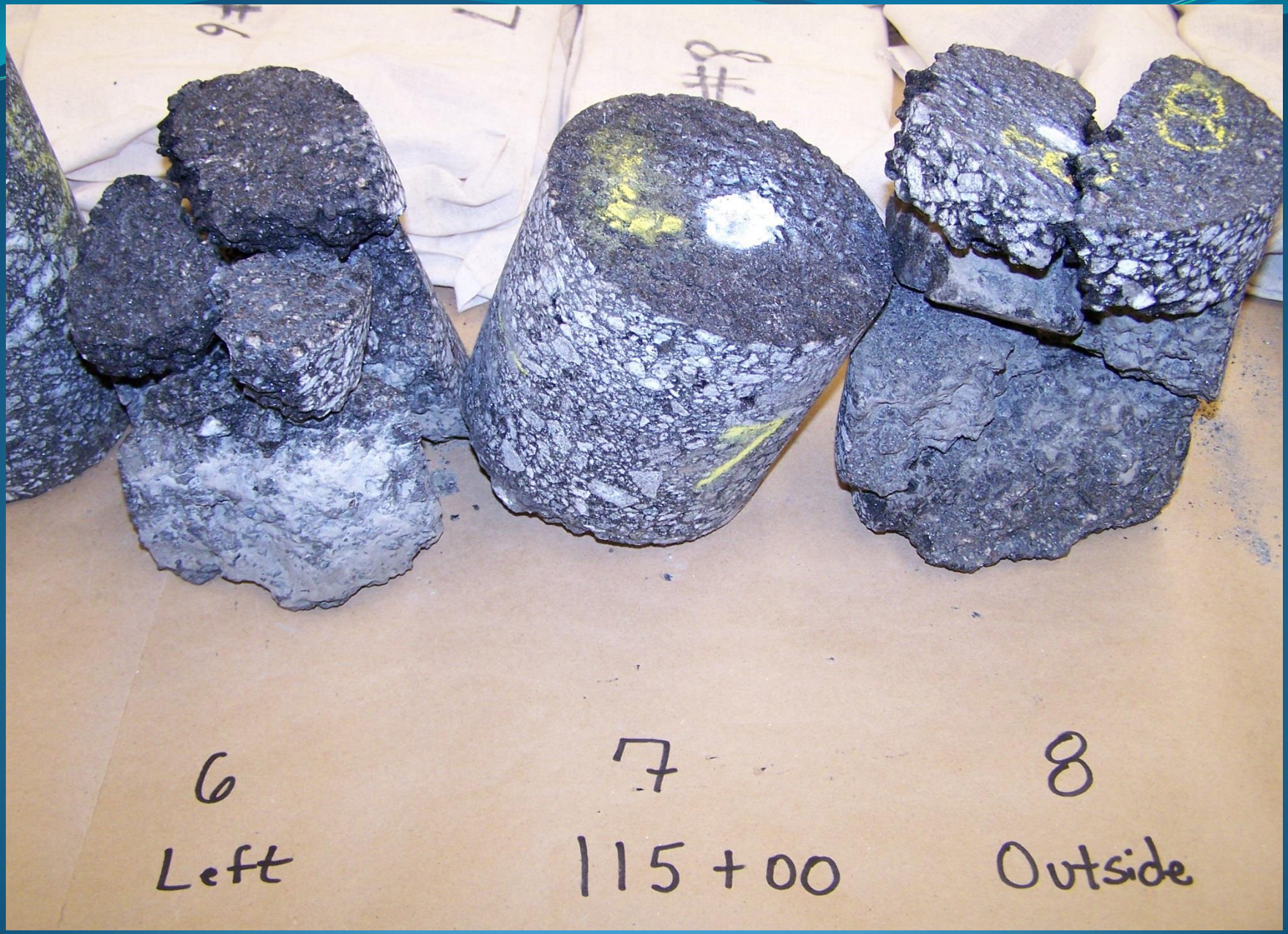
Typical Patching Mixes

- Intermediate C – Common Mix USed
- Intermediate B Special – Trials Ongoing….

Coring

Investigate: Cores




6
Left
7
115 + 00
8
Outside

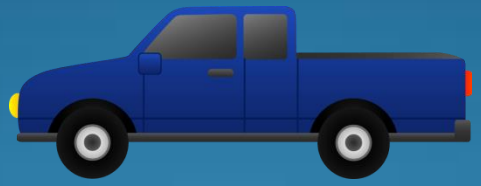
Activities Prior

- 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


T. PETE
Blair, SC


09/14/2015

Construction

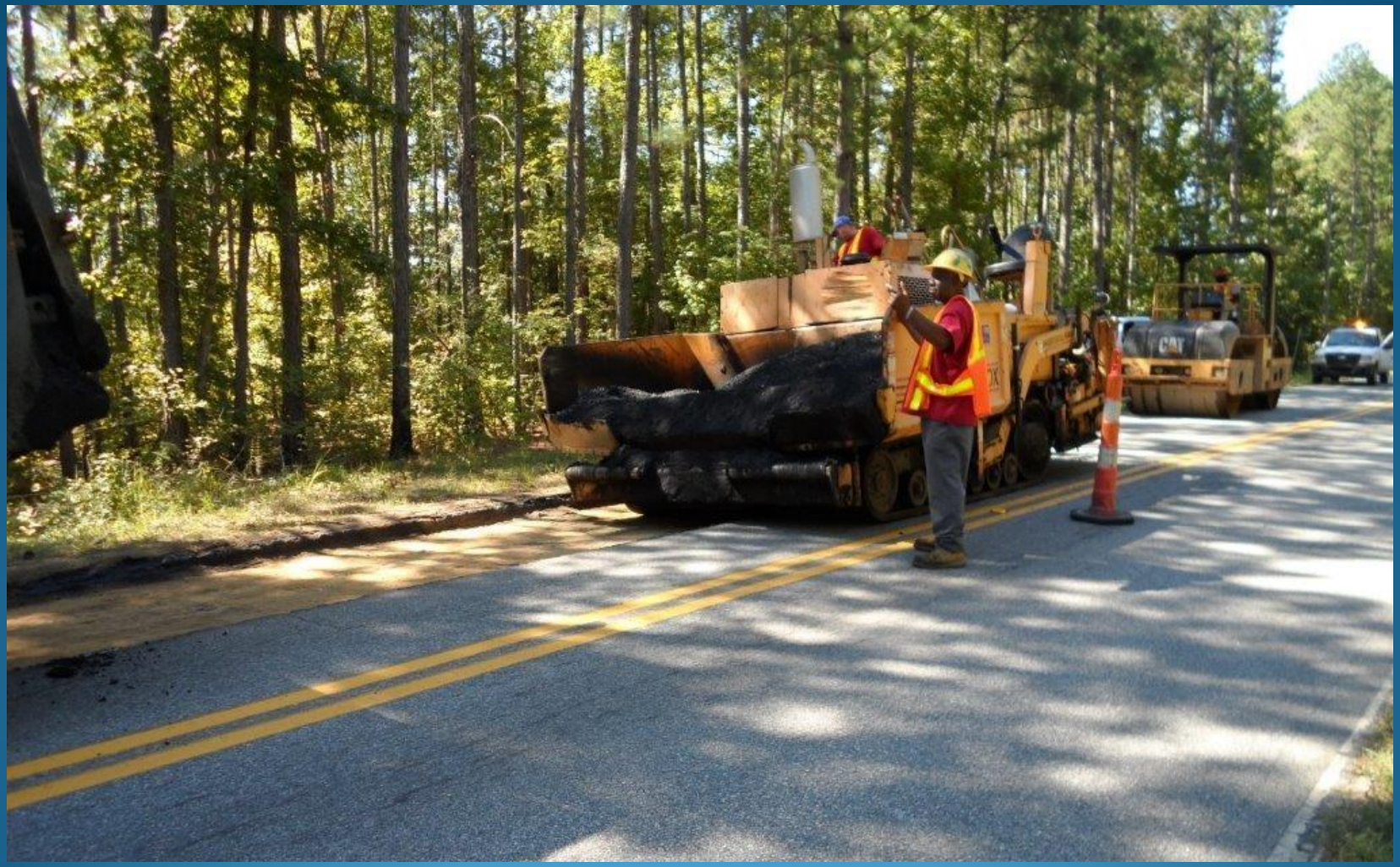
- Remove debris
- Brush and broom the spot
- Tack the sides & the spot
  - Ensure enough tack to cover sides, but not too much to bleed through the pavement
- Place mix
  - 3” lifts required on top two lifts
  - 10” Patch – 4”/3”/3”
  - Ambient temperature requirements? None; but ground should not be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


Bianchard
COMPACT EQUIPMENT


LeeBoy


Cracks? =>
Cracks? =>
09/14/2015

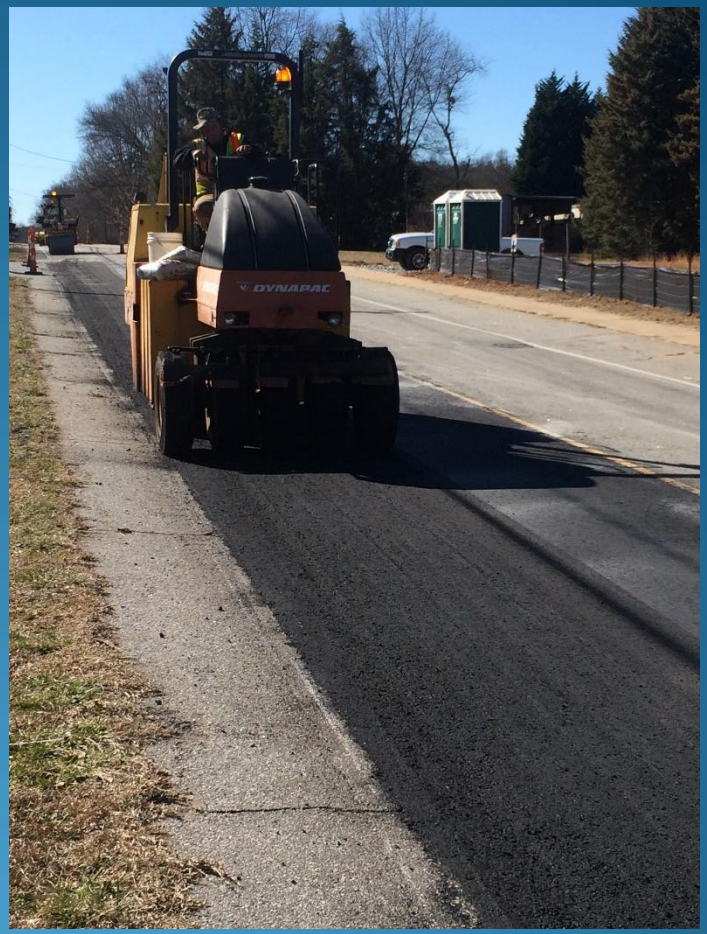

SANITARY
SEWER

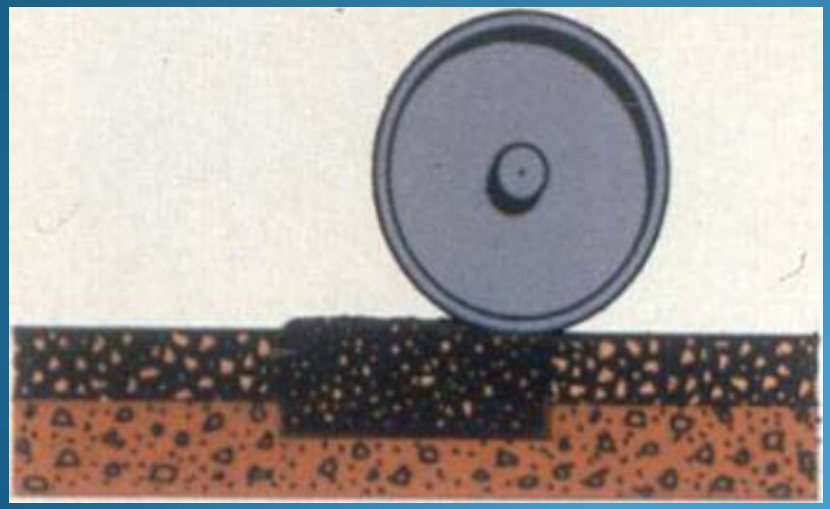

CAT

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?


CAT


DYNAPAC



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!

Send Feedback To:

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