Pavement Patching Repair for AC and PCC Pavement Surfaces

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Overview and Objective

“New” Methods For Pavement Patching-Overview

• What are they
• How they are applied
New Methods

Section

I. Spray Injection

II. Polymer modified **asphalt** based binder/aggregate mixtures (AC pavement repair)

III. Polymer modified **resin** based binder/aggregate mixtures (PCC pavement repair)

IV. Joint Adhesive
Section #1

Spray Injection
“THE COMBINATION OF 2 COMMON MATERIALS: CRUSHED AGGREGATE & WATER BASED EMULSION THROUGH A SINGLE PIECE OF SELF-CONTAINED EQUIPMENT”.
Spray Injection

**Application:**
- Blow out Debris
- Apply tack material
- Fill and compact material
Step 1 - Blow

- High Velocity Air Removes
  - Dirt
  - Loose Pavement
  - Water
Step 2 - Tack

- Emulsion Application
- Increase Bond to Repair Area
Tack
Step 2 – Fill and Compact

- Emulsion coats the stone
- Filling from the bottom up
- You control the material
Fill and Compact
Pothole

Before

After
Manhole
Medium-High Severity Alligator Cracking
Application
Benefits of Spray-Injection

• Year-round use-- with emulsion availability
• No mechanical compaction required, rolling optional
• Use local materials
• Up to 7 tons per hour application
• Less than one minute to repair pavement for traffic
• Can be used in cool, damp conditions-- forgiving process to workmanship and environmental conditions
Section #II
Polymer modified asphalt based binder/aggregate mixtures

Patch repair for AC pavements = PolyPatch and Mastic One

Application:
• Hot-applied
• Pourable
• Self-adhering
• Self-leveling
Polymer modified **asphalt** based binder/aggregate mixtures

**Uses**
- Large thermal (>1.5” wide) cracks/joints
- Recessed transverse cracks
- Moderately Fatigued (alligator) areas
- Wheel ruts
- Bridge approaches
- Manhole covers
- Curb line
Wide Thermal Crack
PolyPatch/Mastic One Application
Thermal Crack
Longitudinal Cold Joints - before
Longitudinal Cold Joints - after
Bridge Approaches
Manhole
Curb Line
Wheel Ruts
Wheel Ruts
Alligator Cracks - before
Alligator Cracks - after
Review
Benefits of Polymer modified asphalt based binder/aggregate mixtures

Patch Repair for AC Pavements

• Year-round use
• Cost effective
• Permanent repair
• Flexible
• Prevents moisture penetration
• Versatile applications
• Load bearing
Polymer modified resin based binder/aggregate mixtures

Patch Repair for PCC Pavements = TechCrete

Application:
• Hot-applied
• Pourable
• Self-adhering
• Self-leveling
• About one (1) hour setup
Polymer modified resin based binder/aggregate mixtures

TechCrete Uses

• Thin Bond Repairs
• Failure on Slabs on Single & Multi Corners
• Spall Areas
• Wide Cracks and/or Joints
• Manhole & Drainage Areas
• Bridge Approaches - PCC to AC
Polymer modified resin based binder/aggregate mixtures

TechCrete Preparation

- Saw cut borders
- Chip out old material
- Blow out debris
- Dry out moisture with heat lance
Before / Need for Repair
Preparation
Preparation
Preparation
Polymer modified **resin** based binder/aggregate mixtures

**Installation**

- Prime area
- Hot applied in layers (2” lifts max)
- Self levelling.
- Dressed in high PSV (polished stone value) Aggregates.
Installation
Installation
Installation
Installation Complete
Installation
Wide Random Cracks
Review

Benefits of Polymer modified resin based binder/aggregate mixtures

• Long lasting
• High tensile strength
• Spans joints
• Multi corner slab repairs
• Flexible
• Compressive resistant
• Excellent adhesion
• Open to traffic in about one hour
Use Of Joint Adhesive To Reduce Longitudinal Paving Joint Crack Formation And Deterioration
Deteriorated Paving Joint

- Early in pavement life
- Raveling
- Accelerating deterioration
- Requires maintenance
- Shortened pavement life
- Joint deterioration problem
- Joint adhesive technique
- Materials
- Installation
- Performance studies
- Usage and acceptance
- Costs
Low Density Zone

- Higher permeability, weaker area
- Increased oxidation/raveling
- Moisture freeze/thaw spalling
- Crack formation, spalling, widening
- Early deterioration
- Significant problem
Joint Adhesive technique

- Application of specialized materials to the cold joint surface

- Seals and protects the low density area

- Adheres and flexibilizes the joint
Adhesive Materials

- Hot-applied, highly polymer modified asphalts with improved high temperature stiffness, sag resistance, adhesion and low temperature performance
Installation

- Oil jacketed, hot applied melters
- Spray or squeegee apply to entire surface
- Approx. 1/8” thick band.
- Approx. 1/2” overlap on top, up to 2” on bottom
- Apply ahead of paver
- Keep traffic off of, repair any damaged areas
- Place and compact adjacent mat
Performance studies

- NCAT, Longitudinal Joint Construction Techniques For AC Pavements

- Michigan, Wisconsin, New Jersey, Colorado, Pennsylvania Research Projects
Techniques studied

- 12/1 wedge
- 3/1 wedge
- Cutting wheel
- Joint maker
- Hot side rolling
- Cold side rolling
- Edge resistant
- Joint adhesive
Colorado – 5 years

- Joint Adhesive – **BEST**
  16% cracking (1/8 – 1/4 in.)
  8.7 rating

- Cutting wheel – Next best
  44% cracking (1/8 – ¼ in.)
  7.7 rating

- Taper, hot side rolling – **WORST**
  88% cracking (1/2 – 1 in.)
  2.3 rating
Without Joint Adhesive
With Joint Adhesive
Acceptance for Usage:

- Ohio Turnpike
- Michigan
- New Jersey
- Minnesota
- Indiana
- Warranty Projects
Benefits of Longitudinal Joint Adhesive

- Significantly improved joint life
- Improved pavement life
- Delays future maintenance and related traffic delays and safety issues
- Proven, consistent process
Summary

-Paving joints deteriorate due to degradation of the low density wedge

-Joint Adhesive seals, adheres, and flexibilizes the joint area

-Improves joint performance, best technique

-Delays future maintenance

-Proven, dependable, available process
Summary-New Patch Methods

I. Spray Injection
II. Polymer modified **asphalt** based binder/aggregate mixtures for AC pavements (PolyPatch/Mastic One)
III. Polymer modified concrete based binder/aggregate mixtures for PCC pavements (TechCrete)
IV. Longitudinal paving joint control
Questions?