FULL-DEPTH RECLAMATION (FDR) 
FOR PREVENTIVE MAINTENANCE: 
SR 65 ANALYSIS 

Kent Davis, INDOT PM 
Jeff Whitaker, PE, Lochmueller Group 
Joe Hile, PE, LS, Specialties Company 
Todd Richardson, PE, American Structurepoint
MINI-SCOPE: 6/2015

- SR 65 - SR 165 to SR 64 (6.04 miles)
- Restore the Surface Condition and Increase the Service Life
- Update Curb Ramps
### TRAFFIC DATA

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>PA</th>
<th>BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>3700</td>
<td>2910</td>
<td>790</td>
</tr>
<tr>
<td>2017</td>
<td>3800</td>
<td>3000</td>
<td>800</td>
</tr>
</tbody>
</table>

- 2014 – Coal Company Opened New Location
- CR 350 to SR64 – Coal Truck Dist. 90%/10%
- 2017 – 5.9 Million Tons/Year of Coal (Approx. 236,000 Trucks)
## TRAFFIC DATA

- 2018 & 2019 – Projected 7-8 Million Tons/Year (300,000 Trucks)

<table>
<thead>
<tr>
<th></th>
<th>Year</th>
<th>Total</th>
<th>PA</th>
<th>BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>AADT</td>
<td>2017</td>
<td>4700</td>
<td>3000</td>
<td>1700 Est. Increase</td>
</tr>
<tr>
<td>AADT</td>
<td>2017</td>
<td>4100</td>
<td>2500</td>
<td>1600 Count</td>
</tr>
</tbody>
</table>
DESIGN DATA

- PM - Partial 3R (Non-Freeway)
- State Collector
- Urban & Rural
- Level Terrain
- R/W – Concerns
PAVEMENT HISTORY

• 1938 – Original Construction 18’ Wide
• 1959 – Widened to 22’ & Resurfaced
• 1963 – Resurfaced
• 1996 – Widened to 26’ with Functional Overlay
• 2012 – Chip Sealed
PAVEMENT CONDITION

Severe Pavement Failures

• NBL from CR 350S to SR 64

Surface Stripping

• SR 165 to CR 350S
PAVEMENT CONDITION – CR 350S TO SR64
PAVEMENT CONDITION – CR 350S TO SR64
PAVEMENT CONDITION – CR 350S TO SR64
PAVEMENT CONDITION – CR 350S TO SR64
PAVEMENT CONDITION – SR 165 TO CR 350S
PAVEMENT CONDITION – SR 165 TO CR 350S
INDOT PAVEMENT CORES/FWD

Existing HMA Pavement – 12” Average Thickness
INDOT PAVEMENT CORES/FWD
INDOT PAVEMENT CORES/FWD
MINI-SCOPE PAVEMENT OPTIONS

Severe Surface Stripping & Failures in Base from the Pavement Cores

• **Option 1:** Full Depth Patching w/Surface Overlay
• **Option 2:** Functional Mill/Overlay
• **Option 3:** FDR with HMA Overlay
PROJECT DESIGN
Lochmueller Group,
Jeff Whitaker, PE
PROJECT DESIGN

• Design Process
• NTP - May 2016
• Stage 3 – Nov. 4, 2016
• Final Tracings – Dec. 26, 2016
• Letting – April 5, 2017
PROJECT DESIGN

• Scoping Meeting
• Preventive Maintenance
• Partial 3R (Non-Freeway)
• Pavement Design (Urban & Rural)
## FINAL PAVEMENT DESIGN

<table>
<thead>
<tr>
<th>Pavement Alternative Rural Section</th>
<th>Initial Const. Cost</th>
<th>Service Life</th>
<th>Cost/Lane Mile/Year of Service Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDR with HMA Overlay (4” Mill, 10” FDR, 7” HMA)</td>
<td>$2,779,524</td>
<td>20</td>
<td>$11,543</td>
</tr>
<tr>
<td>Functional HMA Mill/Overlay (4” HMA Mill/Overlay w/Patching)</td>
<td>$3,428,859</td>
<td>15</td>
<td>$18,986</td>
</tr>
<tr>
<td>Full Depth HMA Reconstruction (10” HMA on SGT)</td>
<td>$3,239,031</td>
<td>20</td>
<td>$13,451</td>
</tr>
</tbody>
</table>

Approved October 14, 2016
PROJECT DESIGN

Other Pavement Alternatives

- FDR with 4” – 5” Thin Concrete Overlay
- 8” – 9” Concrete Pavement
PROJECT DESIGN

How Does the Pavement Section Affect?

• MOT
• Coal Truck Traffic
• Environmental Document & Permits
• R/W
FDR/HMA RURAL TYPICAL

• 4” Mill
• 10” FDR
• 7” HMA (1.5” Surface, 2.5” Intermediate, 3” Base)
• 3” Increase in Elevation
• Transition Street/Drive Approaches
• Transition Aggregate Shoulders
HMA FULL DEPTH TYPICAL

• 10” HMA (1.5” Surface, 2.5” Intermediate, 6” Base, SGT)
• Transition - Bridge Approaches
• Transition – Approach to SR 64
FUNCTIONAL HMA MILL/OVERLAY

• Initially Proposed 4” Mill/Overlay
• 2.5” Mill
• 4” HMA (1.5” Surface, 2.5” Intermediate)
• 1.5” Increase in Elevation
• HMA Full Depth Patching
PROJECT DESIGN

Project Divide into 2-Sections

- Functional PM – 0.59 miles
- Structural PM – 5.45 miles
MOT/SCHEDULE

• Meeting w/Coal Mine
• Meeting w/Town of Owensville
• Letting April 5, 2017
• Completion Date November 10, 2017
PHASE 1 - MOT

• CR 350S to SR 64 (3.49 miles)
• FDR/FD HMA Section
• Road Closure w/Detour
• Coal Truck Traffic
PHASE 2 - MOT

- Old Princeton Rd to CR 350S (1.98 miles)
- FDR/HMA Overlay Section
- Road Closure w/Detour
- Coal Truck Traffic
PHASE 3 - MOT

• SR 165 to Old Princeton Rd (0.59 miles)
• HMA Mill/Overlay & Patching
• Flagging Operations
DETOUR - MOT

- Phase 1 & 2
- SR 168 to US 41 to SR 64/65
PLANS

• Horizontal Alignment (Entire Project)
• Vertical Alignment (Full Depth & FDR Sections)
• HMA Wedge for Street/Driveway/Mailbox Approaches
• Shoulder Aggregate Wedge
• Guardrail - End Treatments/Length of Need
• Signal Detection SR64/65
PLANS

• Curb Ramps (ADA Technical Review Committee)
• Curb Work
• Storm Sewer Work
• Level 1 Design Exception for Travel Lane Cross Slope (Functional Overlay)
• Bundled Project w/SR 64 Project
FDR PROCESS
Specialties Company,
Joe Hile, PE, LS
MIX DESIGN
INITIAL MILLING
PRE-PULVERIZATION
CORRECTIVE AGGREGATE
SPREADING OF CEMENT
FINAL MIXING
COMPACTION
GRADING
ACCEPTANCE TESTING
PROFILE
MILLING
FINAL PAVEMENT
CONSTRUCTION INSPECTION

American Structurepoint,

Todd Richardson, PE
CONSTRUCTION INSPECTION

• Testing Requirements
• Mix Design
• General Notes
• MOT
## TESTING REQUIREMENTS

<table>
<thead>
<tr>
<th>Test</th>
<th>Frequency*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of Pulverization</td>
<td>1 per 500 ft</td>
</tr>
<tr>
<td>Pulverized Material Gradation</td>
<td>1 per 0.5 day of production</td>
</tr>
<tr>
<td>Asphalt Emulsion Content or Cement Application Rate</td>
<td>1 per 500 ft</td>
</tr>
<tr>
<td>Optimum Moisture and Maximum Dry Density</td>
<td>1 per 0.5 day of production</td>
</tr>
<tr>
<td>Compacted In-Place Field Density</td>
<td>1 per 1000 ft</td>
</tr>
</tbody>
</table>

* The Contractor shall perform all QC tests within the first 500 ft after startup or after any change in the mix design.
MIX DESIGN

• The contractor is responsible for obtaining all samples required to develop the mix design

• One sample per lane mile of planned RBC shall be the minimum sampling frequency for mix design preparation

• The contractor shall provide a mix design or designs for approval at least 15 calendar days prior to beginning the pulverization operation

• The mix design shall include all test results performed

• If new materials are added, a new mix design, including the revised test results, shall be submitted at least one day prior to implementation
GENERAL NOTES

• Specialties was able to complete approximately 1 mile at 26 feet wide per day.

• Phase 1 had 2 residences and 1 hog farm that needed access daily.

• Phase 2 had 40 residences.

• Specialties was able to coordinate their stabilization areas so that residents would have access from either the north or south at all times.
GENERAL NOTES

• The FDR process is similar to Subgrade Treatment but has the additional pulverization step.

• The same equipment was used for the FDR as Subgrade Treatment.

• HMA Paving took place 10-14 days after stabilization.

• 7 Day Cure period, Proofroll, 2 Days for profile milling.
MAINTENANCE OF TRAFFIC

• Phase 1
  • Closed SR 65 from CR 350 S to SR 64
  • Coal trucks were detoured through Owensville

• SR 65 was closed June 5 and opened on July 31
  • Phase 1 was 3.49 miles in length and included 49,916 sys of FDR and 23,887 tons of HMA
MAINTENANCE OF TRAFFIC
MAINTENANCE OF TRAFFIC
MAINTENANCE OF TRAFFIC
MAINTENANCE OF TRAFFIC

• Phase 2
  • Closed SR 65 from Owensville to CR 350 S
  • Coal trucks were allowed to use the paved FDR section

• Phase 2 was closed August 2 and opened September 28
  • Phase 2 was 1.98 miles in length and included 32,291 sys of FDR and 12,023 tons of HMA
MAINTENANCE OF TRAFFIC

• Phase 3 Patching
  • Quantities
    • 538.7 tons of HMA Patching – Plan
    • 1149.2 tons of HMA Patching – Used
    • 1216 sys of SGT Type IC - Plan
    • 2311 sys of SGT Type IC - Used
MAINTENANCE OF TRAFFIC
MAINTENANCE OF TRAFFIC
SR 65 – FDR CONTRACTORS

• E&B Paving, Inc.- Prime/Paving Contractor
• Javelina Construction, Inc. - 4" Mill
• Specialties Company, LLC - 10" FDR
• Weddle Bros. Highway Group, LLC - Fine Grading of FDR
QUESTIONS?

Kent Davis, INDOT PM
Andy Pinkstaff, INDOT AE
Dave Dallas, INDOT Pavement
Lochmueller Group, Jeff Whitaker
American Structurepoint, Ken Olsen
American Structurepoint, Todd Richardson
E&B Paving, Nick Chapman
Specialties Company, Joe Hile