Rosphalt Riding Surface: Ohio River Bridges (ORB) Project

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Presentation Contents

• Get Project Bearings
• What is Rosphalt?
• Why Rosphalt on ORB?
• Summary of Project Events
Project Overview

- Design-Build
- Walsh Construction
- $ - 1.45 Billion
- 3 Sections

Complete Date: Dec. 2016
Keys to Rosphalt Placement

• Temperature
• Temperature
• Temperature
• Temperature
• Temperature!
Rosphalt Temperatures

- Atmospheric Temperature: 40°F and Rising
- Mixing Temperature: 410°F-450°F
- Temperature at Paver: 350°F-Mixing
- Compaction Temperature: 212°F-374°F
- Max Traffic Temperature: 140°F
Why Rosphalt on ORB?

• Three Main Factors
  • Bridge Design
  • Cost
  • Project Timing
Bridge Design
Summary of Events

1. Test Strip #1
2. Test Strip #2
3. Deck Preparation
4. Hand Wedging / Leveling Course
5. Test Strip #3
6. Rosphalt Course Placement
Test Strip #1: October 9th

• Small Overpass Deck
• Questions to Answer:
  • Can the Contractor Mix/Place Consistent?
  • Is the Bonding Agent Going to Work?
  • Thin Lift line up with Cores?
# Test Strip #1 – Plant/Lab

<table>
<thead>
<tr>
<th></th>
<th>Test</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Voids –</td>
<td>0.9%</td>
<td>1.0%</td>
</tr>
<tr>
<td>VMA -</td>
<td>18.7%</td>
<td>18.9%</td>
</tr>
<tr>
<td>AC Content –</td>
<td>8.4%</td>
<td>8.7%</td>
</tr>
<tr>
<td>Max Gravity –</td>
<td>2.397</td>
<td>149.6 PCF</td>
</tr>
</tbody>
</table>
Test Strip #1 – Field Evaluation

• S&ME Performed Thin Lift Density Testing
  • Matched Well with Core Densities
• Compaction (89%-96%)
  • Target (96%-98%)
• S&ME Performed Bond Testing
  • Two Tack Coats Evaluated
Test Strip #1 - Bond Testing
Test Strip #1

• What we Learned:
  • Can the Contractor Mix/Place Consistent?
    • Maybe, No “Warm and Fuzzy” Yet
  • Is the Bonding Agent Going to Work?
    • Yes (We Thought So)
  • Thin Lift line up with Cores?
    • Yes
Test Strip #2: October 19th

• On North Bridge Approach
  • Haul Time/Similar Substructure

• Questions to Answer:
  • Will Rosphalt Mixture Hold its Temperature?
  • What Roller Pattern Works Best?
  • Can Contractor Mix/Place Consistently?
  • Will Cores and Thin Lift Continue to Match Up?
## Test Strip #2 – Plant/Lab

<table>
<thead>
<tr>
<th>Test</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Voids –</td>
<td>0.0% → 1.0%</td>
</tr>
<tr>
<td>VMA -</td>
<td>18.5% → 18.9%</td>
</tr>
<tr>
<td>AC Content –</td>
<td>8.5% → 8.7%</td>
</tr>
<tr>
<td>Max Gravity –</td>
<td>2.383 = 148.7 PCF</td>
</tr>
</tbody>
</table>
Test Strip #2 – Field Evaluation

• S&ME Performed Thin Lift Density Testing
  • Matched Well with Core Densities
• Compaction (94%-98%)
  • Target (96%-98%)
• S&ME Performed Thermal Imaging
  • Evaluate Rosphalt Placement Temperatures
Test Strip #2 – Thermal Imaging
Test Strip #2

• What We Learned:
  • Will Rosphalt Mixture Hold its Temperature?
    • Yes
  • What Roller Pattern Works Best?
    • Larger Roller best for Breakdown (12 Ton), 8 Ton as Intermediate
  • Can Contractor Mix/Place Consistently?
    • Getting Better...
  • Will Cores and Thin Lift Continue to Match Up?
    • Confirmed
Deck Prep.: October - November

• Grind Infill Areas
• Sand Blast
• Clean
• Seal Coat – Roller Applied
• 1st Layer Membrane – Spray Applied
• 2nd Layer Membrane – Spray Applied
• Tack Coat – Spray Applied
Wedging / Leveling: November 15-17

- Wedge Infill Areas
- $\frac{1}{2}''$ Thick Course of Conventional Superpave Surface Mix
- Why?
  - Better Prepare the Deck for Rideability
- What Went Wrong:
  - Did Not Bond With Underlying Layers (Temperature)
Test Strip #3: November 19-20

- Multiple Tack Coats / No Tack
  - SSIH / 1080
- Conventional Surface Mix & Rosphalt Mix
- Bond Testing to Evaluate Layer Bonds
  - Need a Decision to Proceed with Paving
No Bond Between Tack and Membrane
Test Strip #3: Summary

- Cannot do Leveling Course
- 2” Layer of Rosphalt on Tack (1080)
- Time to Pave!
Wedging / Leveling: Repercussions

• Lost Valuable Time
• 4 Lanes of Pavement Had to be Removed
• 4 Lanes of Membrane had to be Patched
• Led to Additional Bond Testing and Another Test Strip
Rosphalt Paving: November 24\textsuperscript{th} – December 4\textsuperscript{th} (5 Days of Paving)

- Conventional Paving Operation
- QC Laboratory Testing Every Lane (~250 Tons)
- S&ME Staff at Contractor Laboratory
  - Observe QC Volumetric Testing
  - Perform QA Volumetric Testing
  - Check Truck Temperatures
Rosphalt Paving: November 24th – December 4th

• S&ME Staff in Field
  • Observe Paving Operation
  • Perform QA Density Testing (Thin Lift)
    • 4 QA Tests per Lane
  • Perform Thermal Imaging
• Bond Testing Equipment on Standby
Rosphalt Paving: Plant Day #1

Learned Not to Keep Rosphalt in Silo Due to Absorption

• Why?
  • Laboratory Results
    • Lane #3: 0.6% Voids / 147.3 PCF
    • Lane #2: 1.8% Voids / 149.4 PCF
  • Silo had to be Jack-Hammered out in-Between lanes
Rosphalt Paving: Field Day #1

Mix Product Delivery Time Implications

• Why?
  • Density Testing Results
    • Lane #2: Average 95.4% Max Density
    • Lane #3: Average 96.7% Max Density
  • MTV Clogged up in-Between Lanes
Rosphalt Paving: Day #1

• Thermal Imaging
  • Showed borderline Breakdown Rolling Temperatures

• One Area (~60 FT) Was Removed
Rosphalt Paving: Plant Days #2-#5

• Consistency
  • Laboratory Testing
    • Air Voids Average 0.6%
    • Target Density Average 148.8 PCF
  • No Time Loss Incidents
  • Consistent Truck Temperatures
Rosphalt Paving: Field Days #2-#5

- Roller Pattern Established
- Ambient Temperatures the Main Concern
- Area Removed From Day #1 Caused Concerns with Bond Once Again
- Great Density Testing Results
  - 97.7% - 99.7%
Rosphalt Paving: Bond Testing

- FHWA / KYTC Requested Bond Testing
  - Parts of Patch Area Not Bonded During Removal
Rosphalt Paving: Bond Testing

- November 3rd: Night Work
- Four Locations per Lane
Opening Day: December 5th
QUESTIONS?