Planning, Delivery and Construction for US 35 Bridge Deck Repairs in Dayton, Ohio

Project 160551 – Montgomery Co., Ohio

Matt Blythe, PE – Ohio DOT D7 Bridge Design Engineer
Ed Liberati, PE – Chief Engineer Hydro-Technologies, Inc.

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Columbus, Ohio
ODOT’s Mission

To provide easy movement of people of goods from place to place we will:

- Take care of what we have.
- Make our system work better.
- Improve safety.
- Enhance capacity.
MOT-35-1576 History
MOT-35-1576 History

- 1968 - Built.

- Current ADT: 60,000 vpd.
- City of Dayton was routinely patching structure.
  - 10-15 projects/year.
Decision Making Process to Proceed with Rehabilitation
Rehabilitation Planning

- 2013 work request consisted of replacing the current overlay.
- Red flags with overlay:
  - Exist surface/floor condition.
  - Adjacent bridge proximity.
  - Exist removal depth.
- Programmed for the worst, hoped for the best.
  - FS to perform DCS & evaluate pursuing a 2nd overlay or a deck replacement.
  - $3million vs $9million+ decision.
Deck Condition Survey

- Used truck mounted, near speed thermal imaging to map unsound wearing surface.
- Took 22 bridge cores.
- Evaluated floor with combination of visual and hand sounding inspection.
- Mapped floor condition on top of the WS delams.
Design

- Overlay details:
  - Replaced exist 2.5” MSC overlay w/ 3” LMC overlay.
  - Reduced hydro removal to ½”.
  - Chose LMC based on location & performance.
  - Inflated variable depth & hand chipping quantities.
  - Specified longitudinal joints at flared ramps.
Design

- MOT considerations:
  - Existing width vs. PLC.
  - Closed ramps for safety.
  - Sequenced work.
  - Light pole/sign truss obstructions.

- Duration
  - Limited ramp closure durations.
  - Considered overlapping operations.
  - Specified sequencing to limit duration lights were out.

### Window Contract Table

<table>
<thead>
<tr>
<th>Description of Critical Lane/Ramp to be Maintained</th>
<th>Calendar Days to Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-Ramp (Ramp &quot;A&quot;) - US 35 E.B. to Perry St. Phases 1 and 2</td>
<td>90</td>
</tr>
<tr>
<td>On-Ramp (Ramp &quot;B&quot;) - Ludlow on ramp to W.B. US 35 - Phases 2 and 3</td>
<td>90</td>
</tr>
</tbody>
</table>

Note: The window contract table refers to a project involving the replacement of a bridge deck on Bridge MOT-75-1164 E. It is active during this project. Detour for the closure of N.B. 1-75 ramp to US 35 E.B. (Ramp B3) will be a part of that project. The contractor shall notify the project engineer 3 weeks before ramp B3 is required to be closed.
PIAC

- Proposed lane closure required approval from CO.
- Goal is to minimize traffic disruption to public.
- Weekend work was evaluated.
- Historical projects/traffic impacts were evaluated.
- Traffic data was collected and a que analysis was run.
- Traditional schedule was modified/refined.
Construction

- Project was awarded on 10/20/16 to Complete General Construction
- Contract: $3,391,123.
- Overlay Items: $2,665,393 or 78%
- Final(pending) total CO: $22,127 or 1%
- Project was completed on time.
Surface After Hydro
Variable Depth Removal
Buried Bulb Angle
Finishing Machine Constraints
Longitudinal Joints
Joint Edges
Challenges with Implementing Rehabilitation
Bid Results

160551 Montgomery Co., Ohio
Bid Date 10/20/1996
US 35-15.76 and various; BRIDGE REPAIR

- COMPLETE GENERAL CONSTRUCTION COMPANY COLUMBUS, OH $3,391,122.85
- EAGLE BRIDGE CO. SIDNEY, OH $3,407,756.36
- GREAT LAKES CONSTRUCTION CO HINCKLEY, OH $3,512,279.20
- SHELLEY and SANDS, INC. COLUMBUS, OH $3,696,012.62
- DOUBLE Z CONSTRUCTION COMPANY COLUMBUS, OH $3,699,181.80
- KOKOSING CONSTRUCTION COMPANY, INC. COLUMBUS, OH $4,077,627.17

Low Bidder was under the Engineers Estimate – project was awarded to Complete General
Major Items

- Maintenance of Traffic
- Removal of Existing Concrete Overlay = 19,623 sy
- Latex Modified Concrete Overlay = 19,623 sy
- Hydrodemolition Surface Preparation = 19,623 sy
- Supplemental Specification 848 (7/17/2015)
- Completion Date = 9/30/2017
Construction Planning

- Subcontractors and Material Suppliers, DBE = 9%
- Scheduling – 3 phases, transverse joints, ramps, variable widths
- Recycling Hydrodemolition Wastewater
- Preconstruction Meeting
- Crews and Equipment – Job Superintendent
- Safety of Workers and Traveling Public
Construction Challenges

- Maintaining Traffic – Lot’s of traffic on US 35
- Access to site was tough – No barrier wall openings
- Tight Schedule – Completed before Original Date
- Plans called for minimal transverse joints – Large pours, Variable widths, Ramps
Construction Schedule

- **Phase 1** – Outside Section of EB + Ramps = 5,200 sy
  - 5 pours, 1 hydro unit, 7 mobile mixers
  - First April to Mid May

- **Phase 2** – Inside Section of EB & WB = 9,000 sy
  - 4 pours, 2 hydro units, 8 mobile mixers
  - Mid May to Mid July

- **Phase 3** – Outside Section of WB & Ramps = 5,600 sy
  - 4 pours, 1 hydro unit, 7 mobile mixers
  - Mid July to End August
Construction Operations
Hydrodemolition is a mechanical process by which deteriorated concrete is selectively removed utilizing a high pressure water jet.

By rapid erosion with the high pressure water, the cement matrix and fine aggregates between the coarse aggregate of weakened concrete is essentially washed away. Selective Removal is accomplished.
Finished Overlay

- High Strength Bond to Existing Deck Concrete
- Mechanically Grooved Riding Surface
- Impermeable to Chlorides
- Expected Service Life = 25 Years
Latex Modified Concrete Characteristics

- LMC was specifically designed (1960’s) for use as a thin bonded concrete bridge deck material. It’s quality has withstood the test of time.
- A LMC Overlay is a structural bridge deck repair that will extend the service life of a bridge deck for over 25 years when placed on a hydrodemolition prepared concrete surface.
- LMC is very adhesive and develops great bond strengths to the existing deck.
- LMC shields the underlying deck because it is very impervious.
- LMC has greater flexural strength than conventional concrete.
- LMC is very wear resistant and improves the skid resistance on bridge decks.
- LMC has a very low water/cement ratio. This characteristic prevents shrinkage cracking from occurring in the overlay.