SEMI-INTEGRAL ABUTMENTS WITH UHPC CONNECTIONS

ACCELERATED BRIDGE CONSTRUCTION IN NEW YORK STATE

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Agenda

- I-81 over Preble Road – Project Overview
- Design
- Fabrication
- Construction
- Similar Project by NYSDOT
Bridge Information

- Span Length – 75’
- Bridge Width – 43’
- Interior Precast Panel Width – 11’-7 1/2”
- Exterior Precast Panel Width – 9’

Contractor – Slate Hill Constructors, Warners, NY

Precaster – Fort Miller of Schuylerville, NY

Project Cost $7.775 M (Two Bridges)
Bridge Location

South of Syracuse on Interstate 81
April 27th, 2012 – NB Bridge was hit by Tractor Trailer with Over Height Backhoe
April 28th, 2012 – Support Columns Installed

Repair is deemed temporary – Bridge needs to be replaced.
What is unique about I-81 over Preble Road?

Synergetic combination of the following innovative technologies:

• Vertical Staging of Substructures
• Precast Semi-Integral Abutments
• Prefabricated Modular Deck Beam Elements
• Field cast UHPC Joints
• Integrally Cast Concrete Barriers
• Diamond Grinding for Smooth Riding Surface
Vertical Staging

• Construct Abutments Underneath Existing Bridge while it is Open to Traffic

• Soil Nail Wall is Utilized for Excavation Support

• Allows for a Short Closure Window on the Interstate
Precast Semi-Integral Abutments

- Eliminates Joints at Abutments
- Reduces Construction Time with Precast Backwall
- Easier Shipping and Handling with use of Horizontal UHPC Joints in the Precast Backwall
UHPC Joints

- Extraordinary Bond Strength
- Superior Durability
- High Compressive and Tensile Strengths
- Low Drying Shrinkage
- Fast Strength Gain
- Fully Develops Rebar within a 6 inch Wide Joint
Semi-Integral Abutment – As Fabricated

- Height: ~3.9 ft
- Width: ~2.8 ft
- Depth: ~0.6 ft
- Length: ~2.5 ft
- Total Width: 2.0 ft
Semi-Integral Abutment – As Fabricated

~21 ft
Bridge Design

Modular Deck Beams
- Shored construction for deck
- UHPC for longitudinal joints between deck
- UHPC for semi-integral backwall
Areas of Special Considerations with Shored Construction Bridge Design

- Lack of Software for Shored Construction
- Ability to Replace the Deck in the Future
- Required Camber for Shored Construction
Construction Cost

- Prefabricated Modular Deck Beam Units - $210/SF
- Ultra High Performance Concrete - $180/CF
- Precast Barrier - $240/Ft
- Combined SS Cost - $XX/SF
- Conventional Semi Integral SS Cost - $110/SF
Similar NYSDOT Project
I-190 over Buffalo Ave – Niagara Falls, NY

• Vertical Staging Utilized

• Semi-Integral Abutment Utilized to Accelerate Construction Schedule

• 3 Day Closure

• Accelerated Concrete used for Closure Pours instead of UHPC

• Modular Deck Beam Constructed in a Yard one mile from Bridge Location Instead of Fabrication Plant.
Similar NYSDOT Project

I-190 over Buffalo Ave – Niagara Falls, NY

Vertical Staging
Similar NYSDOT Project
Fabrication at Yard 1 Mile from Bridge
Construction Schedule

Close I-190 NB at Midnight on Thursday, Sept. 25 and Reopen to Traffic at Midnight on Sunday, Sept. 28.

Close I-190 SB at Midnight on Thursday, October 2 and Reopen to Traffic at Midnight on Sunday, October 5.