Accelerated Bridge Construction of the SR 288 Bridge over Wampum Run

Ryan P. Murphy, PE, JMT

Presented to:
2016 Ohio Transportation Engineering Conference – Session 87
Location
SR 288-L10 Existing Bridge
SR 288-L10 Existing Bridge
Project Goals

• Use ABC techniques ~ duration of detour to be less than one month long
• Obtain competitive bids
• Do not use post tensioning >> use Ultra High Performance Concrete (UHPC)
• Integral Abutments
Design Process

- PennDOT recently developed standards for ABC for substructures
- Researched other State’s details and successful projects
- Researched FHWA’s publications
- Presented multiple options to PennDOT
- Community was actively involved with the aesthetics of the bridge
Typical Section

- Deck Module with Attached Barrier
- Deck Module
- Deck Module with Attached Barrier
- Field Cast Ultra High Performance Concrete Connection
- Architectural Surface Treatment
- W36 x 170 Steel Rolled Beam
Precast Abutment and Wingwalls

- Pre-Cast Wingwall
- HP12x74 Pile
- Pre-Cast Pile Cap
- Architectural Surface Treatment
- 27” Corrugated Metal Pipe
- Pre-Cast Cheekwall
Abutment Section

- Pre-Cast Backwall
- Grouted Splice Couplers
- Grout
- Pre-Cast Pile Cap
- Corrugated Metal Pipe
- Shear Studs
- Steel Angle
- HP 12x74
- Grout
Precast Sleeper Slab and Approach Slabs
Closure Pour at Integral Abutment
Ultra High Performance Concrete Joints
# Construction Schedule

**SR 0288 Section L10**  
**Bridge Replacement**  
**ECMS #30030**  
**Pre-Bid Schedule**

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## SR 288-L10 Bid Tabs

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RULD was $36,000/day
SR 288-L10 3-D Model

3-D Model prepared by Newcrete
SR 288-L10 Fabrication Shop Photos
SR 288-L10 – Work done prior to closure
SR 288-L10
Day 1
Monday
8/18/2014
SR 288-L10 – Day 1 Monday 8/18/2014 (continued)
Piles were Located to Avoid the Existing Arch

Cut Piles
SR 288-L10
Day 2
Tuesday
8/19/2014
Welding Angles on Piles

Slope Protection in Front of Integral Abutments
3 cranes were used: 550 Ton, 222 Ton & 100 Ton
SR 288-L10 – Day 2 Tuesday 8/19/2014 (continued)
SR 288-L10
Day 3
Wednesday
8/20/2014
SR 288-L10 – Day 3 Wednesday 8/20/2014
SR 288-L10 – Day 3 Wednesday 8/20/2014 (continued)
SR 288-L10 – Day 3 Wednesday 8/20/2014 (continued)
Deck Modules were Set in 3 Hours

SR 288-L10 – Day 3 Wednesday 8/20/2014 (continued)
SR 288-L10
Day 4
Thursday
8/21/2014
SR 288-L10 – Day 4 Thursday 8/21/2014
Sleeper Slab Sub-base
SR 288-L10 – Day 4 Thursday 8/21/2014 (continued)

View looking Up Underneath Deck

Polyethylene Sheeting to allow Approach slab to Slide over Sub-base
SR 288-L10 – Day 4 Thursday 8/21/2014
(continued)
SR 288-L10 – Day 4 Thursday 8/21/2014
(continued)

Closure Pour at Integral Abutment to Approach Slab
SR 288-L10 – Day 4 Thursday 8/21/2014 (continued)
SR 288-L10 – Day 5 Friday 8/22/2014
(continued)

View Looking at Abutment 2
Closure pour Abutment 1
SR 288-L10
Day 6
Saturday
8/23/2014
UHPC Joints

SR 288-L10 – Day 6 Saturday 8/23/2014 (continued)
SR 288-L10 – Day 6 Saturday 8/23/2014 (continued)

UHPC Concrete

Add Mixtures and Ice
Steel Fibers
SR 288-L10 – Day 6 Saturday 8/23/2014 (continued)

View Looking Into Mixer

Dispensing UHPC from Mixer to Buggies
(continued)

UHPC Pour

Fiber Board
SR 288-L10 – Day 6 Saturday 8/23/2014 (continued)

Leak Being Plugged with Stone
Chimney Used to Fill Voids
SR 288-L10 – Day 6 Saturday 8/23/2014 (continued)

UPHC Cores
SR 288-L10 – Day 6 Saturday 8/23/2014 (continued)
SR 288-L10
Day 7
Sunday 8/24/2014

BRIDGE RAIL and GUIDE RAIL PLACEMENT

Day 6

Day 7
SR 288-L10 – Day 7 Sunday 8/24/2014 (continued)

APPROACH PAVING

UHPC JOINT
SR 288-L10 – Opened to Traffic on 8/24/2014 at 10:30 p.m.
SR 288-L10 – September 27th and 28th
Conclusions

• Very successful project done in less than 7 days for $640/ft² (*bid amount*), about $200,000 more than a normal job, but well within District 11-0 average.

• Lessons Learned:
  • CIP approach slabs
  • Use plexi-glass to cover UHPC joints

• Community was very happy with the project.
Time Lapse Video

You Tube
Project Team

• Owner – PennDOT District 11-0
• Consultant – JMT
• Contractor – Joseph B. Fay
  • Pre-Fabricator - Newcrete

• Awards
  • 2014 National Accelerated Bridge Construction Conference
  • 2014-2015 ABCD – Susquehanna Chapter – Outstanding New Short Span Bridge
  • 2015 ACEC/PA Diamond Award – Honor Award Structural Systems
  • 2016 NSBA Steel Bridge Competition – Short Span Category
QUESTIONS?