Using Innovative and Collaborative Skill Sets to Re-open I-95

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Benesch
Agenda

- Incident and Site History
- Developing a Solution
- Temporary Innovative Roadway
- Summary
Incident & Site History
Incident

- Sunday, June 11, 2023, 6:17 am
- Philadelphia, PA
- PennDOT District 6-0
Benesch & I-95

- Cottman-Princeton Interchange (CPR)
  - PennDOT District 6-0
  - Interchange improvements
  - Reconstruction of 1.4 miles of I-95
  - 5 Contracts: CP1, CP2, CP3, ITF, ITB
  - Total cost: $340M
Developing a Solution
Existing Bridge

- 2 structures (NB & SB)
- 8 steel plate girders, (16 total)
- Concrete deck (composite)
- 103' span
- 34° skew
- 3000' radius
- Superelevated
- Bifurcated median barrier
- 74' - 7 ¾" width (SB & NB)
- 160,000 ADT
Winning the Job

Outreach

Extensive PennDOT District 6-0 experience

Experience with the Contractor

Experience with the Materials

I-95 CPR contract experience

Access to documents and files

People
Contract info

1. Demolition
   June 11 - June 15

2. Emergency Repair: Temporary Roadway
   Contract with PennDOT
   June 12 - June 23

3. Permanent Bridge Replacement
   Design-Build Contract with Contractor
   June 22 - Ongoing
Decision Making: The First 24 Hours

- Accident / Collapse
  - Demo Existing SB Structure
  - Reuse Existing Damaged SB Structure

- Permanent Bridge Replacement NB
- Temporary Roadway NB
- Temporary Roadway

- Product Availability
- 2 Phase Staging Limits
- Permanent Bridge Replacement

Reuse Existing Damaged SB Structure

Demo Existing SB Structure

MassDOT

U.S. Department of Transportation
Federal Highway Administration
Finding a Solution

- **Demo existing bridge**
  - 5 Days, Sep. Contract

- **Construct temp. roadway**
  - 12 Days, 2 Separate Emergency Contracts

- **Open I-95 at 75% capacity**

- **Update steel design**

- **Order and fabricate steel**

- **Construction Stage 1**

- **Construction Stage 2**

- **Restore I-95**
  - 5 Months
  - < 1 Year, D/B Contract
Apollo 13 Approach – Make It Work!

WE NEED TO MAKE THIS...

FIT INTO A HOLE MADE FOR THIS...

USING ONLY THIS!
Finding a Solution

- Temporary retaining wire walls
- Lightweight fill
- Roadway with barrier
- Existing:
  - Four 12 ft lanes (each direction) with full inside/outside shoulders
- Temporary roadway
  - Three 11 ft lanes (each direction)
Temporary
Innovative Roadway
Temporary Roadway Section
Ultra-Lightweight Foamed Glass Aggregate

- 20 lbs/ft³, Φ = 40°
- 8,000 CY produced from 8 million recycled glass bottles
- Ship by truck (100 CY) or even plane
- Non-toxic, non-flammable, non-porous, insulated
- Pennsylvania-made
- Available
- In use at adjacent/nearby sites
Retaining Walls

- Welded wire form
  - Filled with lightweight fill
- Geogrid
- ~22 feet high
Gravix Barriers

- Precast units available (sitting in yard)
- MASH TL-4
- Bottom 4' of unit backfilled roadway subbase 2A to load integral moment slab
- Units were not cut, so additional diaphragm, backwall, and approach slab removal required
Median Barrier

• Bifurcated 4.75"
• Cast with existing formwork
  • Only two forms available
• Turnaround time
  • 5 days 24/7, including weekend
• Strength (shipping) = 3,000 psi
• Strength (28 day) = 4,500 psi
Completed Temporary Roadway
Pressure from Political Interest

- PA Governor, PA & US Transportation Secretaries, US President
Livestream
Summary
## Reopening in 12 Days

### JUNE 2023

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- **Bridge collapse**
- **Demolition**

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- **Concrete coring**
- **Father’s Day**
- **Temporary Roadway Construction**

- Emergency repair design started
- Work starts on permanent replacement
- Utility loading submission approved
- Final signed/sealed/approved temporary structure plans submitted to contractor
- Wire wall shop drawings accepted as noted
- Temporary Roadway Construction
- Concrete coring
- First approval on MPT, 112 sheets
- Design-build contract signed for permanent replacement
- Temporary Roadway opens

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**MassDOT**

**Federal Highway Administration**
Current Status
Questions?