Rhode Island DOT Replaces Bridges Over Extended Weekends Using PBES and SPMTs

DAVID W. FISH, P.E.
ADMINISTRATOR OF PROJECT MANAGEMENT
RI DEPARTMENT OF TRANSPORTATION

WITOLD H. KLOCZKOWSKI, P.E.
PROJECT MANAGER
COMMONWEALTH ENGINEERS & CONSULTANTS, INC.

EAST SHORE EXPRESSWAY BRIDGE

McCORMICK QUARRY BRIDGE
Opening Remarks
Mr. David W. Fish, P.E.
Administrator of Project Management
RI Department of Transportation
OWNER: RI DEPARTMENT OF TRANSPORTATION

OVERSIGHT: FHWA RI DIVISION

DESIGN CONSULTANT: COMMONWEALTH ENGINEERS & CONSULTANTS, INC

CONTRACTOR: MANAFORT BROTHERS INC.
BOTH BRIDGES ARE LOCATED IN EAST PROVIDENCE, RHODE ISLAND
PROJECT LOCATION

TRAFFIC DATA:
- US ROUTE 6 (WARREN AVE), 19,000 VPD
- EAST SHORE EXPRESSWAY, 38,000 VPD
PROJECT LOCATION

EAST SHORE EXPRESSWAY BRIDGE

McCORMICK QUARRY BRIDGE

RIDOT Maintenance Facility

EAST SHORE EXPRESSWAY SB

US ROUTE 6, WARREN AVENUE

INTERSTATE 195
EXISTING BRIDGES

EAST SHORE EXPRESSWAY BRIDGE:
- CONSTRUCTED IN 1958
- 3 SPAN CONTINUOUS T-BEAM
- ~55’ – 110’ – 55’ SPANS
- 60 DEG SKEW

McCORMICK QUARRY BRIDGE:
- CONSTRUCTED IN 1958
- 3 SPAN P/C I-GIRDER
- ~37’ – 69’ – 35’ SPANS
- 40 DEG SKEW
## GENERAL BRIDGE CONDITION

### EAST SHORE EXPRESSWAY BRIDGE

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<tr>
<th>TYPE</th>
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### McCORMICK QUARRY BRIDGE

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• TWO SEASON, TWO PHASE “CONVENTIONAL” CONSTRUCTION RAISED TRAFFIC CONCERNS FOR THIS MAJOR EXPRESSWAY.
• RIDOT SUCCESSFULLY EMPLOYED SPMT’S FOR A PRIOR CONTRACT.
• PROJECT SITE IS WELL SUITED TO SPMT’S, DUE TO PROXIMITY OF BSA’S AND SHORT TRAVEL PATHS.
• CONSULTED WITH AN SPMT CONTRACTOR. ALL AGREED THE SITE WAS IDEAL.
• CONSULTANT PROPOSED GEOSYNTHETIC REINFORCED SOIL (GRS) ABUTMENTS, TO BE CONSTRUCTED IN ADVANCE OF THE W/E CLOSURE, UNDER THE EXISTING BRIDGE.
• PRECAST CONCRETE SUBSTRUCTURE COMPONENTS HELPED TO SPEED UP THE REPLACEMENT.
NEW BRIDGE CONFIGURATIONS

EAST SHORE EXPRESSWAY BRIDGE

EXISTING BRIDGE

3-Span Becomes Single Span
NEW BRIDGE CONFIGURATIONS

McCORMICK QUARRY BRIDGE

EXISTING BRIDGE

NEW BRIDGE

3-SPAN BECOMES SINGLE SPAN
NEW BRIDGE CONFIGURATIONS

EAST SHORE EXPRESSWAY BRIDGE

McCORMICK QUARRY BRIDGE
TYPICAL GRS DETAIL

1" CLOSED CELL PREFORMED POLYETHYLENE FOAM (ATTACH ON BACK OF INTEGRAL BACK WALL W/CONSTRUCTION ADHESIVE)

PROPOSED GRADE
EXISTING GROUND
ROADWAY MAKEUP

REINFORCED BACKFILL
PORTION OF EXISTING ABUTMENT AND PILES TO REMAIN
APPROX. EXIST. LEDGE LINE

12" (TYP.)

7'-0"
21'-0"±

15'-0"
6'-0"

PEASTONE

FACED OF GRS ABUTMENT

PRECISE CONCRETE WALL CAP
TOP OF WALL
EL. 94.67

PRECISE MODULAR BLOCK FACING
EXISTING GROUND

PROPOSED GRADE

EL. 80.00
EL. 78.00

REINFORCED BACKFILL
STRUCTURAL EXCAVATION EARTH PAY LINE
SOIL REINFORCEMENT ELEMENT (TYP.)
REINFORCED SOIL FOUNDATION

NORTH GRS ABUTMENT SECTION
SCALE: 1" = 10'

NO LONG-TERM SETTLEMENT CONCERNS
PRECAST ELEMENTS & INTEGRAL BACKWALL

TYPICAL FOOTING SEGMENT SIZE = 20’X13’X2’, 78,000 LBS.
LARGER WALL SEGMENT SIZE = 20’X11’X1’-7”, 52,000 LBS.
INCENTIVES & DISINCENTIVES

Each bridge was assigned a distinct 80 hour extended weekend incentive closure period, from 9PM Friday to 5AM Tuesday (continuous day/night).

Contract Language:

Interim Completion Times:

Monetary incentives or disincentives will be applied to the following interim completion times according to the terms herein:

- **Interim Completion Time 1 (hereafter referred to as “ICT1”):** 5:00 a.m. on the Tuesday ending the 80 hour ABC Period associated with East Shore Expressway Bridge No. 475.
- **Interim Completion Time 2 (hereafter referred to as “ICT2”):** 5:00 a.m. on the Tuesday ending the 80 hour ABC Period associated with McCormick Quarry Bridge No. 476.

Incentive and Disincentive Assessment:

Incentive (positive assessment): For each hour that the defined work is completed prior to its associated ICT, the following value will be added to any monies due the Contractor. This incentive will be calculated from the defined ICT to the actual time of completion of the work. The actual time of completion will be rounded back or ahead to the nearest hour based on whether it occurs before or after the half-hour point, respectively. The incentive will be applied separately for each ICT:

- **ICT1, East Shore Expressway Bridge No. 475:** $9,000 per hour
- **ICT2, McCormick Quarry Bridge No. 476:** $8,000 per hour

Disincentive (negative assessment): Correspondingly, for each hour that the defined work remains incomplete after its associated ICT, the following value will be deducted from any monies due the Contractor. This disincentive will be calculated from the defined ICT to the actual time of completion of the work. The actual time of completion will be rounded back or ahead to the nearest hour based on whether it occurs before or after the half-hour point, respectively. The disincentive will be applied separately for each ICT:

- **ICT1, East Shore Expressway Bridge No. 475:** $9,000 per hour
- **ICT2, McCormick Quarry Bridge No. 476:** $8,000 per hour
EAST SHORE EXPRESSWAY BRIDGE TRANSPORT PATH STUDY (McCORMICK QUARRY BRIDGE STUDY SIMILAR)
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BRIDGE STUDY SIMILAR)
EAST SHORE EXPRESSWAY BRIDGE TRANSPORT PATH STUDY (McCORMICK QUARRY BRIDGE STUDY SIMILAR)
ADVANCED GRS CONSTRUCTION
McCORMICK QUARRY BRIDGE (BRIDGE EAST SHORE EXPRESSWAY SIMILAR)

CONSTRUCTING GRS ABUTMENTS UNDER THE EXISTING BRIDGE
BUILDING THE NEW BRIDGE IN THE "BRIDGE STAGING AREA"
CONSTRUCTION
EAST SHORE EXPRESSWAY BRIDGE (McCORMICK QUARRY BRIDGE SIMILAR)

COMPLETED SUPERSTRUCTURE, WITH BARRIERS INCLUDED
CONTRACTOR’S DEMOLITION SUBMITTAL

- Demolition equipment, materials, sequence designed by the Contractor to suit his means and methods.
- Contractor's engineer analyzed the existing bridge members to address their condition, and to accommodate the proposed sequence.
- Bridge ratings were made available to the Contractor.
- Demolition was performed entirely during the 80 hour road closure.
EAST SHORE EXPRESSWAY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND
EAST SHORE EXPRESSWAY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

START OF THE W/E ROAD CLOSURE
EAST SHORE EXPRESSWAY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

DEMOLITION DURING THE WEEKEND ROAD CLOSURE
EAST SHORE EXPRESSWAY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

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EAST SHORE EXPRESSWAY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

SETTING THE PRECAST COMPONENTS
EAST SHORE EXPRESSWAY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

SETTING THE PRECAST COMPONENTS
EAST SHORE EXPRESSWAY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

MOVING THE BRIDGE ON THE SPMT’s
EAST SHORE EXPRESSWAY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

MOVING THE BRIDGE ON THE SPMT’s
EAST SHORE EXPRESSWAY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

FINISHING THE APPROACH FILL & WALLS
EAST SHORE EXPRESSWAY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

MOVING THE BRIDGE ON THE SPMT’s
FINISHING THE APPROACH FILL & WALLS
EAST SHORE EXPRESSWAY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

AFTER THE W/E CLOSURE - NEW STRUCTURE OPEN TO TRAFFIC
McCORMICK QUARRY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND
McCORMICK QUARRY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

START OF THE W/E ROAD CLOSURE
McCORMICK QUARRY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

DEMOLITION DURING THE WEEKEND ROAD CLOSURE
DEMOLITION DURING THE WEEKEND ROAD CLOSURE
McCORMICK QUARRY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

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DEMOLITION DURING THE WEEKEND ROAD CLOSURE
McCORMICK QUARRY BRIDGE
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McCORMICK QUARRY BRIDGE
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MOVING THE BRIDGE ON THE SPMT’s
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80-HOUR ROAD CLOSURE WEEKEND

FINISHING THE APPROACH FILL & WALLS
McCORMICK QUARRY BRIDGE
80-HOUR ROAD CLOSURE WEEKEND

AFTER THE W/E CLOSURE - NEW STRUCTURE OPEN TO TRAFFIC
A PDF OF THIS PRESENTATION, AND WEB-LINKS TO TIME-LAPSE VIDEO’S WILL BE PROVIDED BY FIU
FINAL STRUCTURES

- Contract Type: Design/Bid/Build
- Total Construction Cost
  - Bid = $12.7 million, to-date = $11.8 million
- Total Construction Duration = 16 months
- East Shore Expressway Bridge incentive payment = $0.00
- McCormick Quarry Bridge incentive payment = $152k = 19hrs x $8k/hr
- Total Incentive Payments - $152k

EAST SHORE EXPRESSWAY BRIDGE

- Contract Closure = 80 hrs per bridge
- Actual Closure:
  - East Shore Expressway Br = 80hrs
  - McCormick Quarry Bridge = 61 hrs

No traffic gridlock!
Key take-aways:

- Conducted successful public out-reach,
- Weekend move = less traffic and short-lived impacts,
- Lesson learned from 1st bridge - construct some of the approach fill and wing walls with wrapped-face system before the SPMT move rather than after,
- Adjustable bearing detail pros/cons.
THANK YOU FOR WATCHING