Rapid Replacement of Two Bridges Simultaneously on the Same Line

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VHB
MBTA Rail Bridge Replacement Design-Build Project

Intervale Road

Bacon Street

High Line

Lynn Fells Parkway

Parker Street

Commercial Street
MBTA Rail Bridge Replacement Design-Build Project
Intervale Road—Existing Conditions

- Originally built in 1914
- Four track structure (2 active)
  - Steel girders with open deck
  - Granite masonry abutments
- Roadway
  - 20’ face-to-face of abutment
Intervale Road—Existing Conditions

- **Utilities**
  - Signal and FO on bridge
  - PTC overhead

- **Railroad Operations**
  - 52 commuter trains on weekdays
  - 18 commuter trains on weekends
  - Amtrak and CSX freight as well
Bacon Street—Existing Conditions

- Originally built in 1911
- Four track structure (2 active)
  - Steel girders with ballasted deck
  - Granite masonry abutments
- Roadway
  - 29’-6” between abutments
  - Single, 5’-6’ sidewalk
Bacon Street—Existing Conditions

- Utilities
  - Signal and FO on bridge
  - PTC overhead

- Railroad Operations
  - 52 commuter trains on weekdays
  - 18 commuter trains on weekends
  - Amtrak and CSX freight
Contract Requirements

- Full bridge replacements
- Track outages
  - 10 weekends of single-track operations
  - 2 weekends of full track outage
- Work on both bridges simultaneously
Design Considerations

- Simple details, standardized for both bridges
- Non-weather dependent details
- Maximize field adjustability
- Minimize work during outage
Intervale Road—Proposed Design

**BRIDGE LONGITUDINAL SECTION**

- **BRG SOUTH ABUTMENT (FIXED)**
- **BRG NORTH ABUTMENT (FIXED)**
- TOP OF RAIL
- **40'-0" SPAN**
- **BALLASTED DECK**
- **THROUGH GIRDER**
- **14'-0" PROP. MIN. VERT. CL.**
- **20'-0" ±**
- **EXISTING GRANITE ABUTMENT (TYP.) (SEE NOTE 1)**
- **30'-0" PRECAST APPROACH SLAB (TYP.)**
- **PRECAST ABUTMENT (TYP.)**
- **MICROPILE (TYP.)**

*Note: This diagram provides a longitudinal section of the proposed design for Intervale Road, detailing the components and dimensions of the bridge.*
Bacon Street—Proposed Design

BRIDGE LONGITUDINAL SECTION
Typical Section—Proposed Design

Intervale Road Bridge
Construction Staging

FRAMINGHAM/WORCESTER LINE

EXISTING BRIDGE

BACON ST.

EAST CENTRAL ST. (RTE 135)
Construction Staging
Construction Staging

DEMOLISH ABANDONED BAYS OF EXISTING BRIDGE

BACON ST.

EAST CENTRAL ST. (RTE 135)
Construction Staging

TEMPORARY SHORING

BACON ST.

EAST CENTRAL ST. (RTE 135)
Construction Staging

- New Bridge Girder
- Temporary Shoring
- Bacon St.
- East Central St. (RTE 135)
Construction Staging

TEMPORARY SHORING

NEW BRIDGE GIRDER

BACON ST.

EAST CENTRAL ST. (RTE 135)
Construction Staging

- DEMO EXISTING BRIDGE
- NEW BRIDGE GIRDER
- SPMT
- BACON ST.
- EAST CENTRAL ST. (RTE 135)

FULL SHUTDOWN WEEKEND:
Construction Staging

EAST CENTRAL ST. (RTE 135)

BACON ST.
Planning for Weekend Outages

- Detailed Schedule
  - Hour-by-hour to track progress of both bridges

- Personnel Availability
  - Multiple crews with experience

- Equipment Availability
  - Cranes, SPMT’s
First Weekend Outage
First Weekend Outage
Second Weekend Outage
Second Weekend Outage
Lessons Learned

- Field adjustability, especially at bearings
- Plan for equipment breakdowns
- Grout installation and cure time is critical
- Provide conservatism in design
- Engineering support during track outages
Conclusions

- All work was completed within permitted outages
- Although risk increases with replacement of two bridges simultaneously, can be achieved with proper planning and provide operational advantages
- Project success in part due to close collaboration between designer and contractor
Thank you!
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