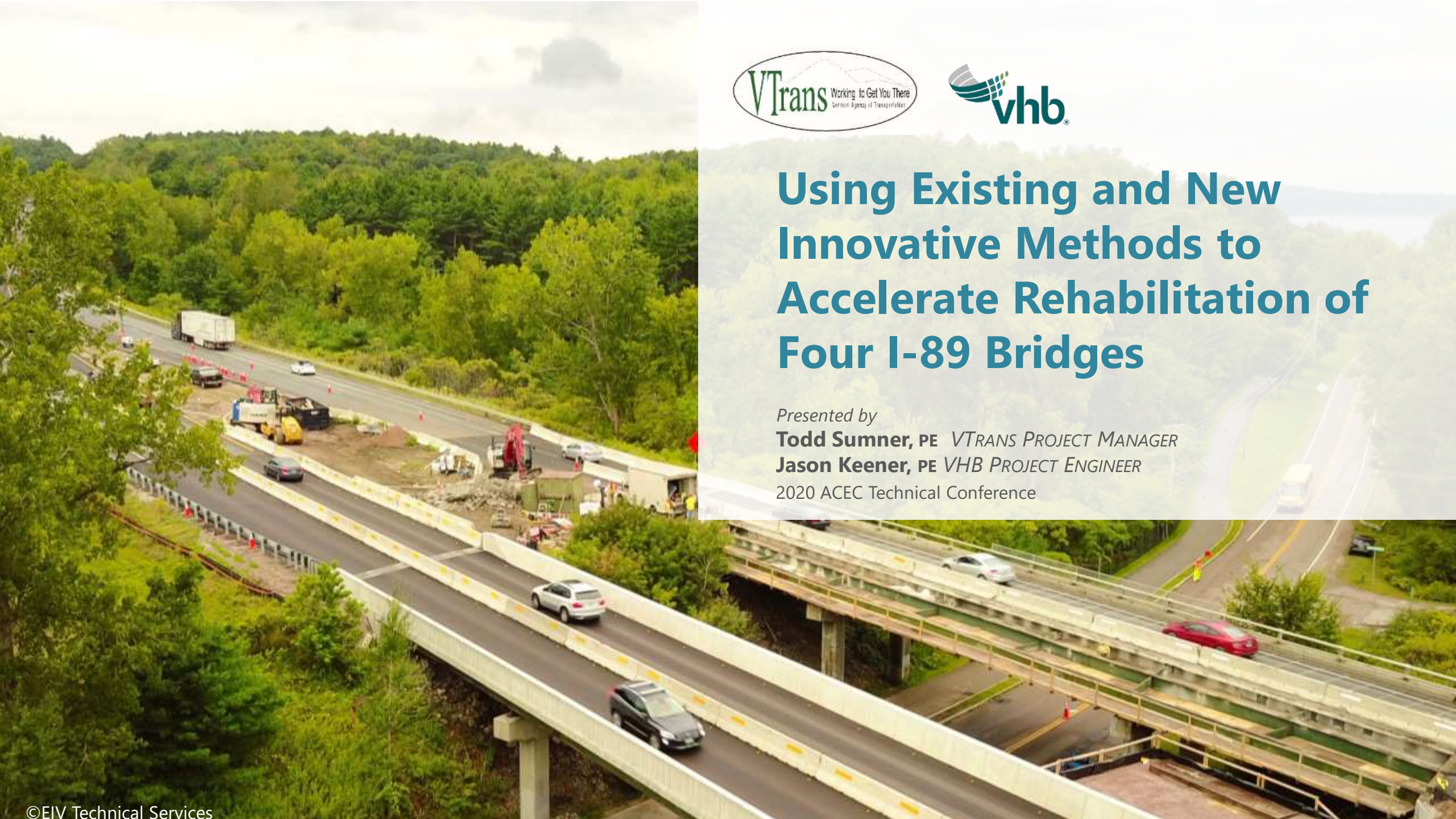

Using Existing and New Innovative Methods to Accelerate Rehabilitation of Four I-89 Bridges

Presented by
Todd Sumner, PE *VTrans Project Manager*
Jason Keener, PE *VHB Project Engineer*
2020 ACEC Technical Conference

Introduction

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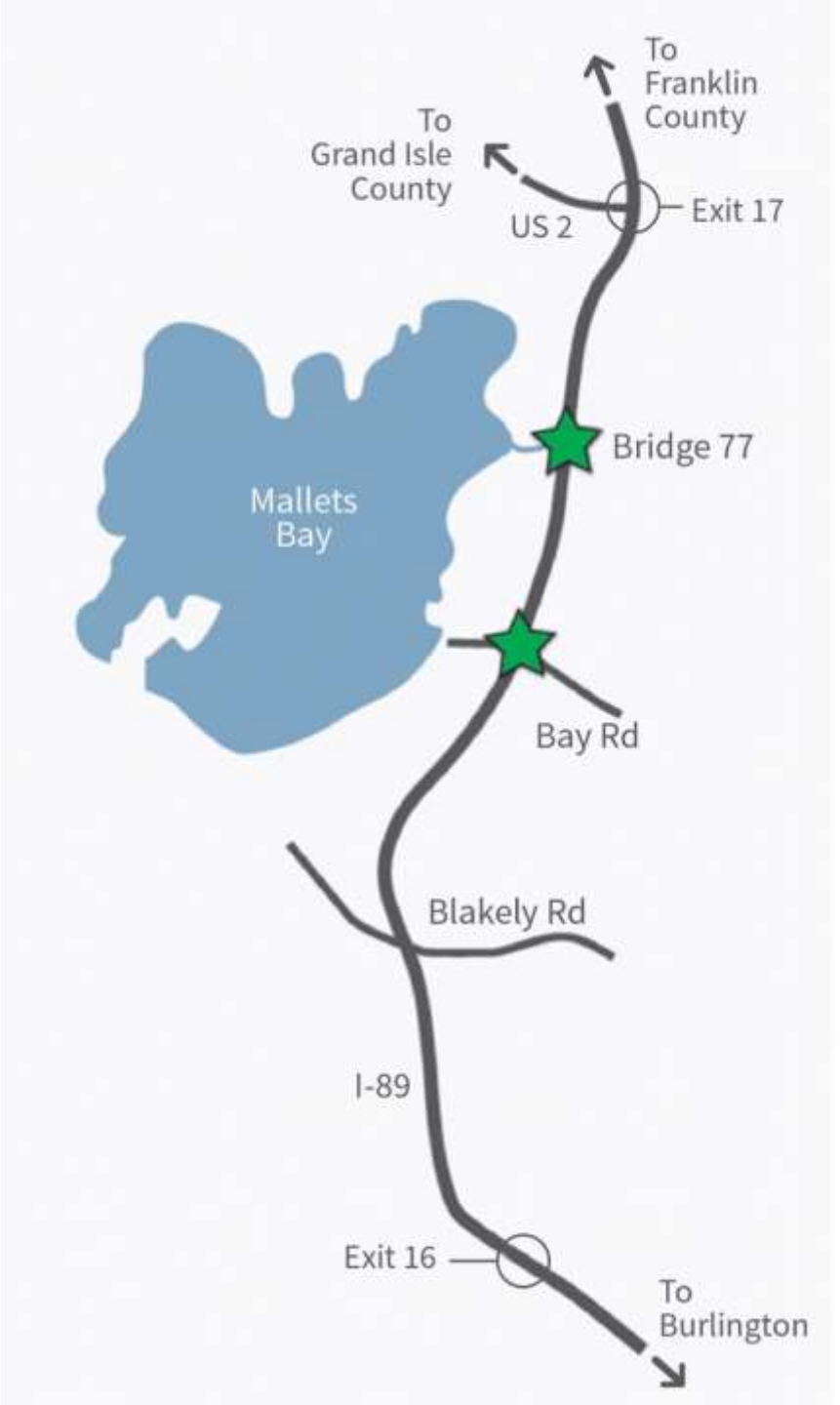
Introduction

- Removal & Replacement of 4 Bridge Decks on I-89 in Colchester, VT
- High (for VT) AM & PM Traffic Volumes (2,500 VPH)
  - Critical link for Franklin, Grand Isle, and northern Chittenden Counties
- Used AccelBridge Proprietary Prestressing System to meet the schedule



Project Location

Project Need

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Fair to Poor Deck Condition

- Bridge 76N – 5
- Bridge 76S – 5
- Bridge 77N – 5
- Bridge 77S – 4
  - Exposed reinforcing
  - Spalls on underside and fascia

Substructure Issues

- Bridge 76N – 6
- Bridge 76S – 6
- Bridge 77N – 6
- Bridge 77S – 6

Steel Beam Condition

- Bridge 76N – 6
- Bridge 76S – 6
- Bridge 77N – 6
- Bridge 77S – 6

Beams to be repainted as part of future project

Why CMGC?

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High Traffic Volumes

- High Traffic Volumes
  - 6:00 AM to 9:00 AM (3000 VPH Max.)
  - 3:00 PM to 7:00 PM (2600 VPH Max.)
- Single Lane Closure
  - Requires 1400 VPH or Less

Temporary Bridge Not Feasible

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Why CMGC?

- High traffic volumes
- Temporary bridge not feasible
- Determination to close one barrel of interstate
- 59 hour closure periods determined
- Means & methods critical and needed contractor input to be successful

Project Team

- Owner – VTrans
- Designer – VHB
- CM/GC – Kubricky Construction Corp. (KCC)
- ICE – CX Consulting, Inc. (CXC)

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KUBRICKY CONSTRUCTION CORP.

CXC
Construction EXPERT Consulting, Inc.

Project Team (cont.)

- KCC assisted with:
  - Final Design
    - Bridge
    - Traffic control
  - Construction Schedule
  - Constructability Review
- Project Team performed three quantity & cost reconciliations
  - Preliminary, final, pre-contract plans

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KUBRICKY CONSTRUCTION CORP.

CXC
Construction EXPERT Consulting, Inc.

CMGC Process

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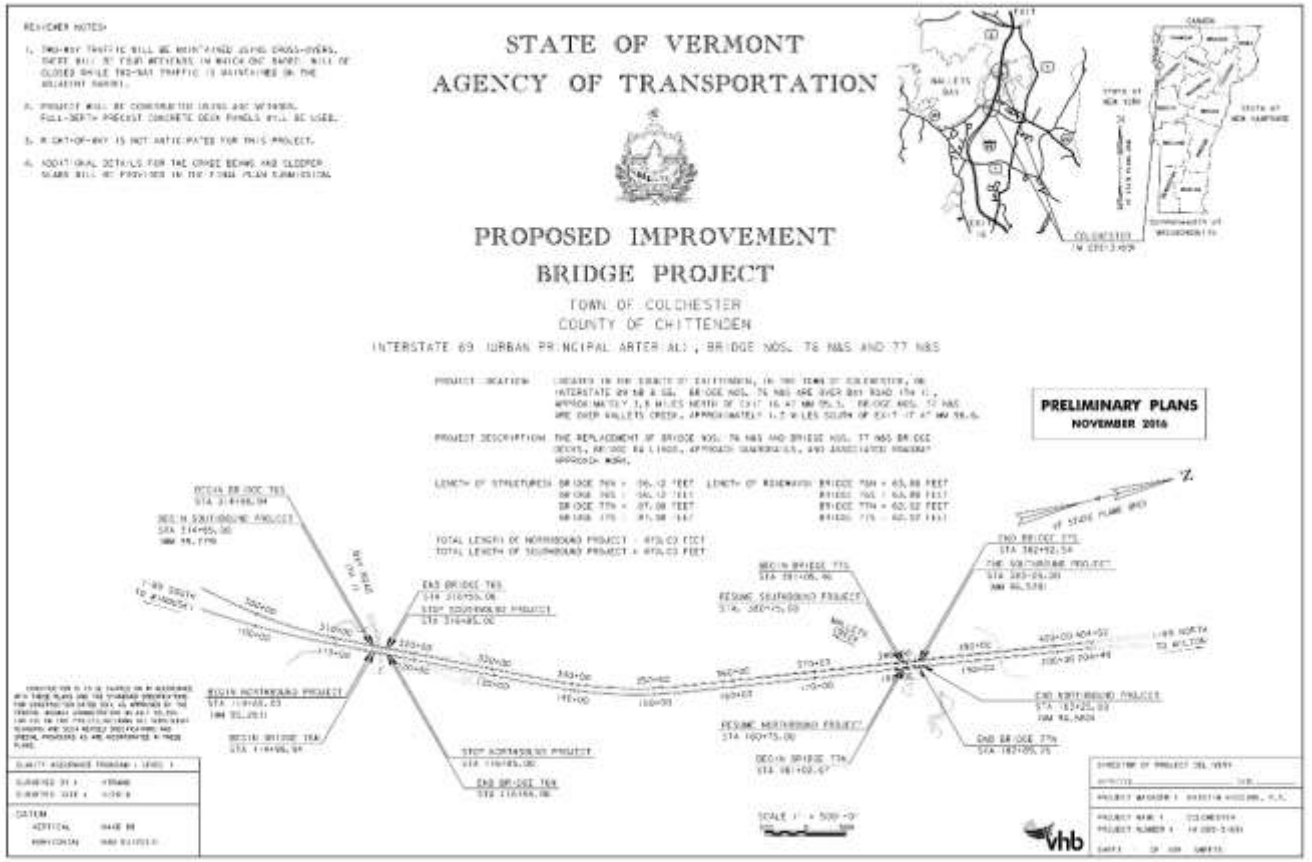
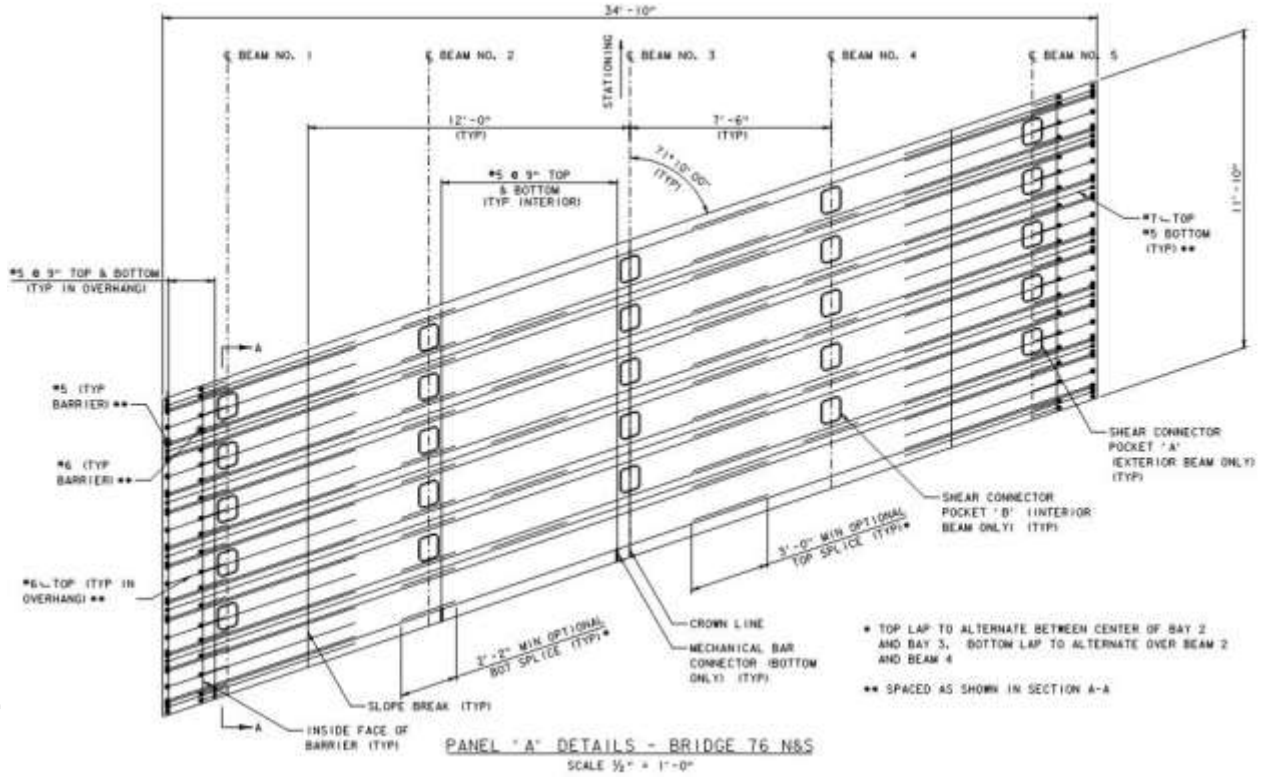
Preliminary

- Preliminary Plan Review
- Quantity Reconciliation
  - Understanding of pay items
- Cost Reconciliation
  - Understanding of where costs were being carried



Final

- Development of Design Calculations, Final Plans, and Spec's
  - CM Provided Input On
    - Deck panel design & system
    - Determination of required closures & construction schedule
    - Traffic control plans



Final (cont.)

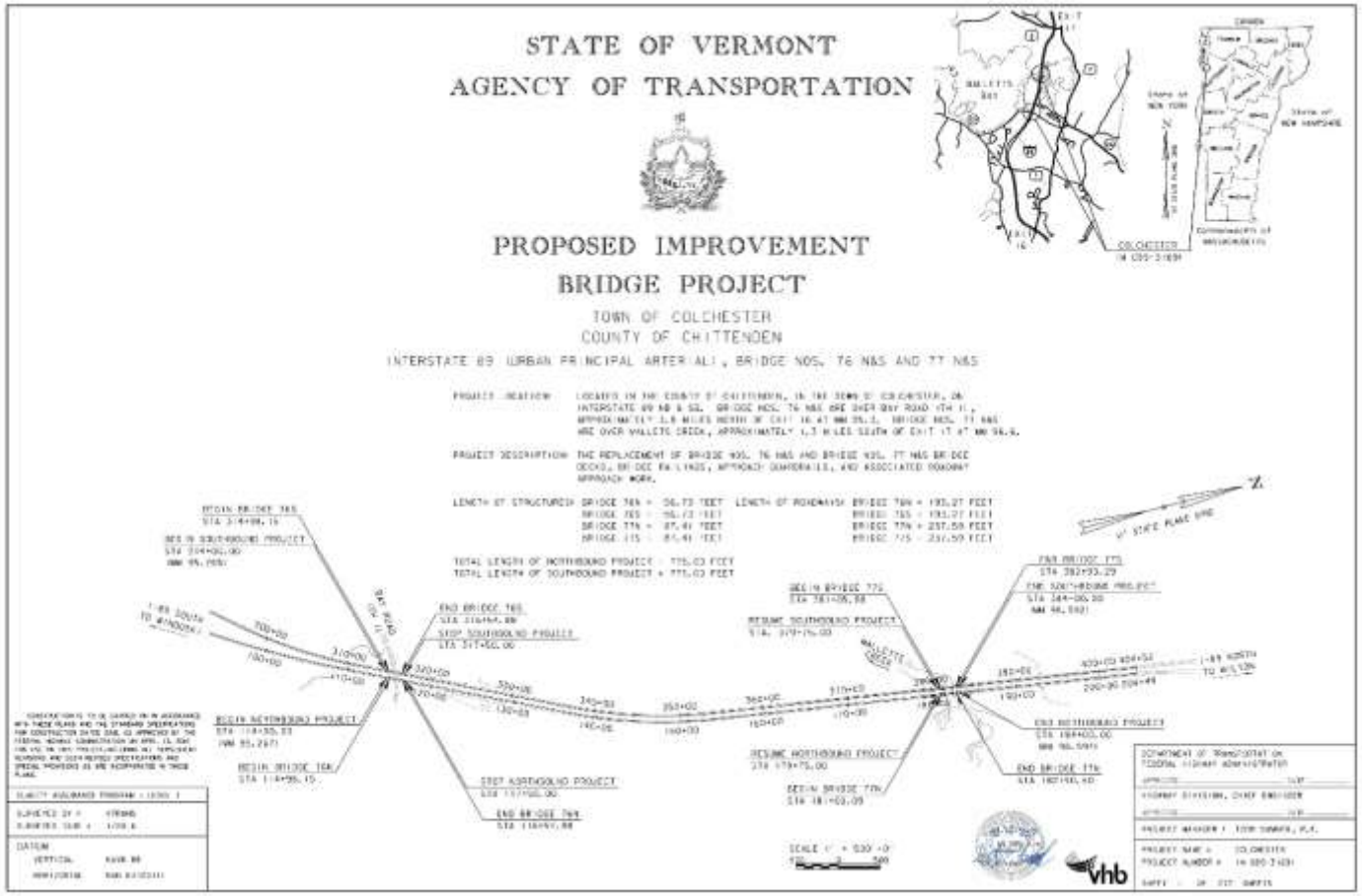
- Quantity Reconciliation
  - Independent calculations completed
  - Thorough review of quantities
- Cost Reconciliation
  - Independent estimates completed by team
  - Understanding and agreement on where costs were being carried

Pre-Contract

- Updated Plans & Specs Based on Final Design Comments
- Quantity Reconciliation
  - Independent calculations completed based on revisions
- Cost Reconciliation
  - Capture changes and revisions from final plans
  - Updated quotes and subcontractor estimates

Contract

- Negotiate Targeted Maximum Price = CMGC Bid
- Proposal Sent & Contract Award
- Bid Analysis
- CM Becomes GC



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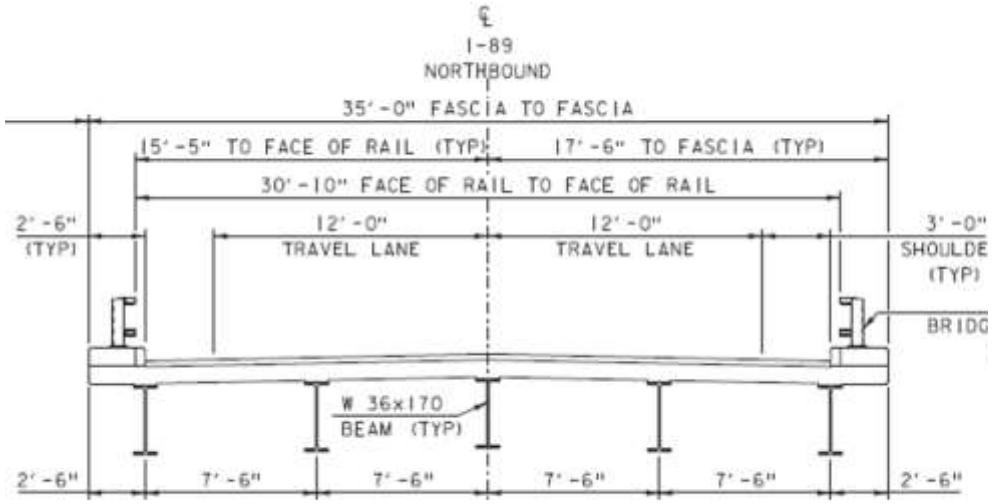
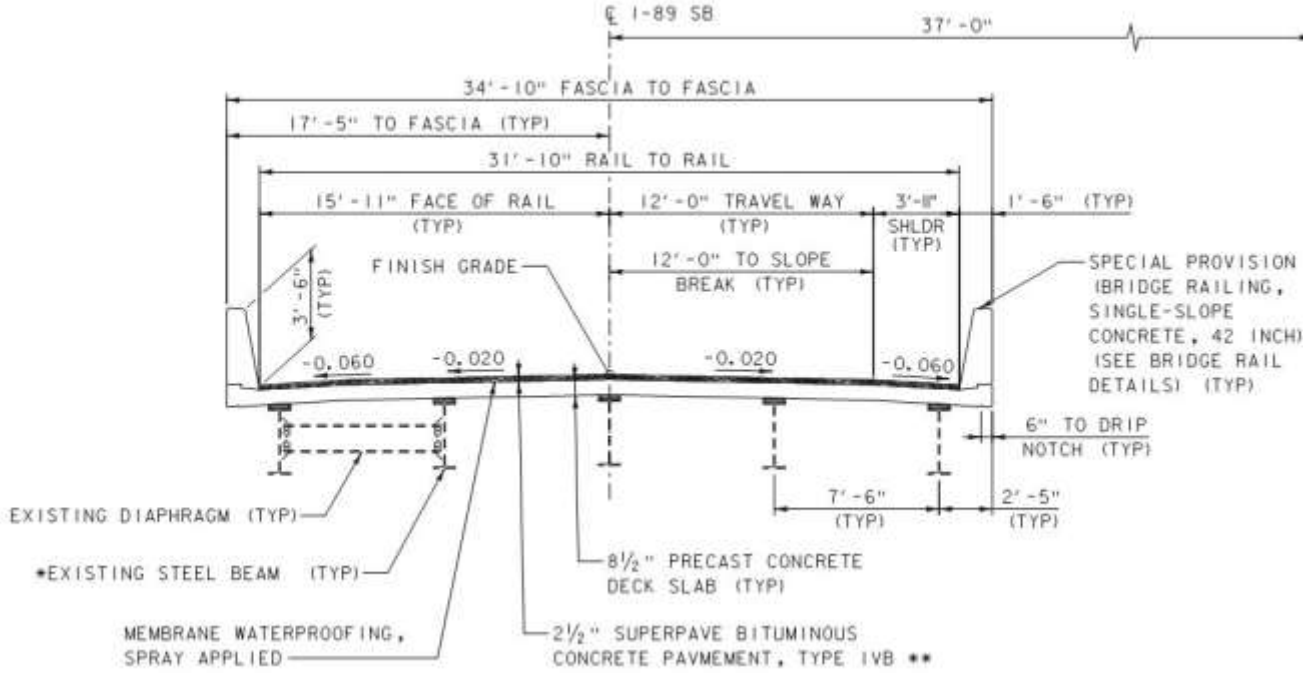
Project Design

Existing Bridge Section



Proposed Bridge Section



Existing & Proposed Bridge Sections

Project Design

- Precast Deck Panels
  - Accel bridge system used
  - epoxy sealed match cast joint
  - Deck panels compressed by jacking
- Precast Backwall/ curtain walls
- Precast Approach Slabs & sleeper slabs
- Slip-Forming of Bridge Rail

AccelBridge

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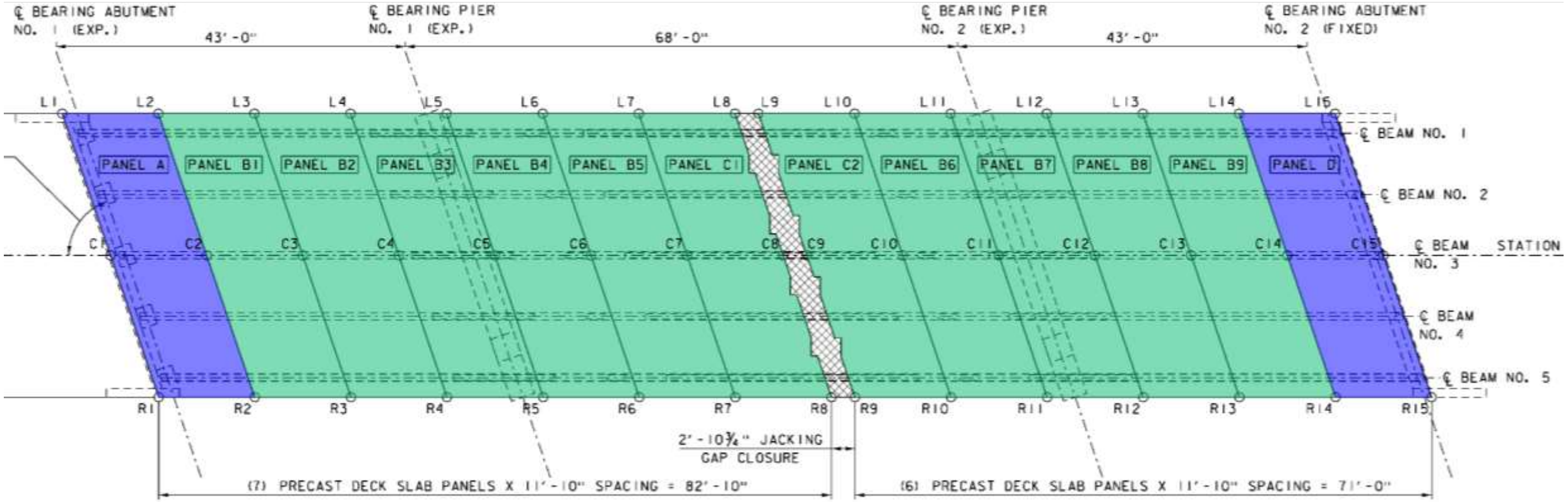

ACCEL Bridge System

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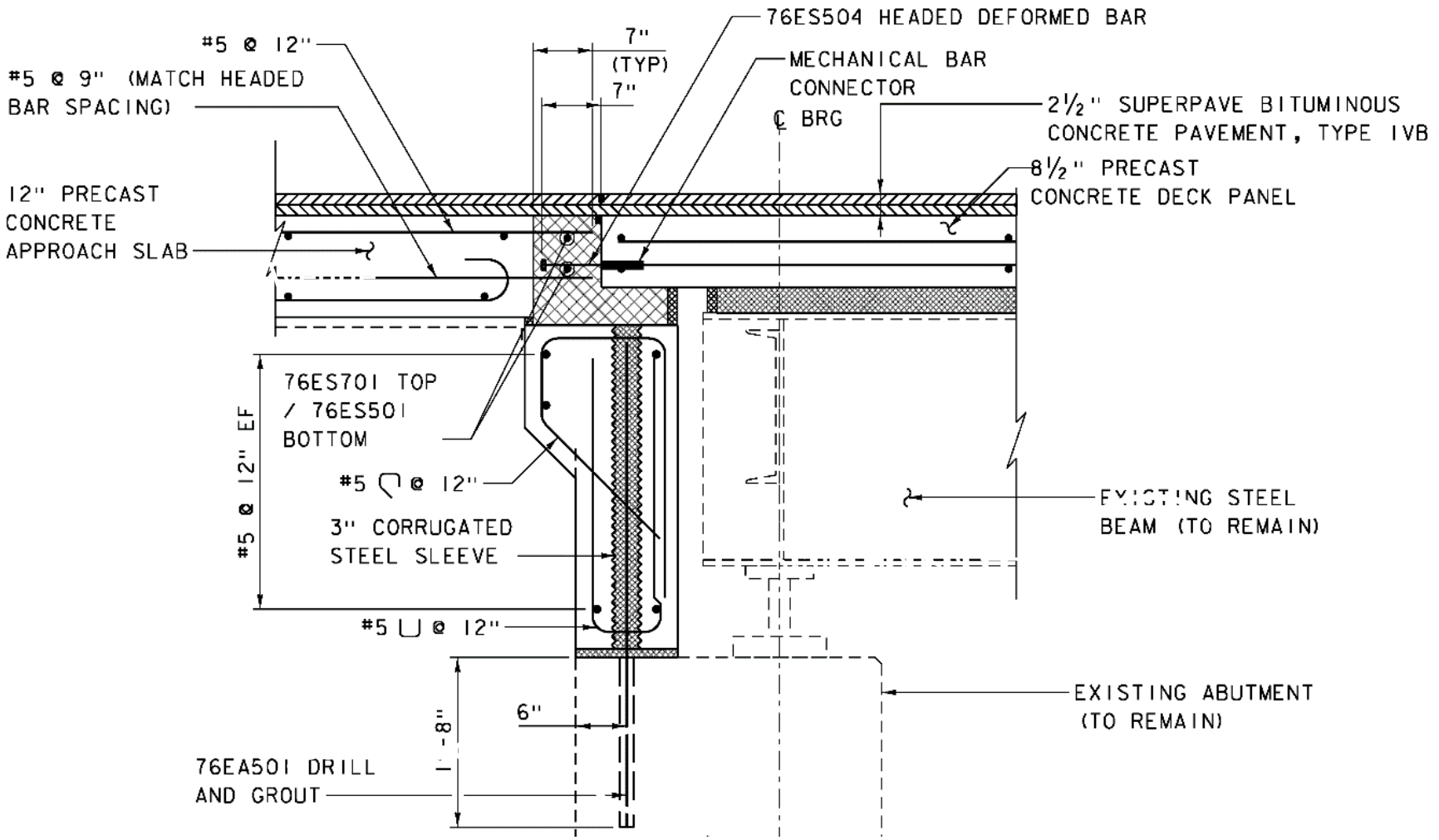
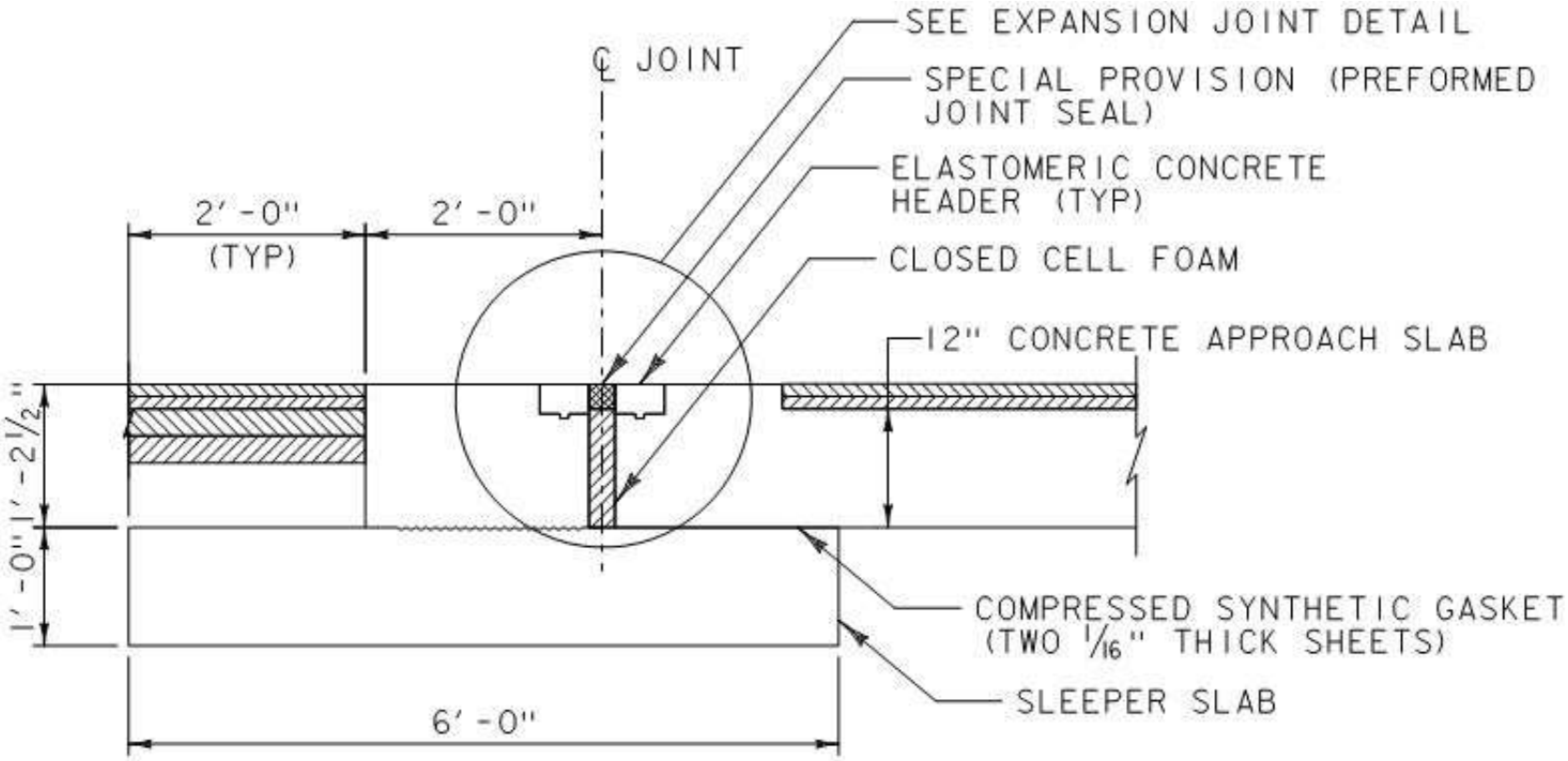
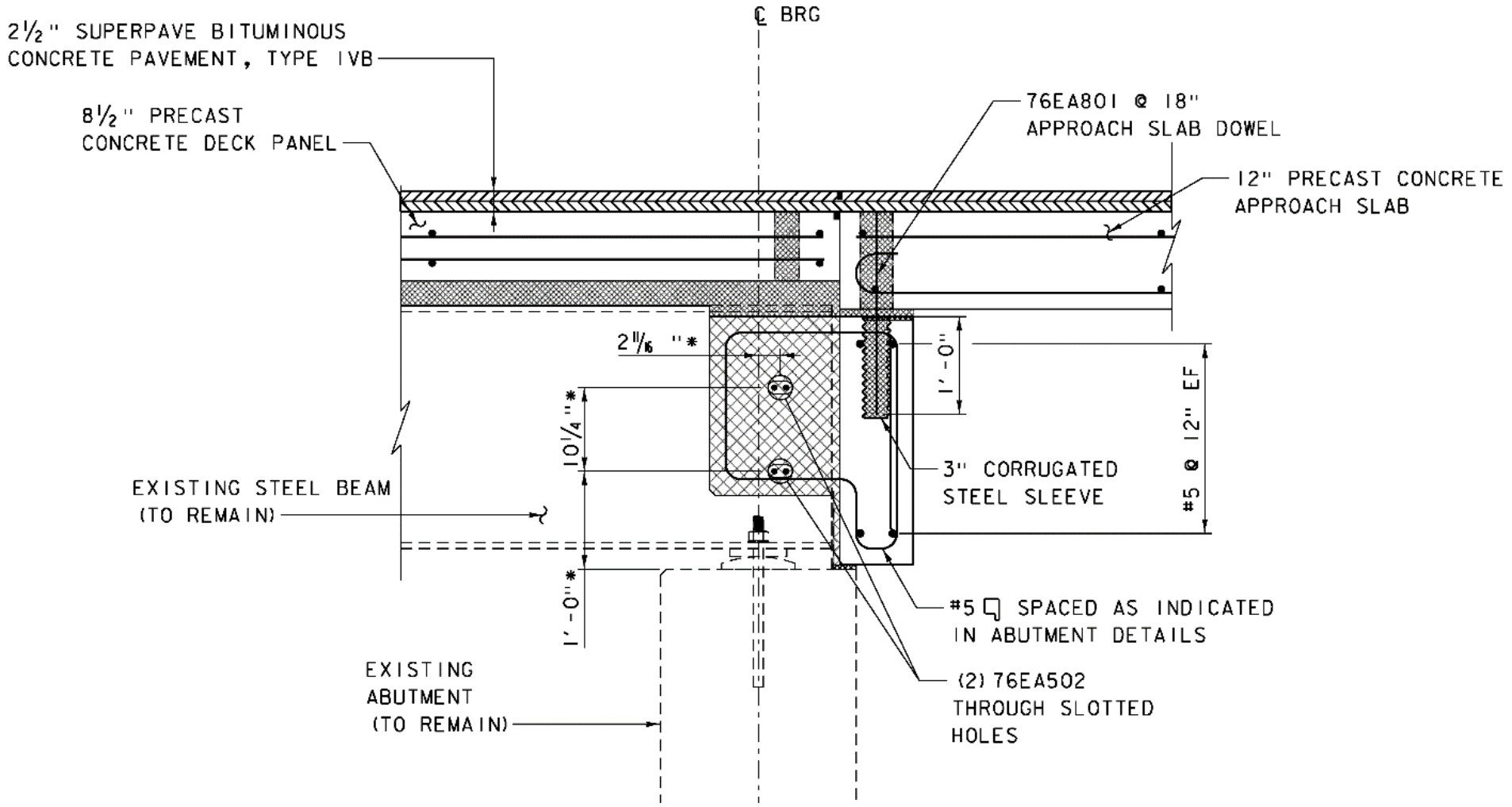


Precast Concrete Backwalls



Precast Concrete Approach Slabs & Sleeper Slabs



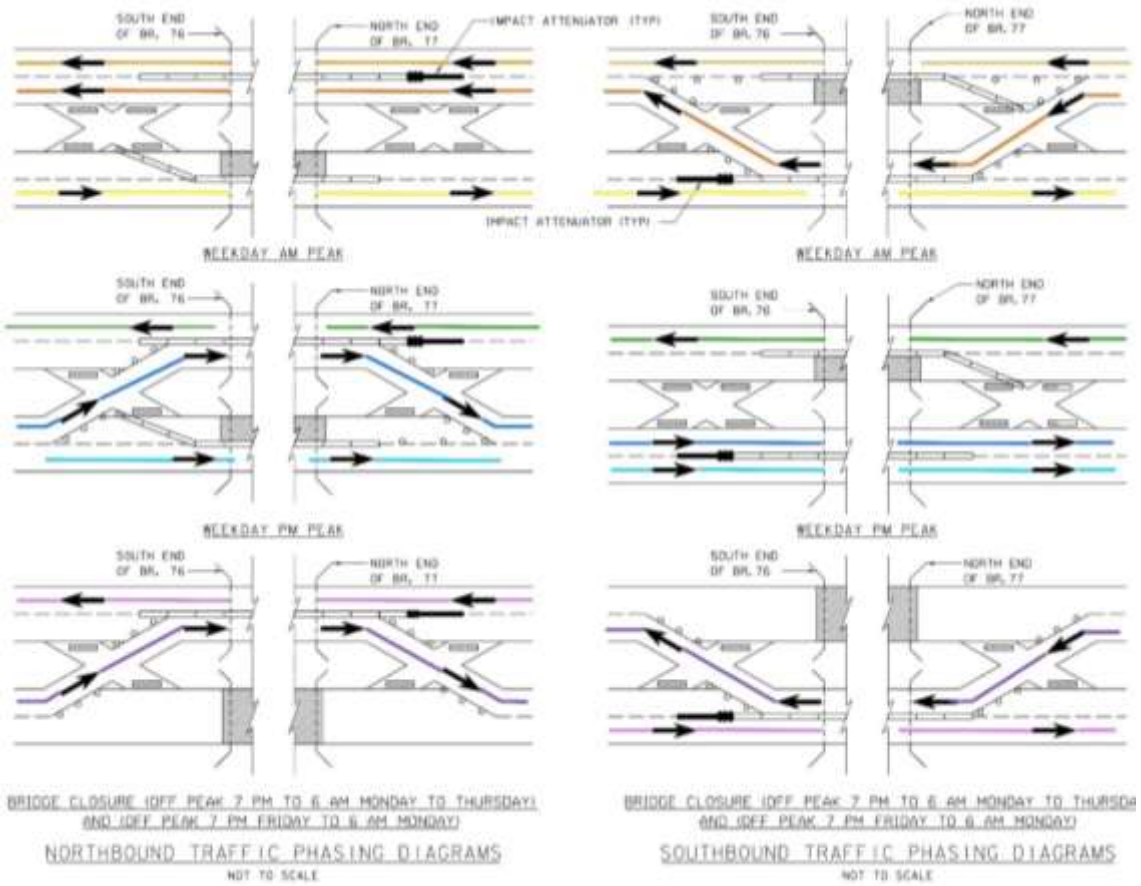
Precast Concrete Curtain Walls

Determination of 6 Weekend Closures

- CM Input & Schedule Resulted in Utilization of 6 Closures
- Owner Requirements
  - Mid July to early October timeframe to complete
  - Labor Day Closures Prohibited
- 59 Hour closures due to traffic volumes

Traffic Control

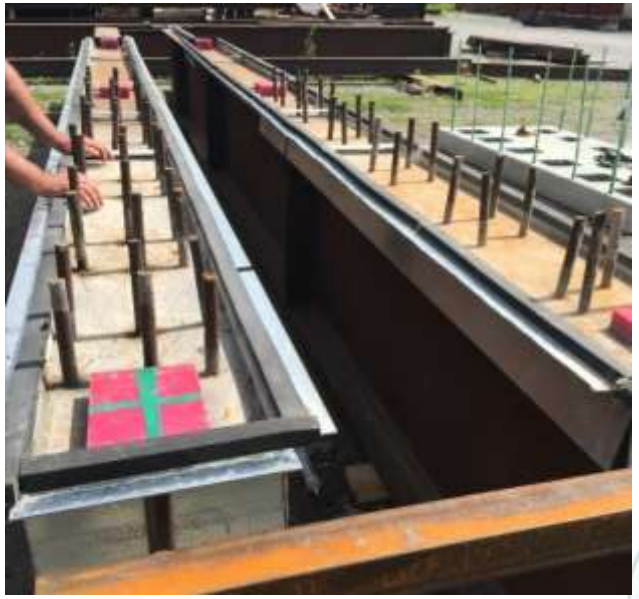
- 6 Weekend Closures
  - 7PM Friday to 6AM Monday
- Management Of traffic prior to bridge closures
  - 2 Lanes Maintained During Peak
    - 6AM to 9AM
    - 3PM to 7PM
  - Single Lanes Allowed Off-Peak

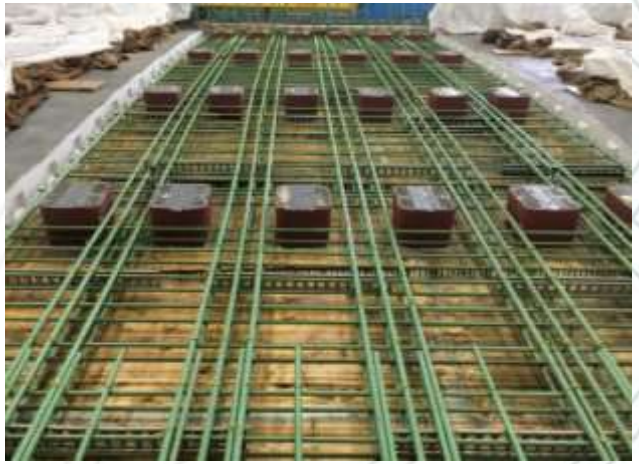


Construction

Preparation

- Precast Fabrication & Mock-Up
- Substructure Repairs
- Causeway/GRSS Wall Installation
- Installation of Traffic Control
- Pull offs, Crossovers, U-Turns Construction





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Preparation

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Preparation

6 Weekend Closures

- Weekend 1 – NB Barrel
  - Backwalls/Curtain walls & sleeper slab – Bridge 77N
- Weekend 2 – NB Barrel
  - Removal & Replacement of deck & approach slabs – Bridge 77N
  - Backwall/Curtain walls & sleeper slab – Bridge 76N

6 Weekend Closures (cont.)

- Weekend 3 – NB Barrel
  - Removal & Replacement of deck & approach slabs – Bridge 76N
  - Slip-forming of bridge rail – Bridge 77N
- Weekend 4, 5, & 6 - Repeat Process on SB Barrel

Backwall/Curtain Wall Replacements

1. Removal of Existing Backwalls/Wingwalls
2. Install Precast Backwalls/Wingwalls
3. Place Dowels and Grout Exp. Backwall
4. Place Rapid Set Concrete for Fixed Curtainwall
5. Install Sleeper Slabs on Exp. End




Deck Replacement

1. Finish Deck Removal
2. Prep Beams/Install Form Angles
3. Set and Grout/Secure End Panels
4. Erect Remaining Panels
5. Jack at Closure Pour
6. Install Studs, Grout Haunches, Closure Pours
7. Install Approach Slabs
8. Slip Forming
9. Expansion Joint


CRAFTSMAN


DA COLLINS

Lessons Learned

Lessons Learned

- Important that Discussions, During the CM/GC Process Are Well Documented
- Require Construction Personnel from All Participants be a part of the CM/GC Process

Lessons Learned (cont.)

- Have Contingency Items to Mitigate Risk
- Flexibility During Closures with work not critical to opening to traffic
- Start the Process Early
  - Material testing/design

Lessons Learned (cont.)

- Proper Planning
  - Hourly Schedules and Work Plans
- Temperature Effects on Cure Time
- Concurrent Activities = Success

Conclusions

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Conclusions

- Four bridge decks were removed and replaced over six weekend closures
- Accelbridge with innovative thinking resulted in success
- Minimized traffic impacts by using new to VT methods
- Benefit to commuters and the general public

Questions?

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