



Rt. 15/29 (SBL) Bridge Superstructure Replacement and Roadway Widening

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Prior to Construction

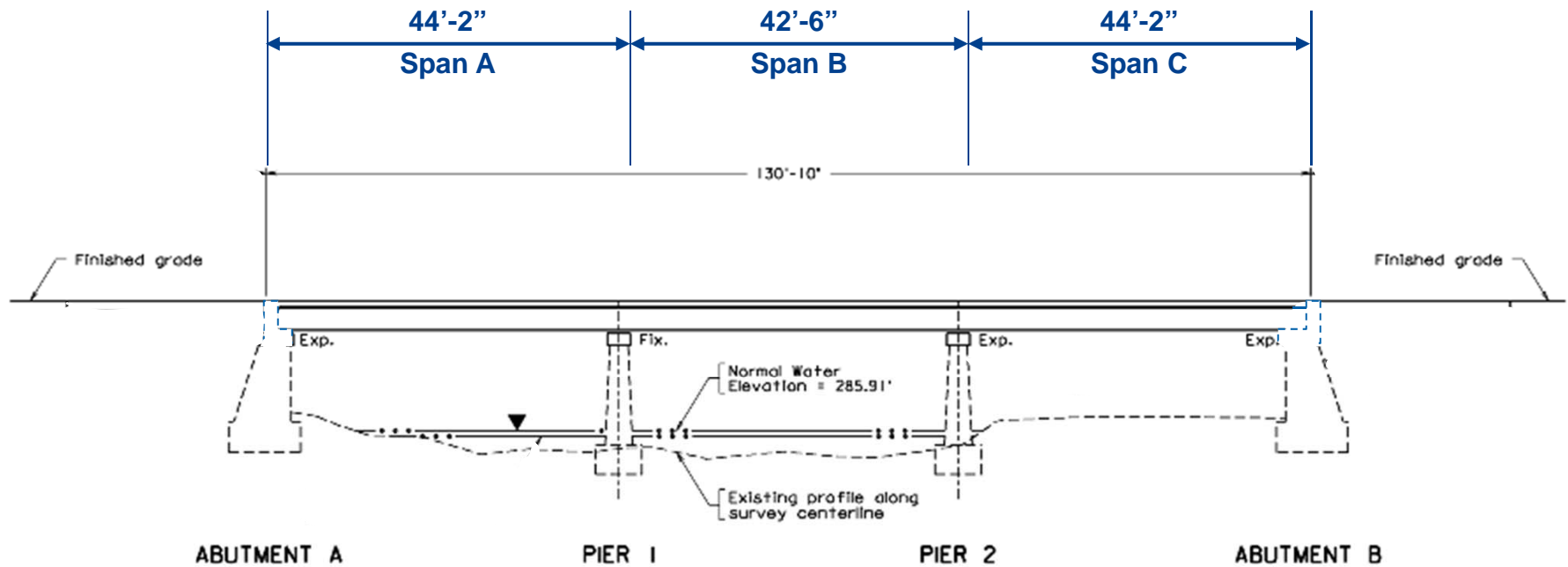


West side view of SBL bridge prior to construction



East side view of SBL bridge prior to construction

Existing Bridge Elevation



Project Information

- **Location:** The Route 15/29 (SBL) Bridge Superstructure Replacement and Roadway Widening Project over Broad Run is located in Prince William County, 0.55 Mile North of Route 215.
- **Scope:** Work includes replace and widen existing bridge superstructures with offsite-fabricated superstructure segments, substructure concrete widening and repairs, re-alignment and approach work.
- **Superstructure:** 3-Span, Concrete T beam, Simply Supported
- **Substructure:** Wall type piers and abutments
- **Year Built:** 1952
- **ADT:** 25,000
- **Condition:** Structurally deficient and functionally obsolete.

Traffic Impacts Identification and Mitigation – Design Phase

- Analysis of Impacts
 - Traffic analysis, to show the impact of closing a lane for 24 hours, was performed by Simulation Modeling . The data used was based on both published VDOT traffic data as well as the site-specific traffic counts obtained during the project.
 - The results of the analysis showed that conventional bridge construction caused a significant daily traffic backup—1.5 miles—for the duration of the construction (100 days), and resulted in at least \$15M in user cost, due to traffic delays only
- Identification of traffic impact mitigation strategies
 - Implement Accelerated Bridge Construction (ABC) method
 - ABC during low volume traffic periods only – night construction
 - Phase ABC if the construction time exceeds low volume traffic period

Project Limits

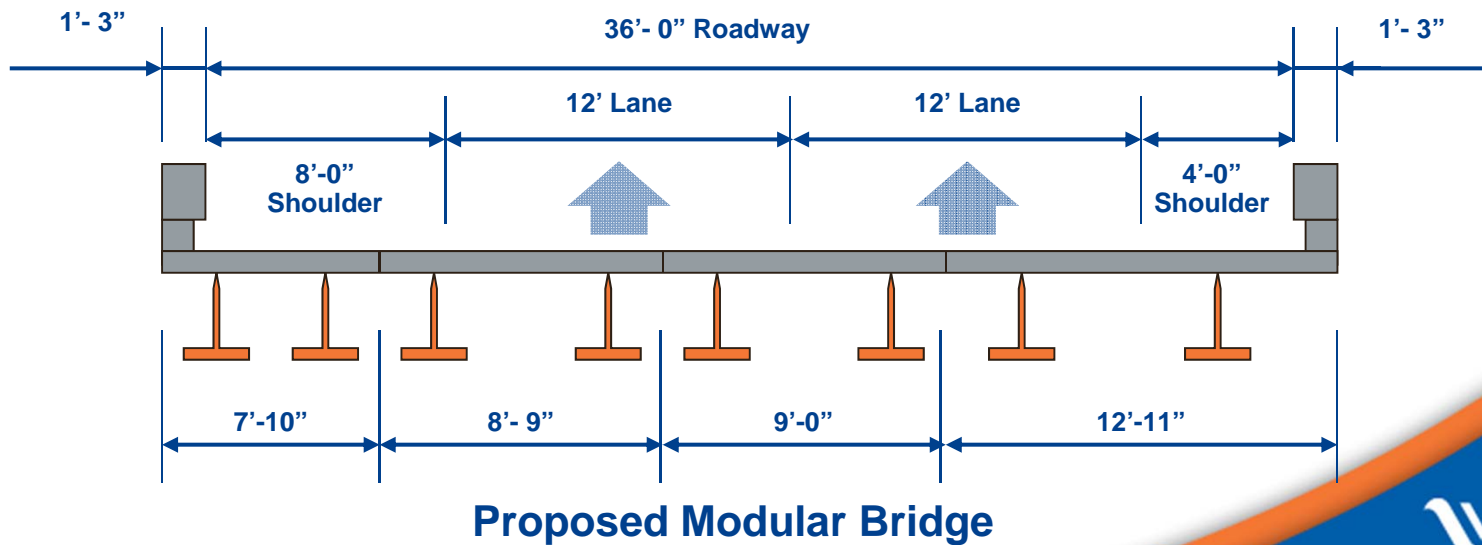
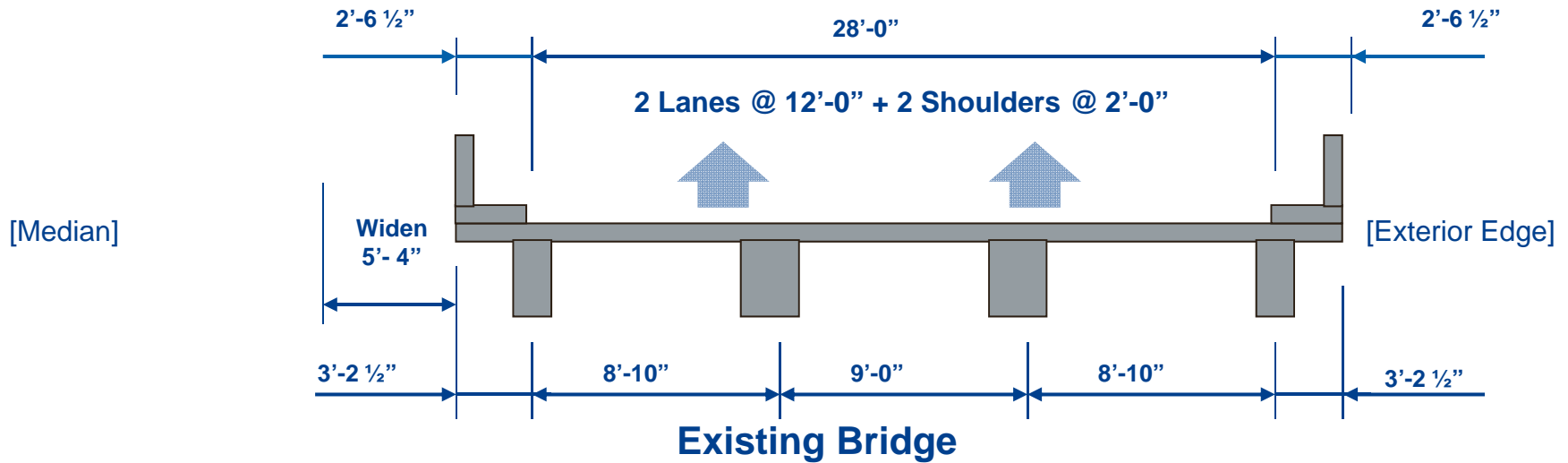


Project limits within the Buckland Historical District
and the Mosby Heritage Area



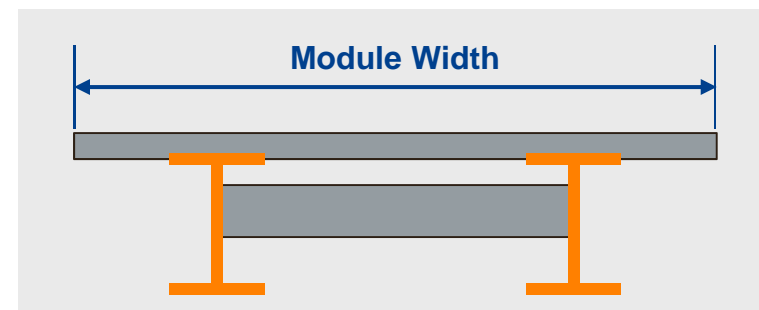
Construction Concept

Typical Sections

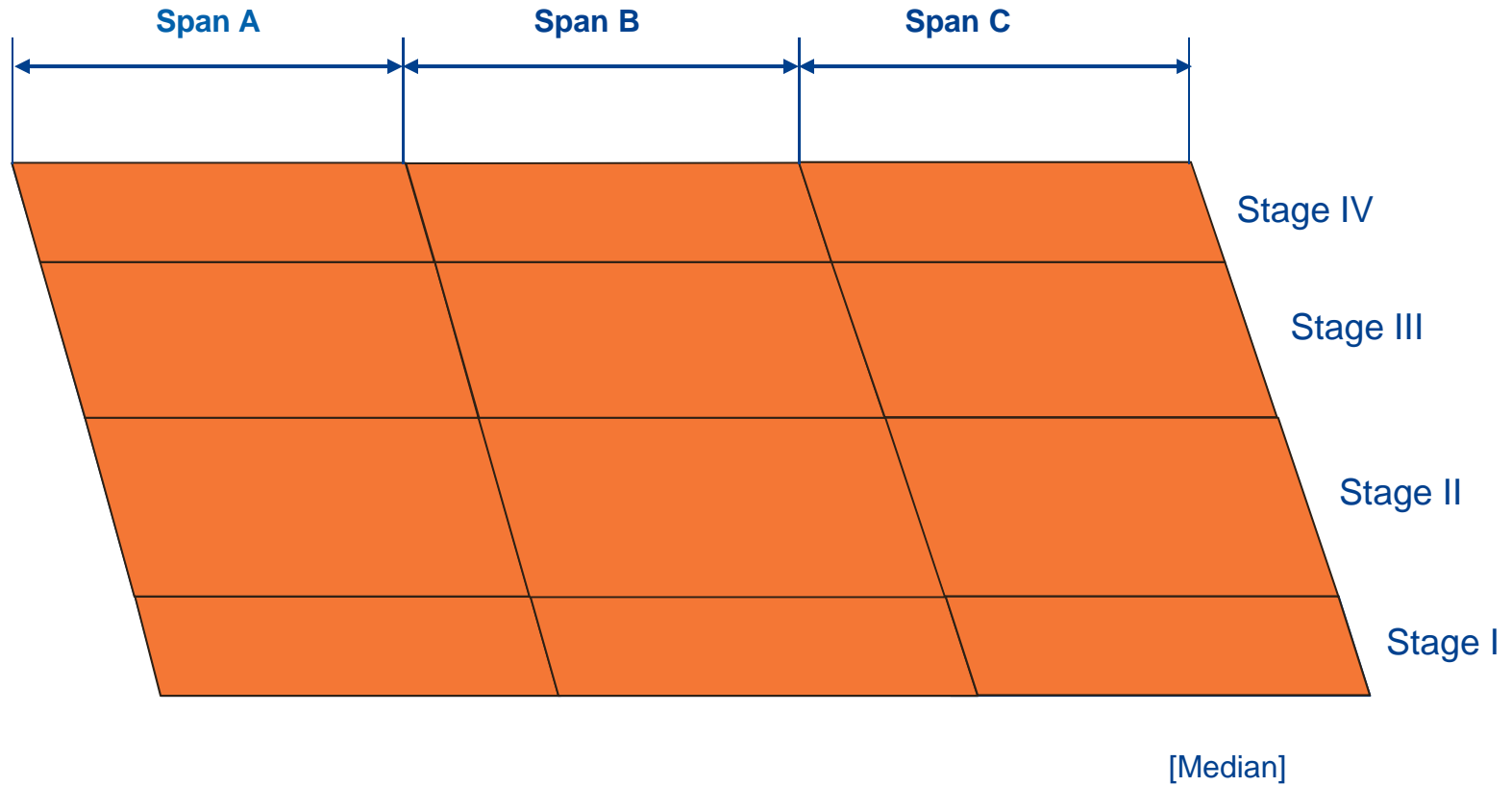


Proposed Modular Structure

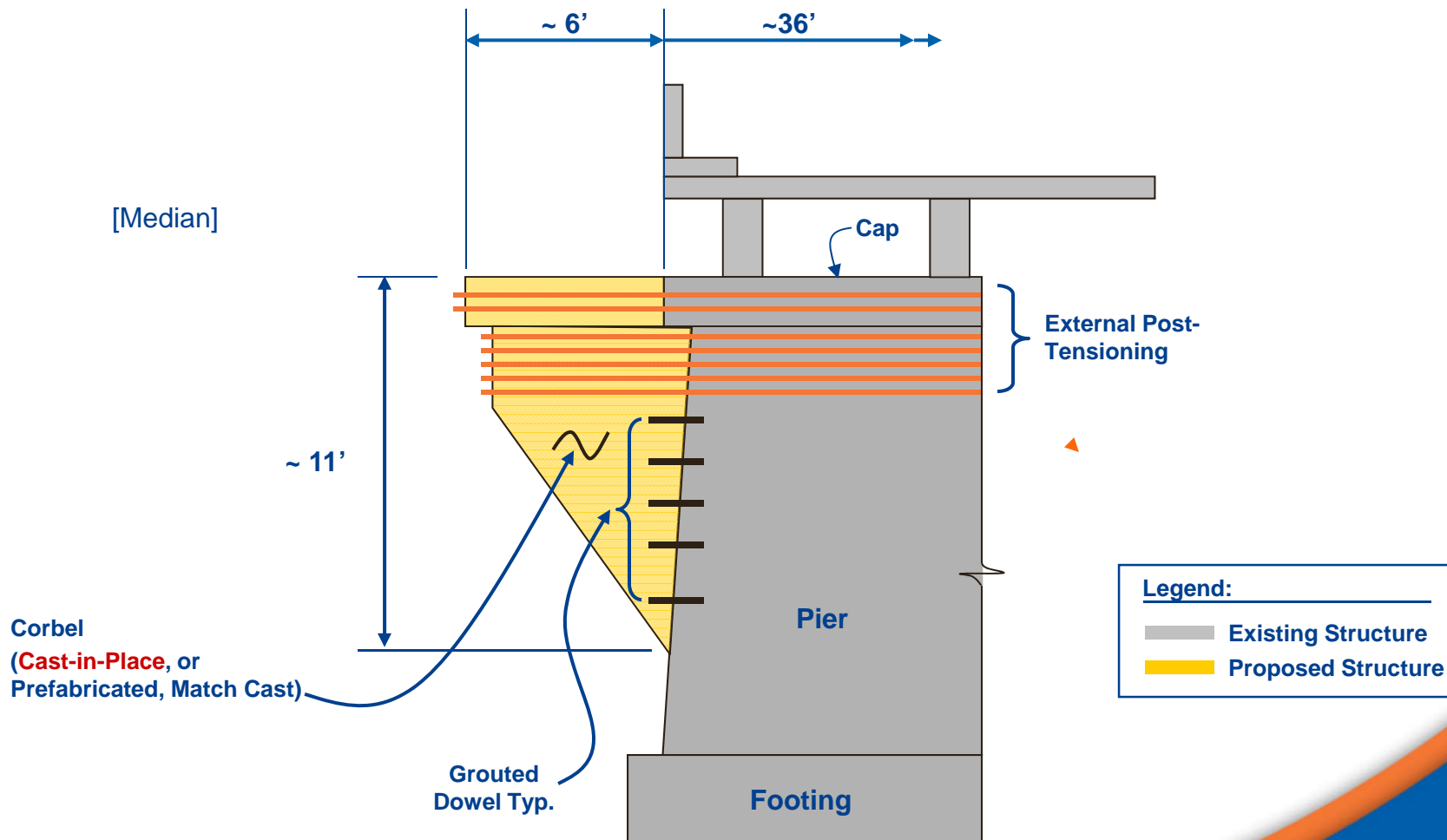
- **Module Configuration:**
 - Each Module Consists of a Prefabricated Conc. Deck on Two Steel Beams
 - Module Width Arrangement in Transverse Section: (7'-10") (8'- 9") (9'- 0") (12'- 11")
 - Module Length = Span Length (~ 44')
 - Max. Module Weight = ~35 tons (~30 tons w/ Lightweight Concrete)
- **Longitudinal Joints between Modules:**
 - Grouted/Waterproofed Keyways
- **Diaphragms between Modules:**
 - Field Installed Steel Diaphragms
- **Deck Parapets:**
 - Plant Cast Concrete
- **Asphalt Overlay:**
 - 3" Thick with Waterproof Membrane



Proposed Sequence of Construction

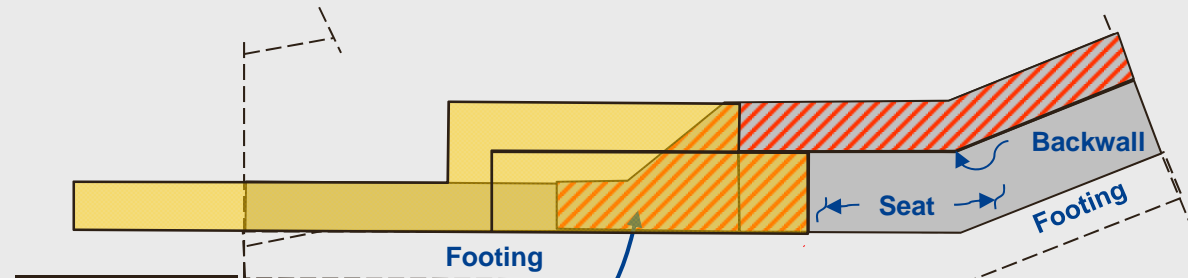


Extending Pier with External PT



Extending Abutment A (Typical)

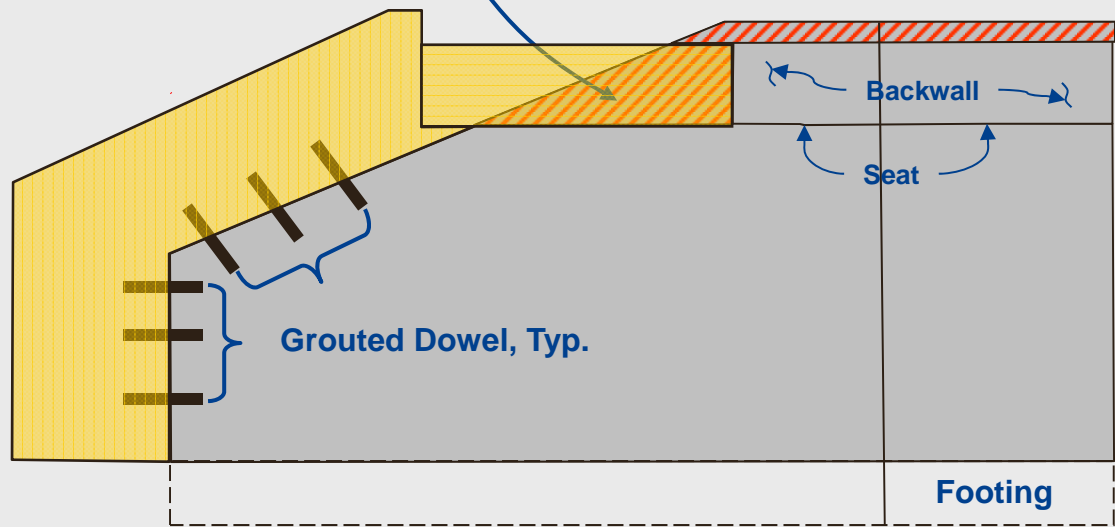
PLAN



Legend:

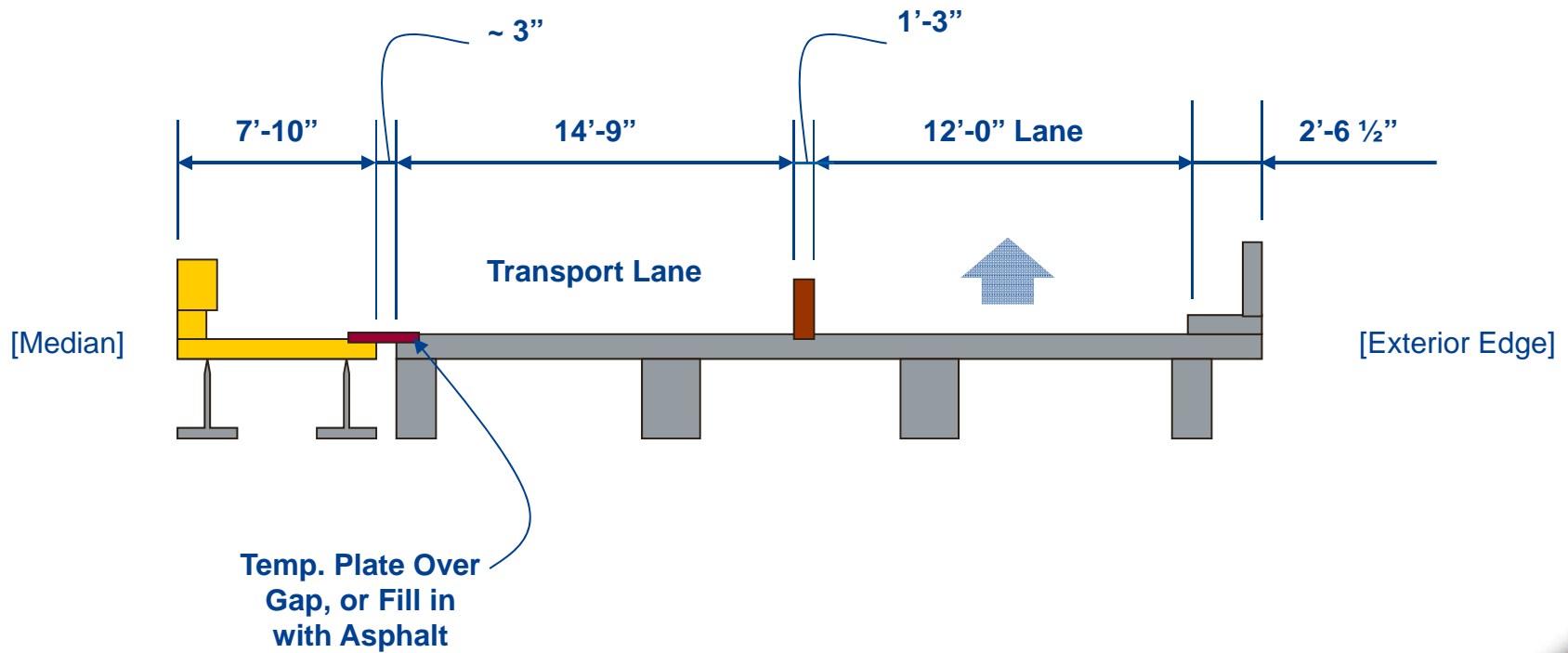
- Existing Structure
- Proposed Structure

ELEVATION



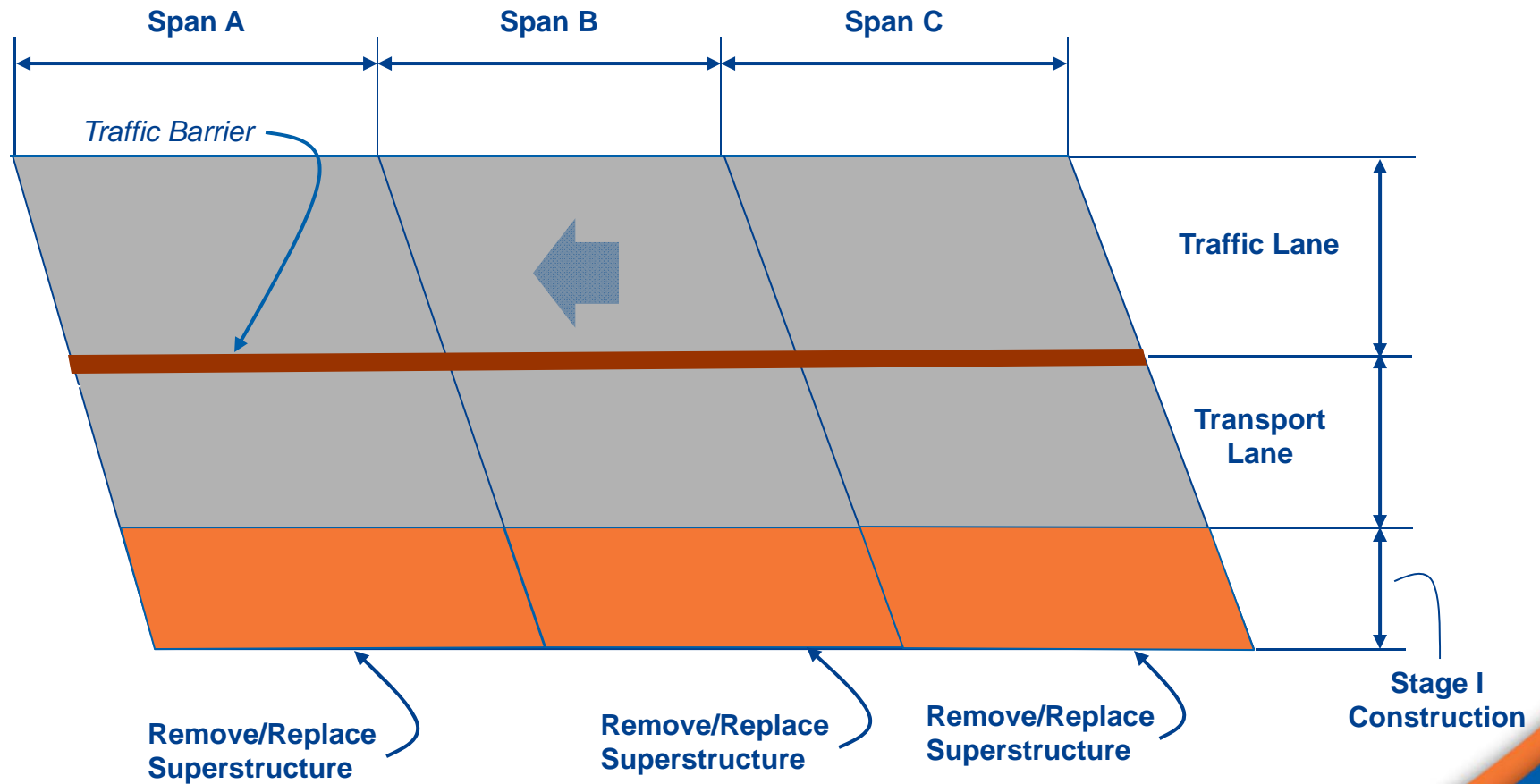
Proposed Construction

Stage I at Night: 9 p.m. to 5 a.m.

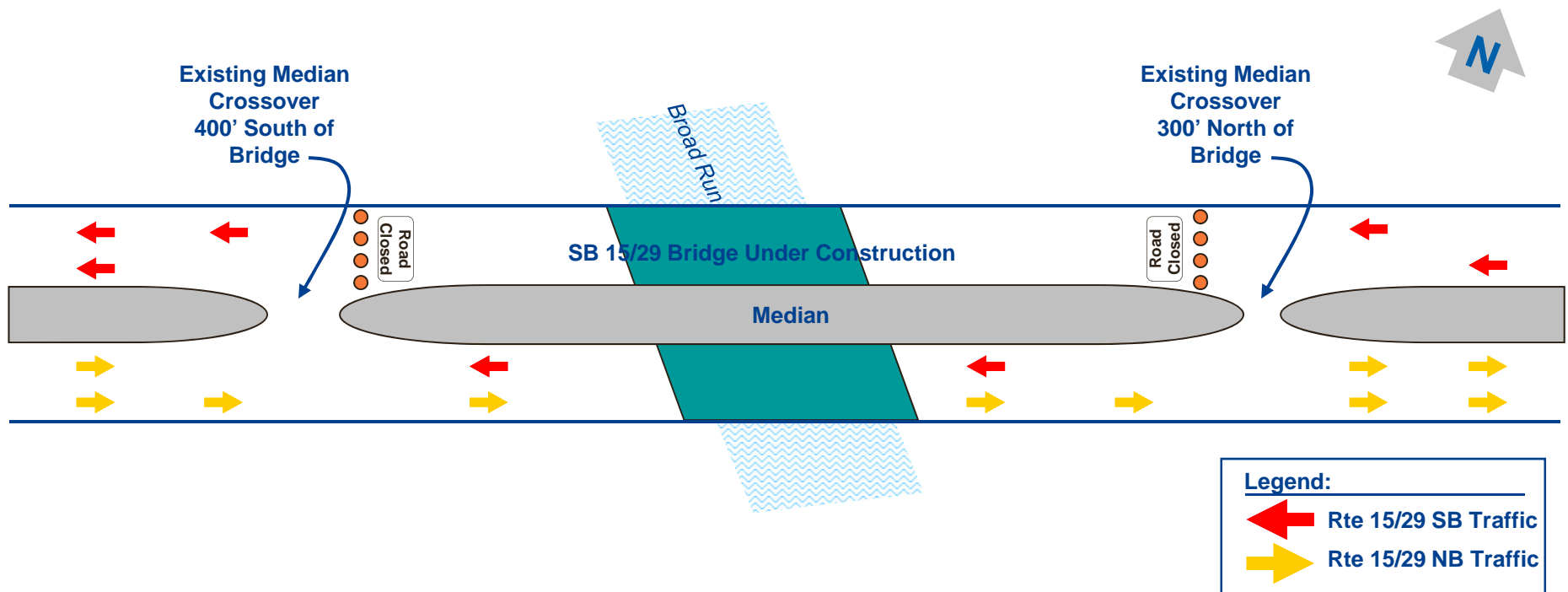


Proposed Construction

Stage I Night



NOTE: Stages III and IV similar

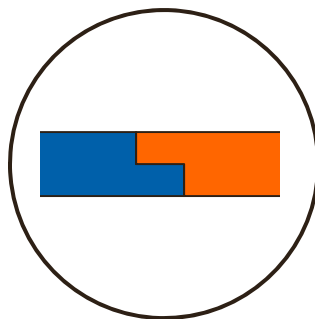
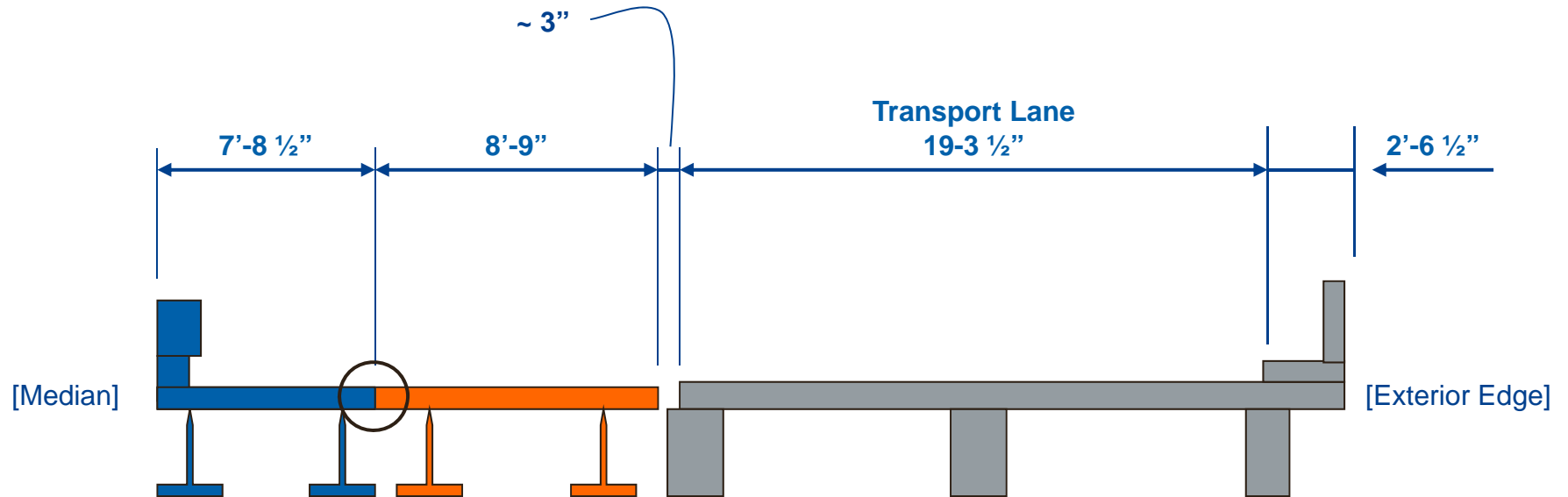


Stage II MOT for Nighttime Construction

1. Close the SB bridge to traffic from 9 p.m. to 5 a.m.
2. Route the SB traffic on NB via the crossover 300' north of the bridge.
3. Route the SB traffic back on SB via the crossover 400' south of the bridge
4. Maintain both lanes of traffic on SB bridge from 5 a.m. to 9 p.m.

Proposed Construction

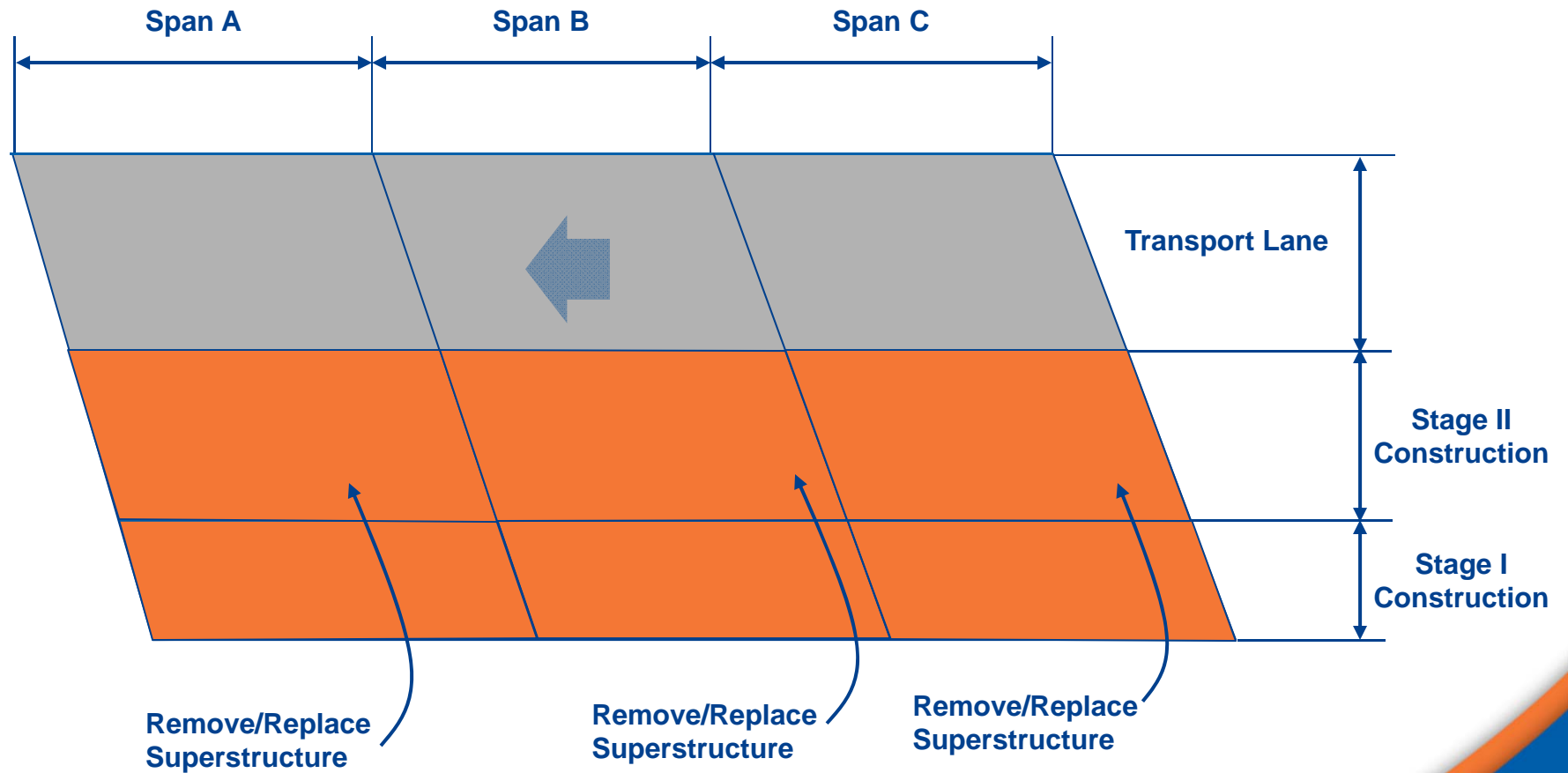
Stage II at Night: 9 p.m. to 5 a.m.



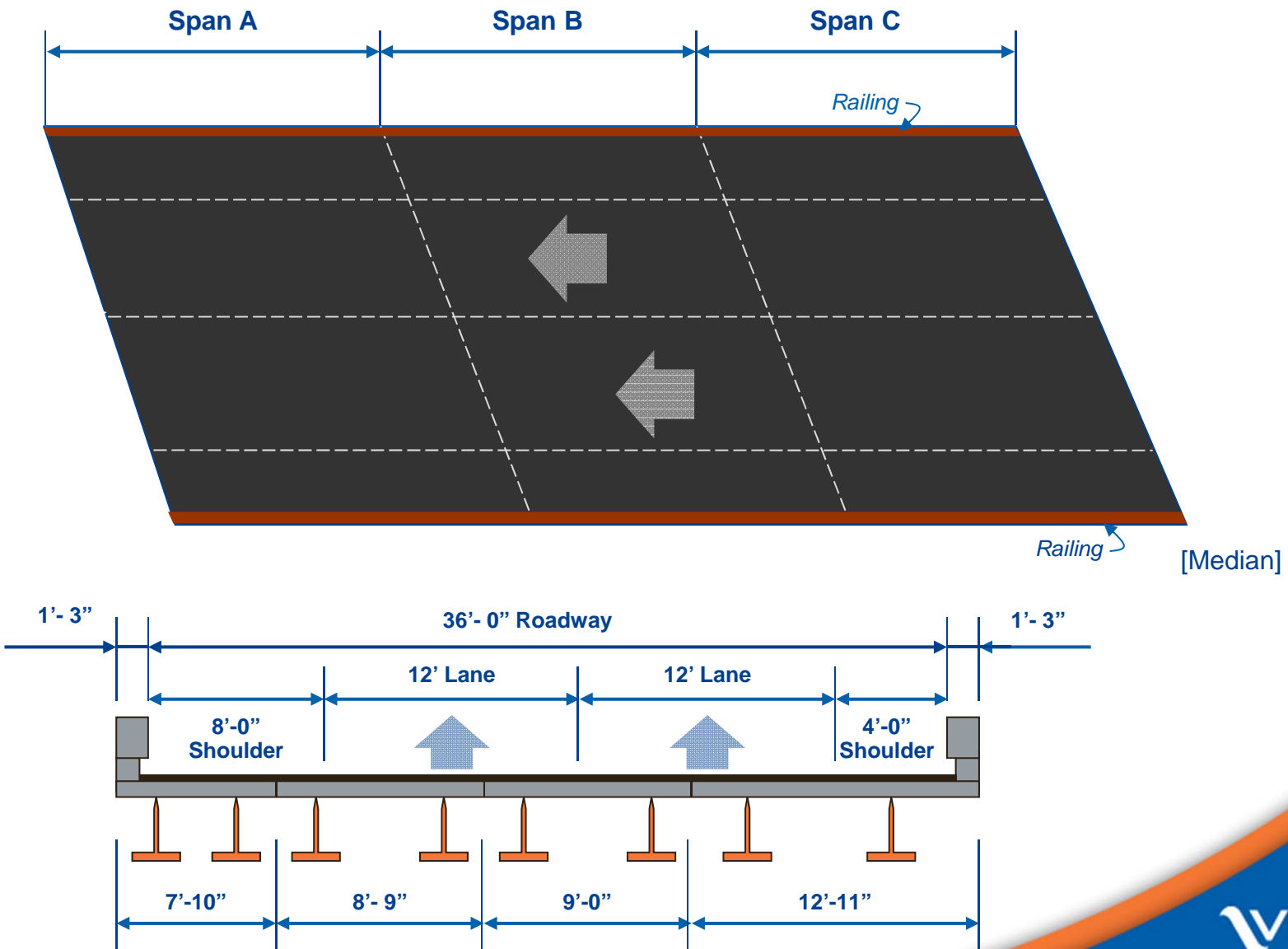
Final Joint Configuration

Proposed Construction

Stage II at Night



Completed Structure



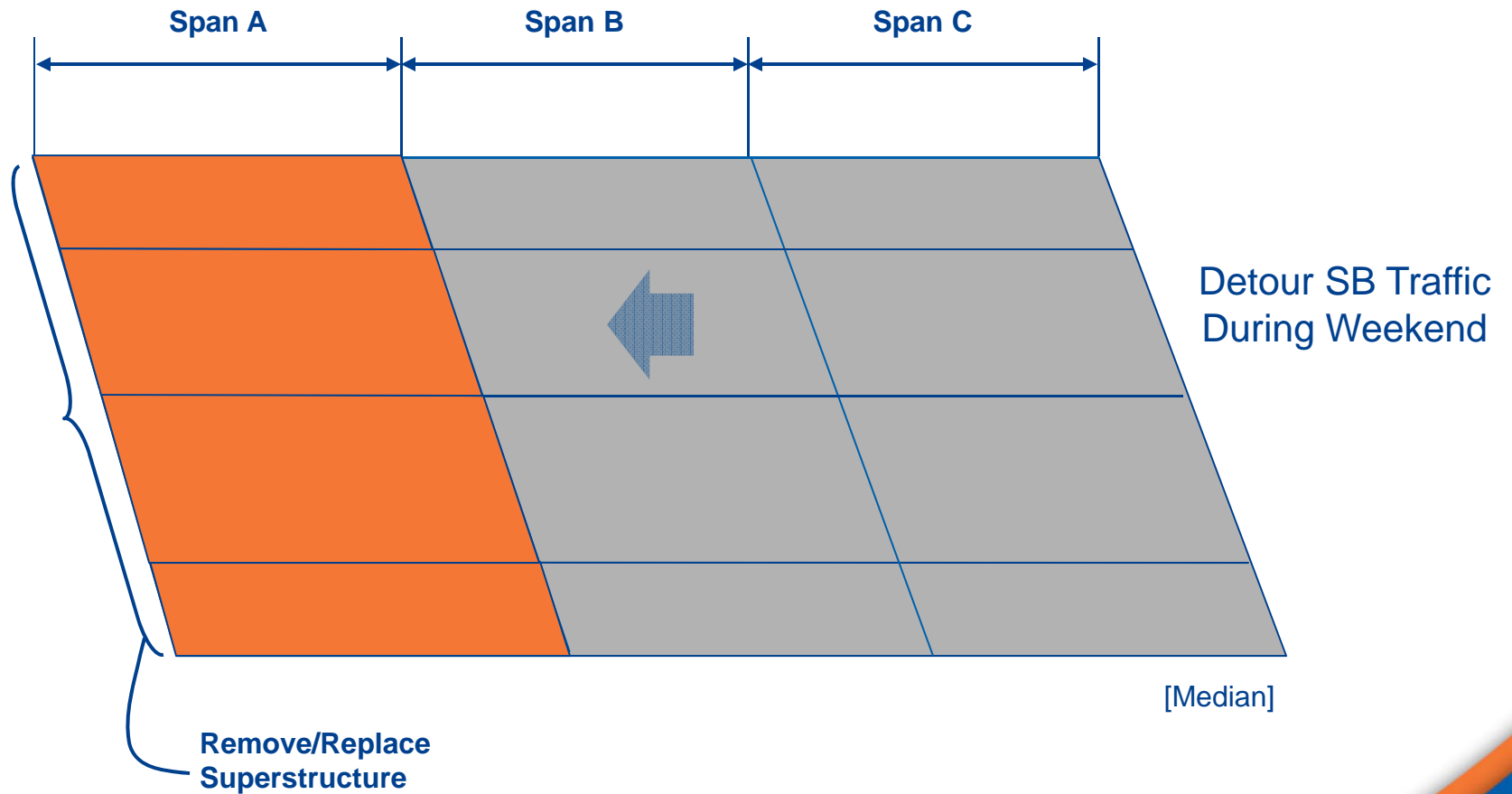


Construction Phase

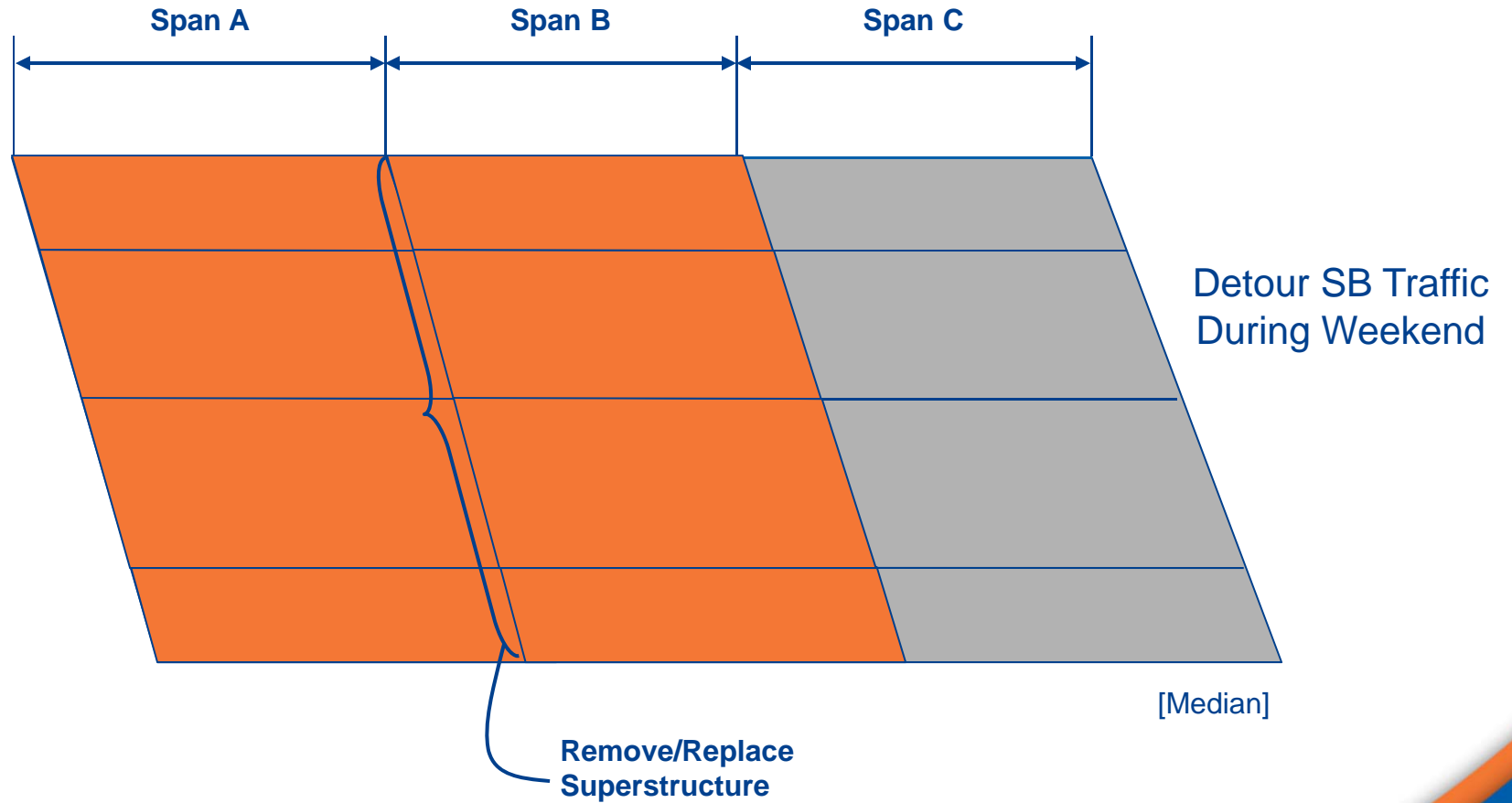
Traffic Impacts Identification and Mitigation – Construction Phase

- **Final TMP**
 - **Use ABC during weekends: Begin Friday Mid-night; End Sunday PM.**
 - **Detour Traffic during ABC**
 - **Designate separate detour for trucks**
 - **Repeat ABC/detour 3 weekends to complete construction**
 - **Provide Complete MOT Plans with traffic signs, VMS, etc.**
 - **Incident Management Plan during construction**

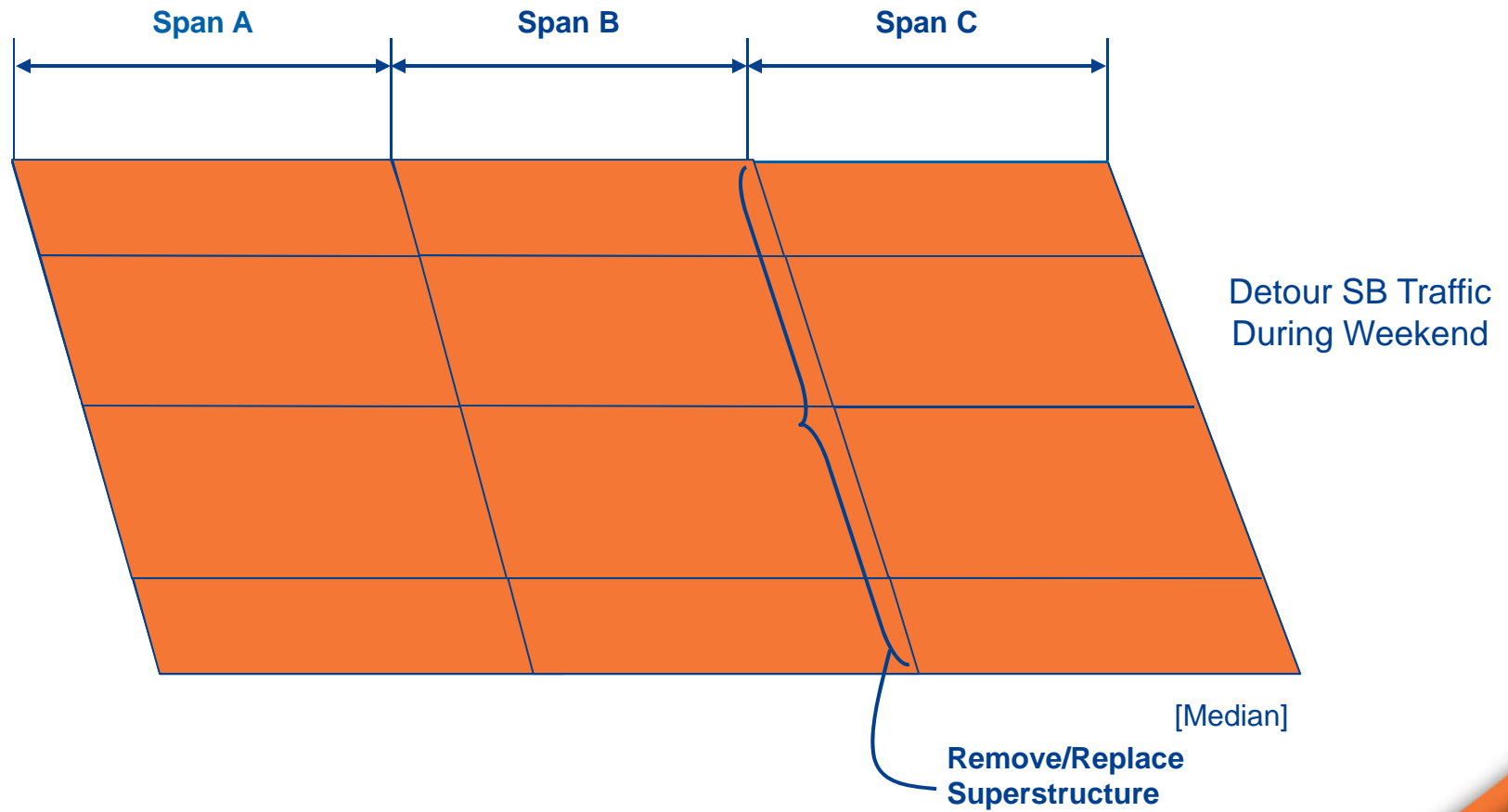
Revised Construction of Span A



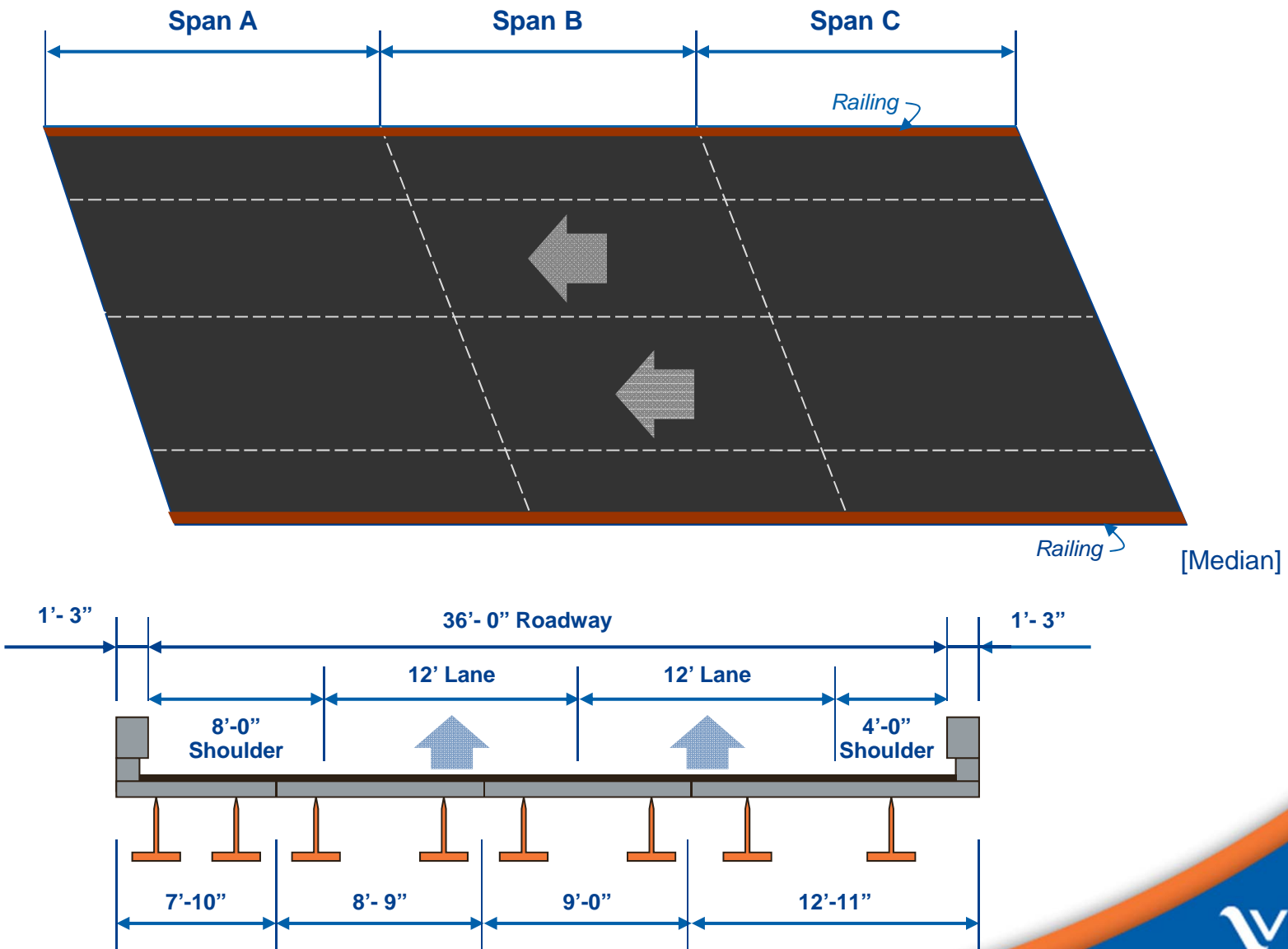
Revised Construction of Span B



Revised Construction of Span C



Completed Structure



Lessons Learned

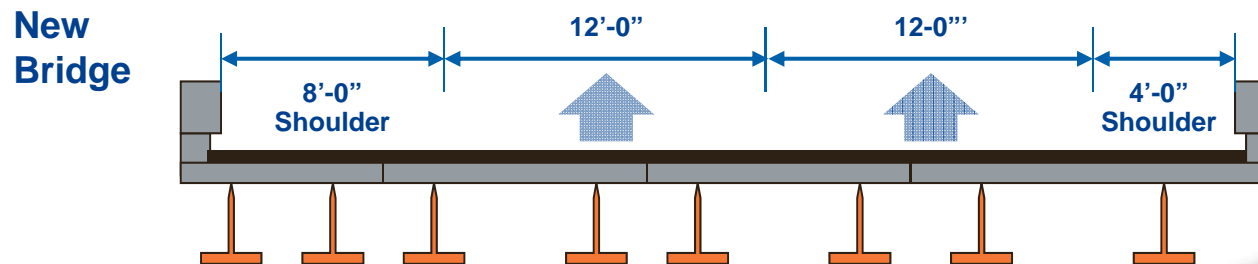
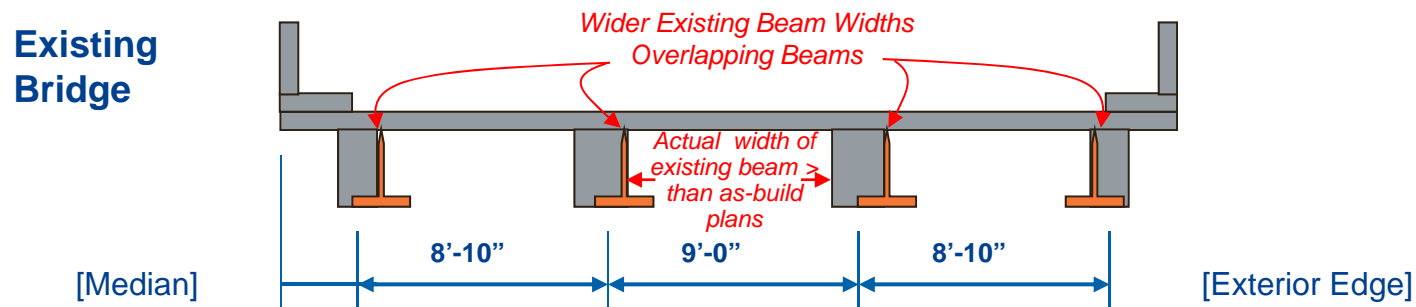
Traffic Management with Accelerated Bridge Construction

- **Achievement of Project Goals**
 - Project was completed with minimum disruption of traffic and inconvenience to public, and full satisfaction of the Buckland community.
 - Superstructure construction reduced from 100 days to 6 days
- **Lessons Learned**
 - Accelerated Bridge Construction is slightly more expensive than the conventional construction, but it could result in significant savings in User cost and eliminate inconvenience during construction
 - Public communication essential to success of the TMP
- **Future Directions on Traffic Operations Management for High Impact Projects**
 - Accelerated Bridge Construction as a valid construction option for projects in congested areas where full traffic capacity during peak hours must be maintained

Lessons Learned

Conflicts With Beams

- Encourage full detailed survey/as-built investigation during Preliminary Engineering Phase.
- Design should use maximum tolerances to allow for field adjustments.
- Designers need to insure all specified materials are readily available (standard typical beam sizes).



Lessons Learned (Continued)

Crane Issues

- Larger crane required
- Limited work area





Placing Asphalt at the Abutment and Sealing Deck Joints



Completed Structure with Asphalt Overlay

