UPDATES OF OFFICE PRACTICE AND STANDARDS OF STRUCTURE AND BRIDGE DIVISION

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Outlines

• An Example of Partnership for Developing Bridge Design Standards
• New Bridge Railings
• Bridge Communication Lines Conduit Systems
• Seismic Design Considerations
• Jacking and Blocking
• Design Considerations of Climate Change and Coastal Storms
Route 744 over Bluestone River in Tazewell County

2018 ACI Commonwealth Award for Excellence in Concrete Construction

Virginia Adjacent Member Connection (VAMC)
Virginia Adjacent Member Connection (VAMC)

Prototype of VAMC:

![Joint 1 and Joint 2 images]

![Diagram showing dimensions: R = 1/2", 1" above]

Virginia Department of Transportation
Virginia Adjacent Member Connection (VAMC)

Test Setup in Virginia Tech:
Virginia Adjacent Member Connection (VAMC)

Plan View of VAMC:

- #4 bar, typ.
- 20 spa. @ 2'-0"
- 6" x 6" x 4" blockout, typ.
- ¼ beam length
- ½ beam length
- ¼ beam length
- 12"
- 4½" min. lap with #4 bars
- #4 @ 2'-0"
- VAMC typ.
- #5 bar
- 12"
Virginia Adjacent Member Connection (VAMC)

Cross-Sections of VAMC:

Fill with Very High Performance Concrete (VHPC)

R = 2''
New Bridge Railings

Single Slope Parapet, Single Slope Median Barrier and Midwest Guardrail System Bridge Railing

Virginia Department of Transportation
Bridge Communication Lines Conduit Systems

- 10 new standards (BCLC series), 5 for steel, 5 for prestressed
- 3 of each for new bridges, 2 of each for existing bridges, further broken down by abutment types
The chapter is new…but it does not impose any new requirements!

- Seismic design is required in Virginia
- Seismic design may include seismic analysis, seismic detailing, seat length check, and connection design
- A seismic analysis is only needed for multi-span bridges in seismic zone 2 or greater
Jacking and Blocking – Chapter 28

For the bridges that meet the following criteria, the plan set will need to include plans for jacking and blocking:

- Criteria: ADT >= 2,000 and span length >= 125’ for steel, 100’ for concrete
- Regardless of criteria, DBE can always decide to include or not

Some sample details are provided. Designers can use these as a starting point – every situation is different.
Jacking and Blocking – Chapter 28

Steel girder example:

- Clip beam ends
- 7/8" shear studs @ 12"
- Conc. deck to bear directly over beam
- 3" x 1/4" stiffener for jacking, each side
- 1" typ.
- W 24 x 76
- HP 10 x 57 jacking columns
- Top of seat
- 1/4" @ H.S. bolt with washer and nut, typ.
- 2'-0" 3'-2" 2'-0"
Jacking and Blocking – Chapter 28

Concrete Beam Example:
Miscellaneous Updates

• Chapter 23 – Piles
  • Use of H-Piles in Corrosive Environment

• Chapter 26 – Environmental Permit Sketches
• New Terminal Wall Standards for Some Bridge Railings
Structure and Bridge Division identified the following four factors that may affect bridges:

- Temperature Change
- Salinity
- Rainfall Intensity
- Sea Level Rise (SLR)
Design Considerations of Climate Change and Coastal Storms

Salinity:

Climate change -> SLR -> Intrusion of salty and brackish water toward to inland

Borderline for use of corrosion resistant strands in concrete piles
Design Considerations of Climate Change and Coastal Storms

Rainfall Intensity and Discharge:

- Deck drainage – the design storm intensity values shall be increased by 20%
- Scour – the 200 year flood event shall be used for scour analysis
- Stream pressure – the design velocity of water shall be based on the 200 year flood event
- Buoyancy – the 200 year flood event for calculation of buoyancy

Note: The 200 year flood event approximately corresponds to a 25% increase in discharge over the present-day 100 year flood event.
Design Considerations of Climate Change and Coastal Storms

Sea Level Rise (SLR):

• Executive Order 24 – water levels in the Hampton Roads region are now 18” higher than they were a century ago
• Executive Order 45 – use NOAA Intermediate-high scenario curve
Design Considerations of Climate Change and Coastal Storms

NOAA

Sea Level Rise Viewer:
Design Considerations of Climate Change and Coastal Storms

Sea Level Rise (SLR) would affect:

- Layout and profile of bridges
- Structural design of bridges (e.g. buoyancy, stream pressure, vessel collision, wave force)
# Design Considerations of Climate Change and Coastal Storms

## Flexibilities of Design:

<table>
<thead>
<tr>
<th>Factors</th>
<th>Towards using future MHT considering 4 feet of SLR</th>
<th>Towards adjusting future MHT</th>
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<tr>
<td>1 Redundant route(s)</td>
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<tr>
<td>10 Navigable routes</td>
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<tr>
<td>11 Project type</td>
<td>New construction</td>
<td>Maintenance</td>
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Design Considerations of Climate Change and Coastal Storms

Sea Level Rise (SLR):

Planned Modification
Design Considerations of Climate Change and Coastal Storms – Chapter 33

Design for Coastal Storms:

Guide Specifications for Bridges Vulnerable to Coastal Storms
Design Considerations of Climate Change and Coastal Storms

Areas Potentially Affected by:

- Salinity
- SLR
- Coastal Storms
Questions?

Contact Information

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