



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

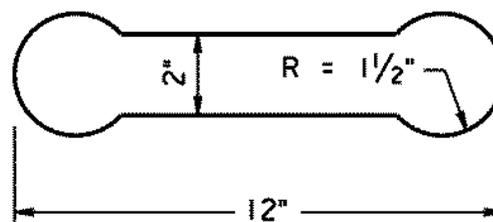
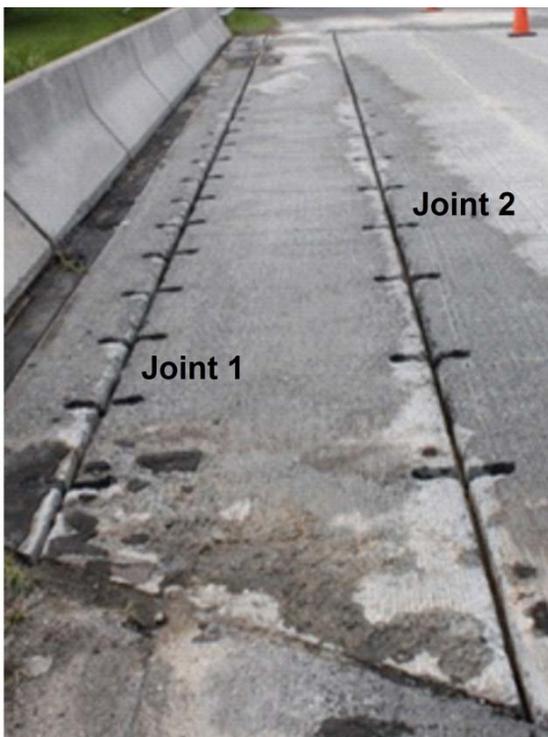
2018 ACI Commonwealth Award
for Excellence in Concrete Construction



Virginia Adjacent
Member Connection
(VAMC)

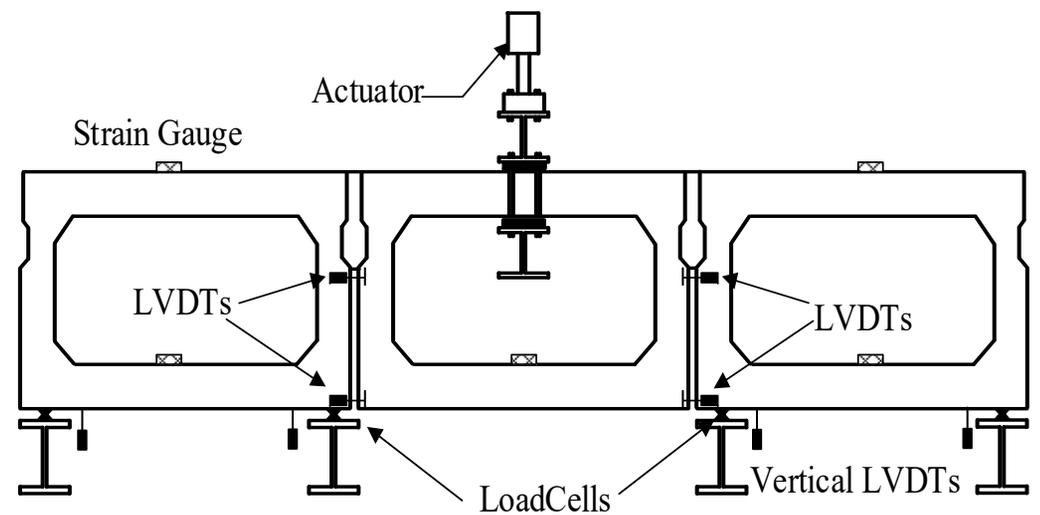
Virginia Adjacent Member Connection (VAMC)

Prototype of VAMC:



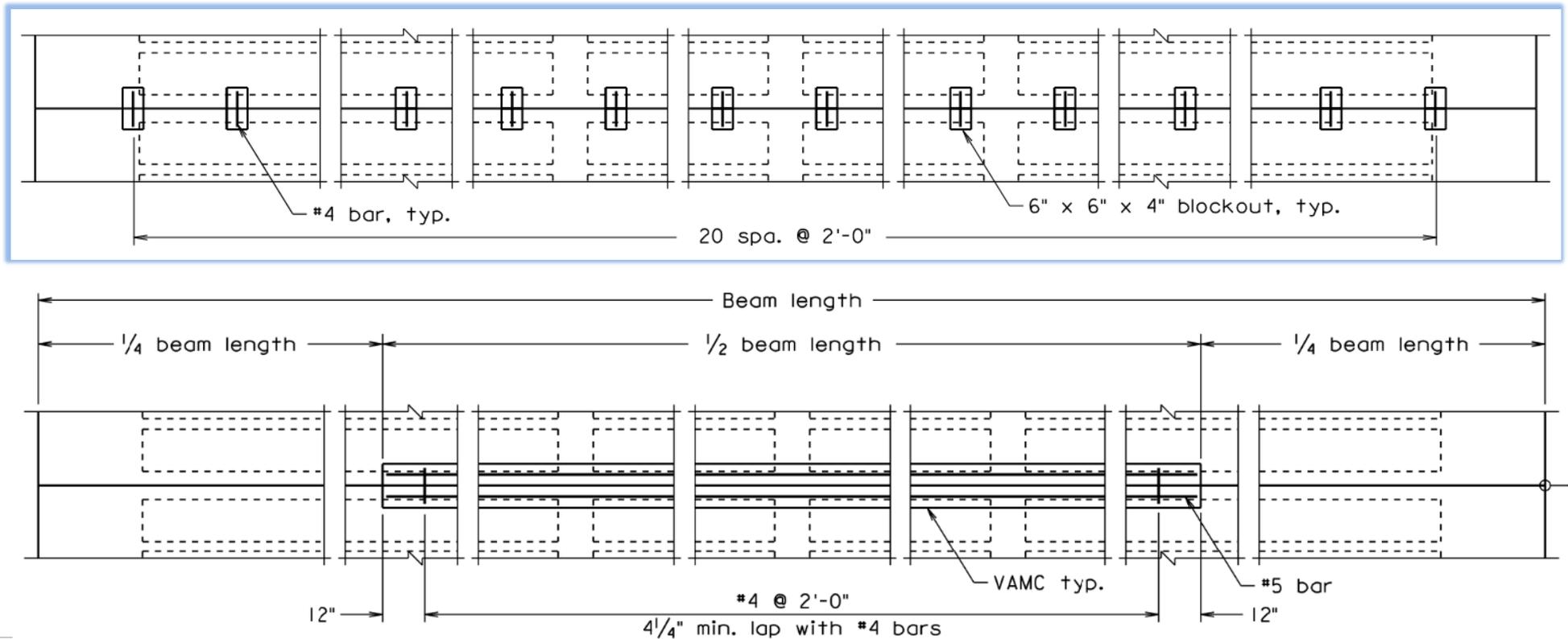
Virginia Adjacent Member Connection (VAMC)

Test Setup in Virginia Tech:



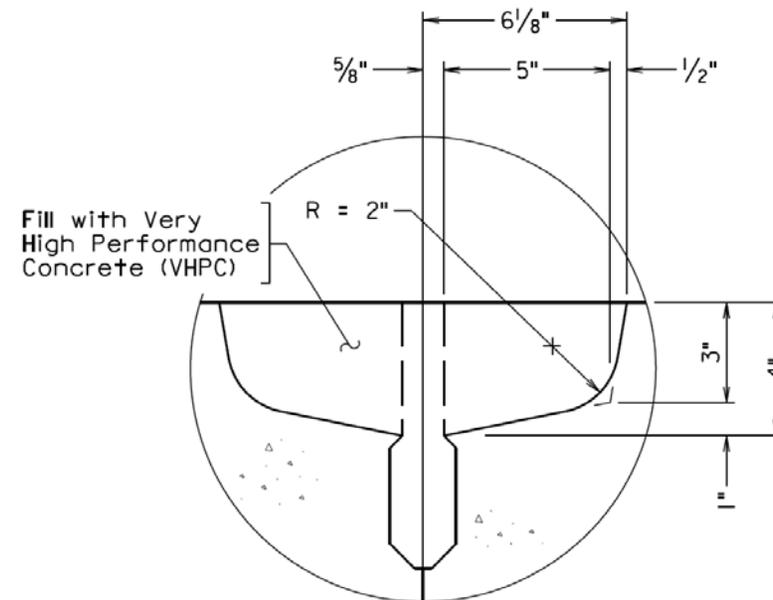
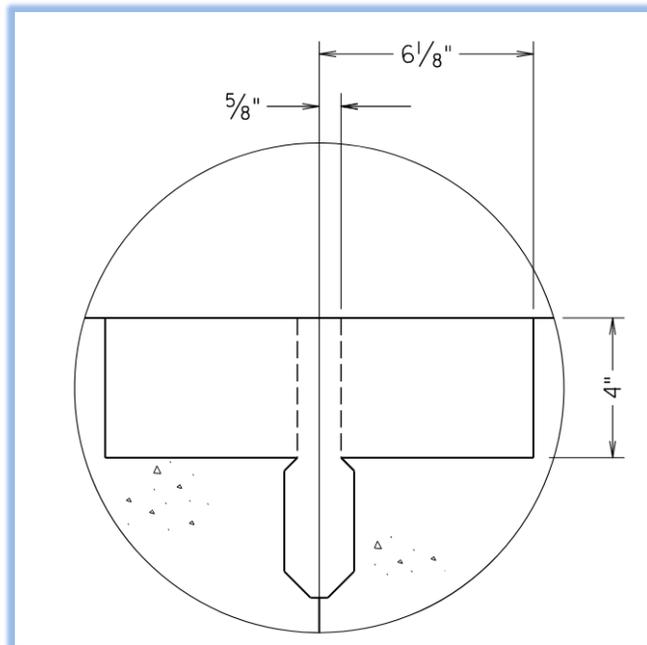
Virginia Adjacent Member Connection (VAMC)

Plan View of VAMC:



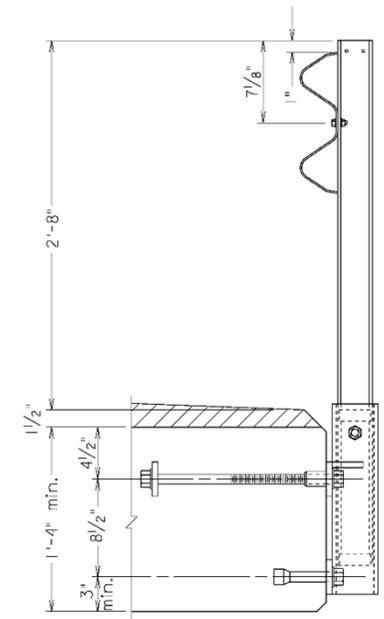
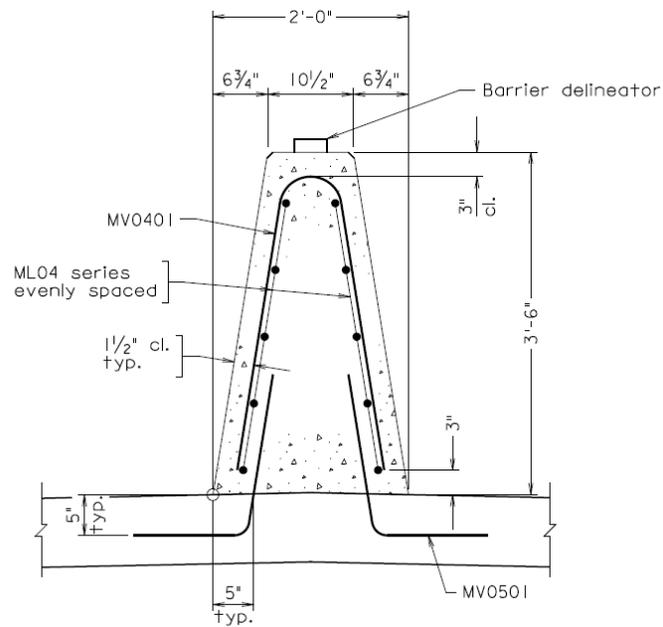
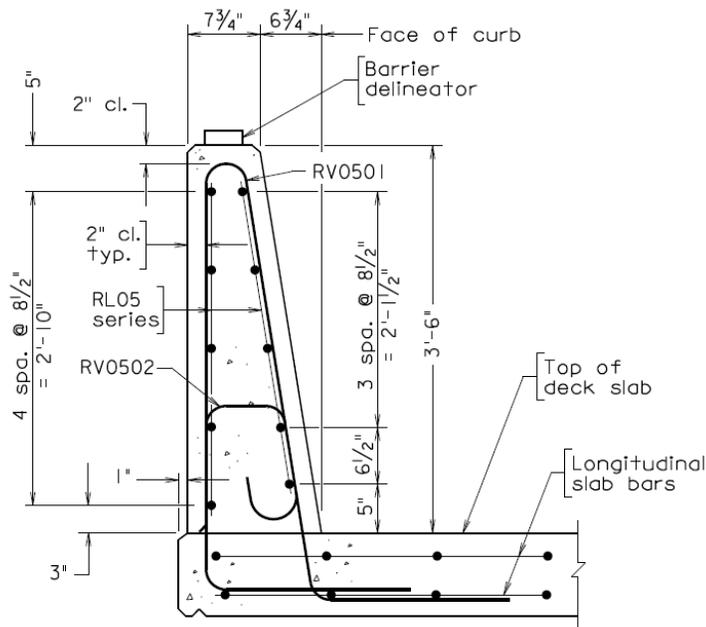
Virginia Adjacent Member Connection (VAMC)

Cross-Sections of VAMC:



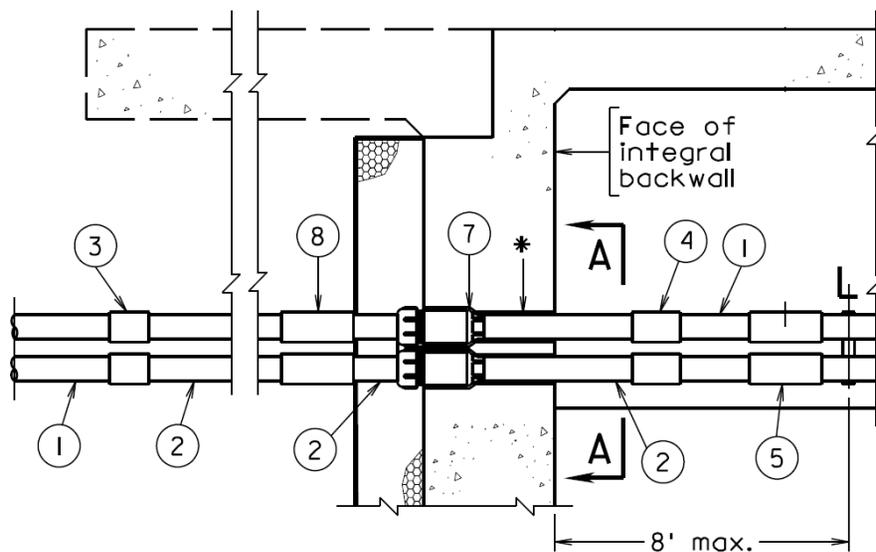
New Bridge Railings

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



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



Seismic Design Considerations – Chapter 24

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

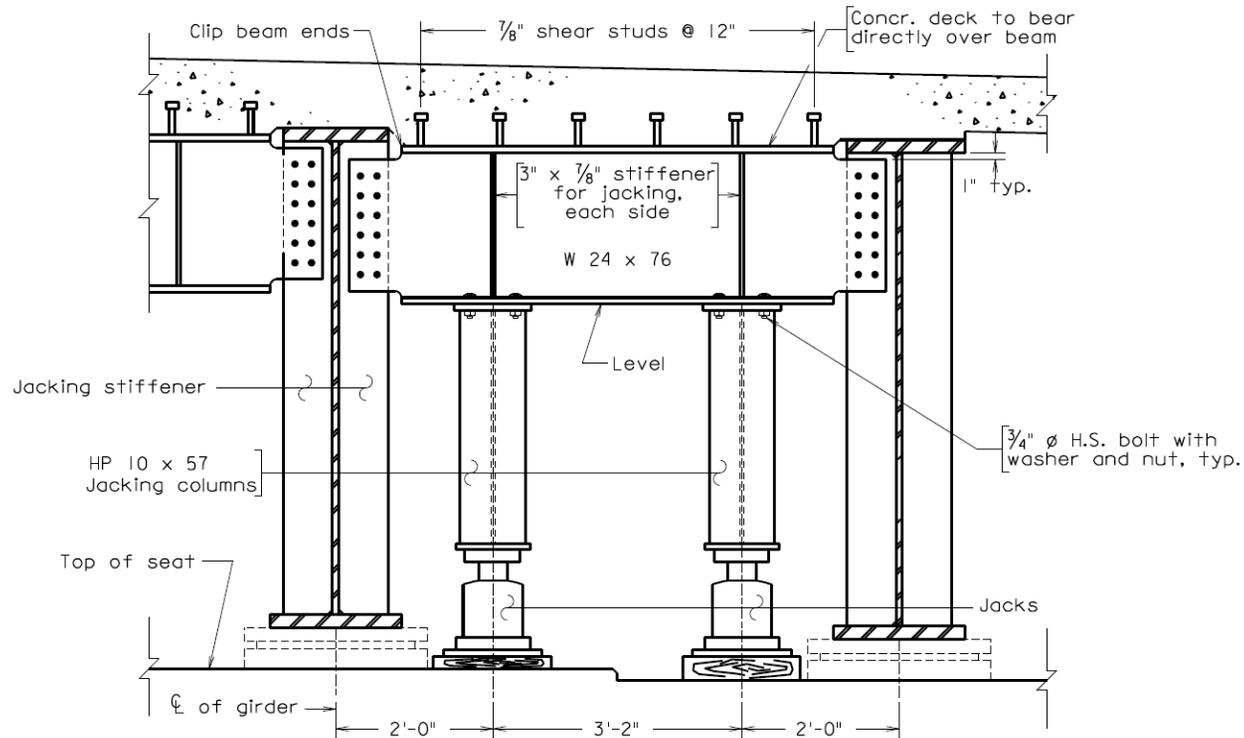
For the bridges that meet the following criteria, the plan set will need to include plans for jacking and blocking:

- **Criteria: ADT \geq 2,000 and span length \geq 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.

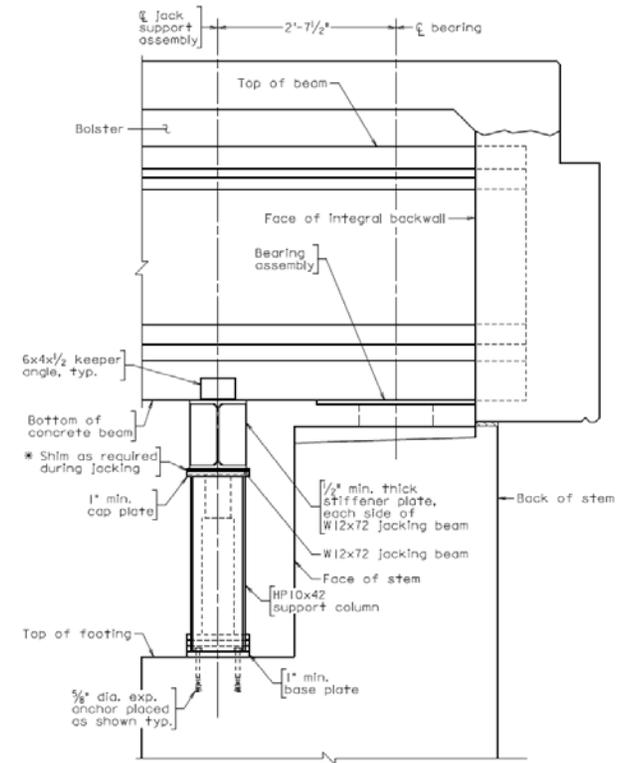
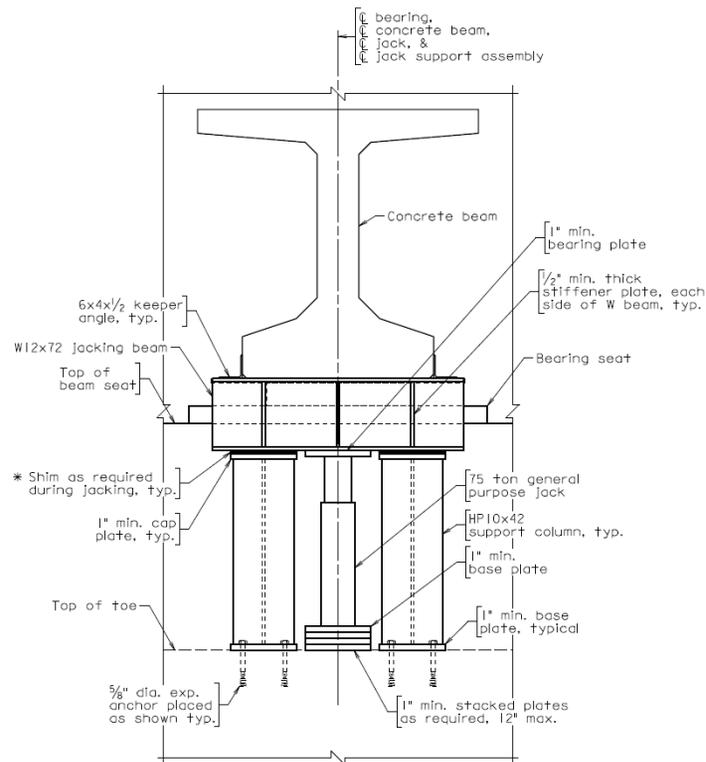
Jacking and Blocking – Chapter 28

Steel girder example:



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**

Design Considerations of Climate Change and Coastal Storms – Chapter 33

Structure and Bridge Division identified the following four factors that may affect bridges:

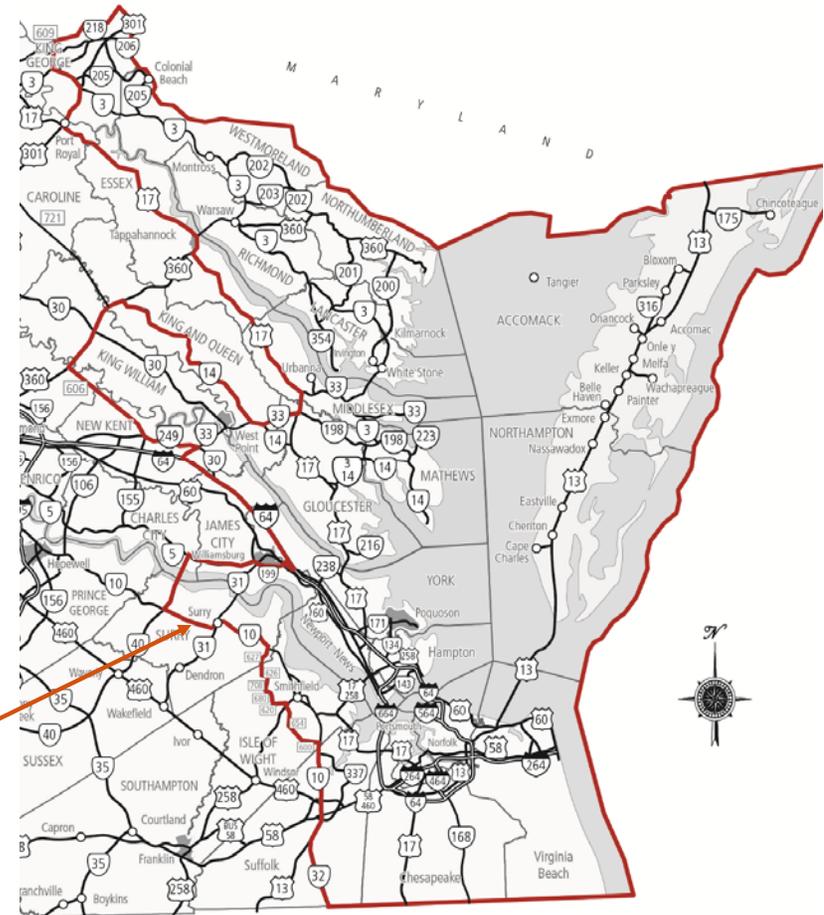
- **Temperature Change**
- **Salinity**
- **Rainfall Intensity**
- **Sea Level Rise (SLR)**

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:

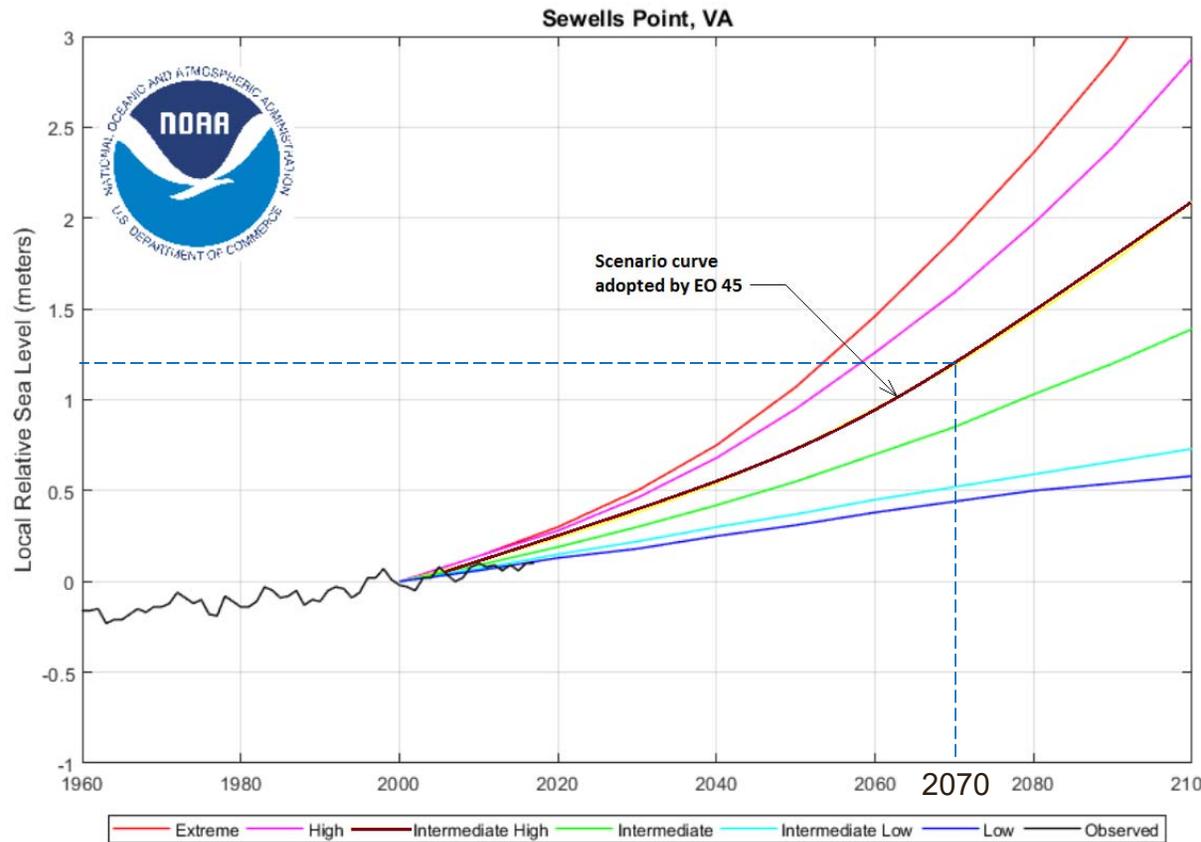
- Deck drainage – the design storm intensity values shall be increased by 20%
- Scour – the 200 year flood event shall be used for scour analysis
- Stream pressure – the design velocity of water shall be based on the 200 year flood event
- Buoyancy – the 200 year flood event for calculation of buoyancy

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

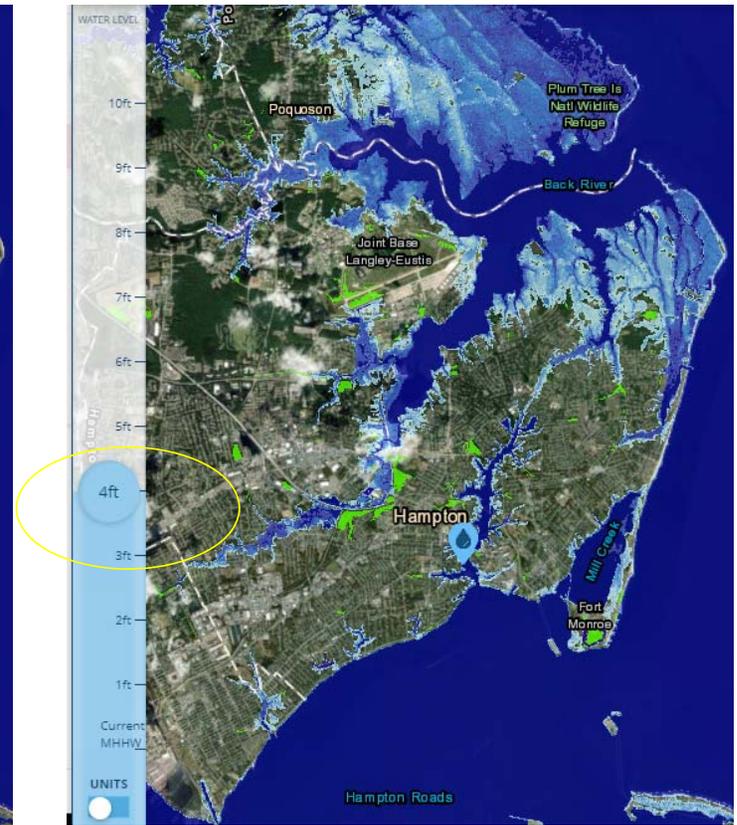
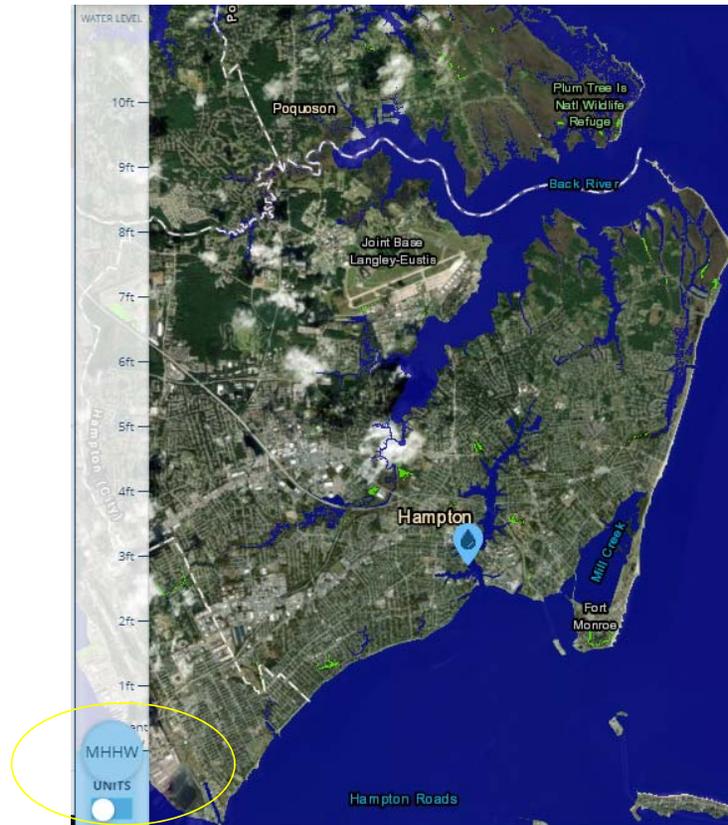
Sea Level Rise (SLR):

- 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)

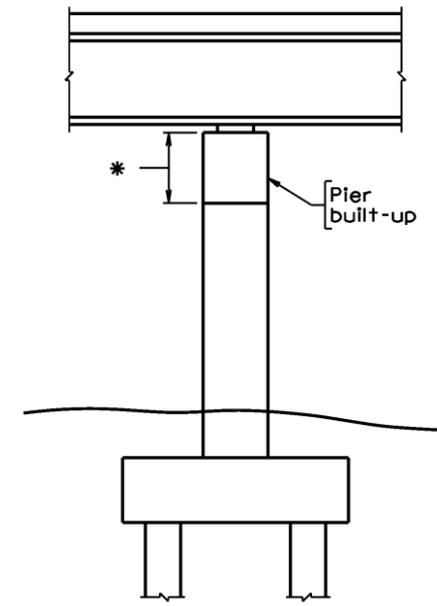
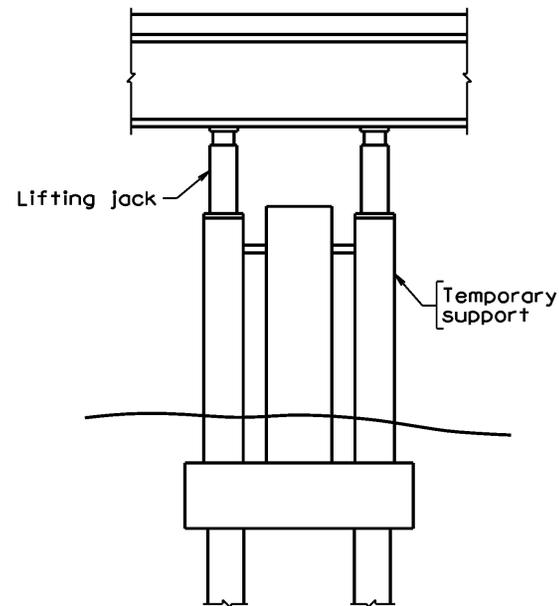
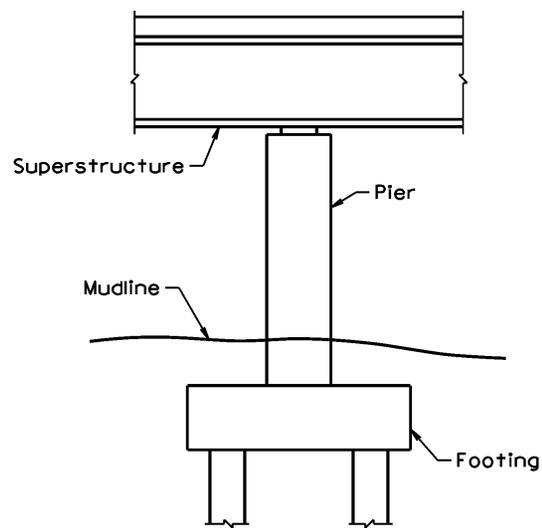
Design Considerations of Climate Change and Coastal Storms

Flexibilities of Design:

	Factors	Towards using future MHT considering 4 feet of SLR		Towards adjusting future MHT
1	Redundant route(s)	No		Yes
10	Navigable routes	Yes		No
11	Project type	New construction		Maintenance

Design Considerations of Climate Change and Coastal Storms

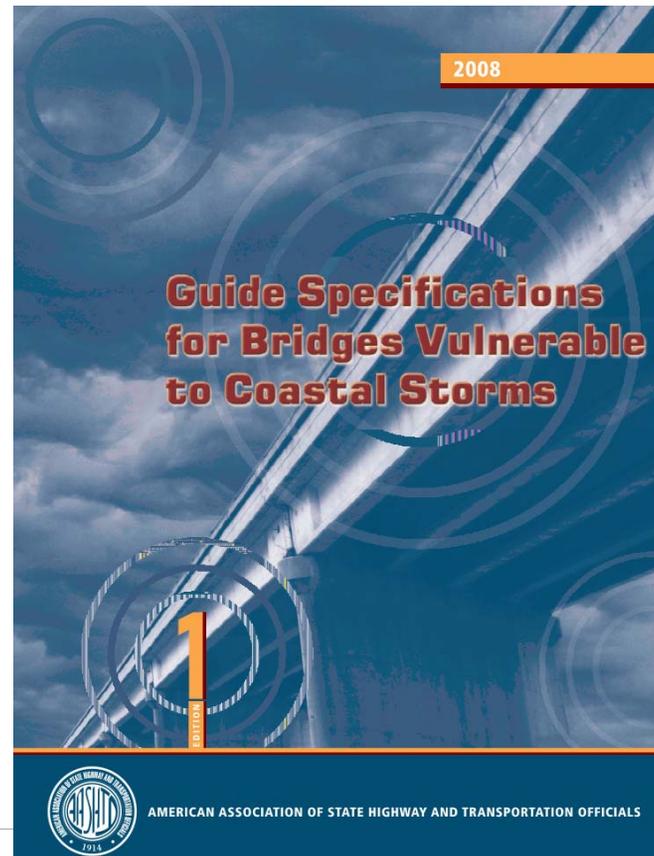
Sea Level Rise (SLR):



Planned Modification

Design Considerations of Climate Change and Coastal Storms – Chapter 33

Design for Coastal Storms:



Design Considerations of Climate Change and Coastal Storms

Areas Potentially Affected by:

- Salinity
- SLR
- Coastal Storms



Questions?

Contact Information

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