2016 PTI Convention
Long Beach, California

Technical Session #3
PT Bridge II
Project Updates on the St. Croix and Lesner Segmental Bridge Projects

Carlos Perez/ Ed Underhill
Freyssinet Inc.
Presentation Goals

• Construction update of the St Croix River Crossing in Stillwater, MN

• Construction update of the Lesner Bridge replacement in Virginia Beach, VA
St. Croix River Crossing

- Connecting Stillwater, MN and St Joseph, WI
The Old Bridge

- 1930 Stillwater lift bridge
- Heavy traffic >18,000 AADT
- Environmentally protected area
- Historic area
- Different alternatives since 1995
- Aggressive construction schedule
St Croix River Crossing

5,200 ft long
4 x 600 ft extradosed spans
Typ 100 ft wide
Min 60 ft navigational clearance
Towers 70 ft height over deck
« Organic » design

Owner: MnDOT & WisDOT
Design: HDR / Buckland & Taylor
Consulting Engineer: Parsons Transportation Group/ International Bridge Technologies
Main Contractor: Lunda Ames J.V.
Engineering firms: McNary Bergereon / Corven Engineering
PT Supplier: Freyssinet, Inc
## Project Schedule

### St. Croix Crossing Project Schedule

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Design</td>
<td></td>
<td></td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
<td>Q1</td>
</tr>
<tr>
<td>Early Fnd Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pile Load Test contract</td>
<td></td>
<td></td>
<td>Q3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Fnd Contract</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superstructure Contract</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Q1: First Quarter
- Q2: Second Quarter
- Q3: Third Quarter
- Q4: Fourth Quarter
5 Structures: 3 PC Segmental Bridges, 2 CIP on FW Bridges

- On-site casting yard
- About 330 pre-cast segments get trucked from the on-site casting yard to these bridge areas.
- Cast-in-place
- About 650 pre-cast segments get barged to the river bridge from Grey Cloud Island casting yard in Cottage Grove.
Wide Range of Post-tensioning

- 11.4 million ft strand (3,800 Ton)
- 35,000 ft PT bars 1 3/8” and 1 ¾”
- 16,000 Anchorages: 4, 7, 12, 19, 27, 31, 55 strands. Each anchor delivered Galvanized or Epoxy-Coated
- External PT with diabolos
- Anchorages galvanized/epoxy coated
- PP duct and grout accessories as per MNDOT (FDOT) specs.
Typical Approach Segment
Multi-cell Sections

BR. 82045 (WB) - WEST ABUTMENT TO PIER 1W
TH 36 WB STA. 454+80 ± TO 456+75.32

BR. 82045 (EB) - WEST ABUTMENT TO PIER 1E
TH 36 EB STA. 456+66 ± TO 456+60.66
On-site Casting Yard

338 segments total
- 3 casting beds
- 80 to 90 tons each seg.
Grey Cloud Casting Yard

- 650 segments total
- 5 casting beds
- 140 to 180 Tons each
- Indoors, Year-round operations
- Segments hauled by barge
Transverse PT in Deck
Transverse PT in Pier Segments
Longitudinal PT
External Post Tensioning
External PT
Deviators and Injection Point Finishing
Diabolo Extensions
Main Bridge

- Single structural unit over river
- Avoid in-span joints (maintenance concerns)
- Avoid sliding deck at end extradosed piers
- Complex knuckle design at crossbeam
Stay Anchor Segment
Transverse External PT
Erection Using Segment Lifters
Closure Pour Between EB & WB Segments w/ PC Transverse Strut
Stay Cable Erection and Stressing
Stay Cable Erection
Extremely Congested Area
Required Specific Detailing and Coordination to Manage Interferences
Cross Beam
Freyssinet 55C15 Anchorage

(01) FREYSSINET 55C15 TRUMPLATE

(02) FREYSSINET 55C15 ANCHOR BLOCK
Cross Beam
20 - 52 x 0.6” Strand Tendons
Installation of 55-Strand Tendons
Cross Beam PT Bars
Cross Beam PT Bars
Acknowledgements

Engineers and Contractors
- HDR
- Buckland & Taylor
- HNTB
- Parsons
- IBT
- Parsons Brinkerhoff
- Kraemer North America
- Lunda / Ames Joint Venture
- McNary Bergeron
- Corven Engineering
- Figg

Material Suppliers
- Freyssinet
- VSL
- GTI
- EFCO
- Mageba
- Sika
- Eulcid
- Southern Forms
- Watson Bowman
- Williams Form Eng

Pictures Courtesy of MNDOT/WIDOT / Lunda Ames JV
Project Information

**Project Website**
[www.mndot.gov/stcroixcrossing/](http://www.mndot.gov/stcroixcrossing/)

**E-mail**
[stcroixcrossing.dot@state.mn.us](mailto:stcroixcrossing.dot@state.mn.us)

**Facebook**
[www.facebook.com/saintcroixcrossingmndot](http://www.facebook.com/saintcroixcrossingmndot)

**Twitter**
[@stcroixcrossing](https://twitter.com/stcroixcrossing)
Lesner Bridge Replacement

City of Virginia Beach, VA
Lynnhaven Inlet
Lesner Bridge Replacement

1,575 ft long
4 x 150 ft + 225 ft + 4 x 150 ft
2 bridges 53’ 8’ wide

Owner: City of Virginia Beach (co-founding VDOT FHWA)
Design: FIGG
Consulting Engineer: Parsons Transportation Group/International Bridge Technologies
Main Contractor: McLean Contracting Company.
Construction Engineering firms: McNary Bergeron, RS&H & FIGG
Segment precast: Atlantic Metrocast
PT Supplier: Freyssinet, Inc

Pictures courtesy of McLean Contracting Company
City of Virginia Beach
Existing John A. Lesner Bridge

From 1957 (EB) and 1958 (WB)
Structurally Deficient
General Arrangement
Typical External PT Arrangement

Embedded Anchorage Components  Galvanized

- Transverse PT: 4F15
- External PT: 27C15 and 19 C15
- Cantilever Top Slab PT: 19C15
Grout Mock Up Test at the Beach
Overhead Gantry
Typical Precast Segment

Aprox. 70% completed

9’-4” and 10’ long

Depth 9’-2” to 10’
Precast Segment

Deviation pipes instead of diabolos
Segmental Couplers
GTI Segmental Couplers
Pushing External Tendons

Typically Prefabricated Winched
Far More Efficient Installation w/
Freyssinet Strand Pushers
Pushing External Tendons

1st Span
Pushing External Tendons

2\textsuperscript{nd} Span and Following.

Push from Deck

Minimizes Labor & Strand Exposure
Stressing Operations

Tendon Pairs Stressed Simultaneously
Thank You!
Questions?