

Broadway Bridge

Value Engineering

Western Bridge Engineers Seminar

September 7, 2017

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Project Overview



**Original Design
Criteria**



Value Engineering



Construction

Broadway Bridge Team



Arch Design



Design



Construction



Erection Engineer

TOPIC 1

Project Overview

T1

T2

T3

T4



Project Overview



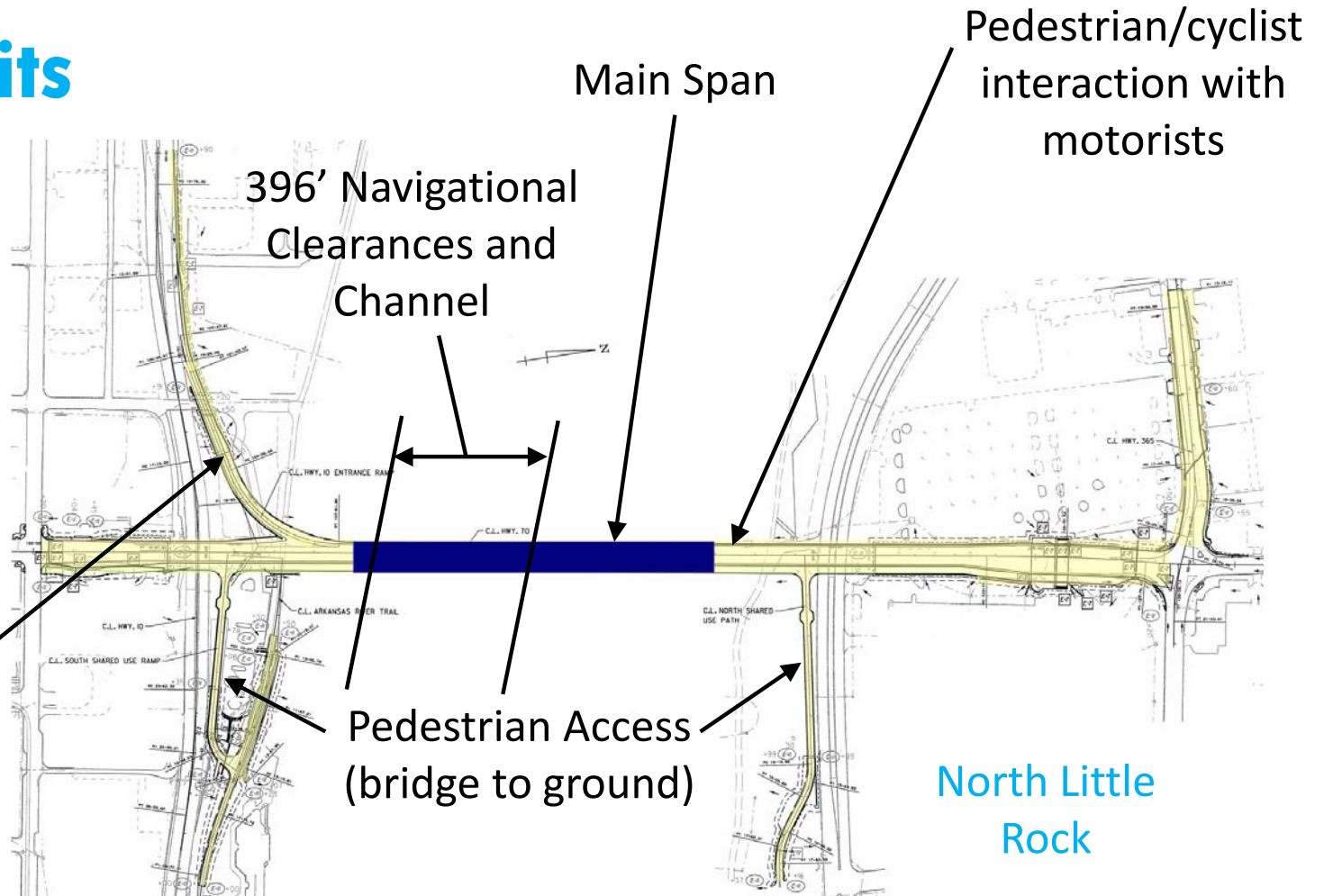
Project Limits



Project Limits

Downtown Little Rock

Ramp connections to La Harpe Blvd.

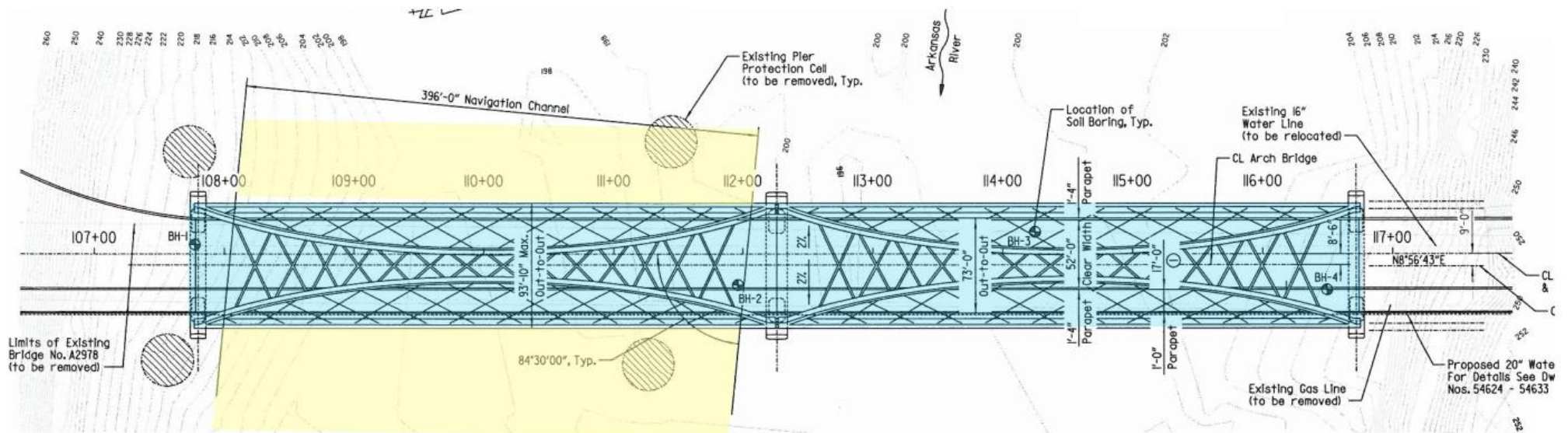




Existing Structure

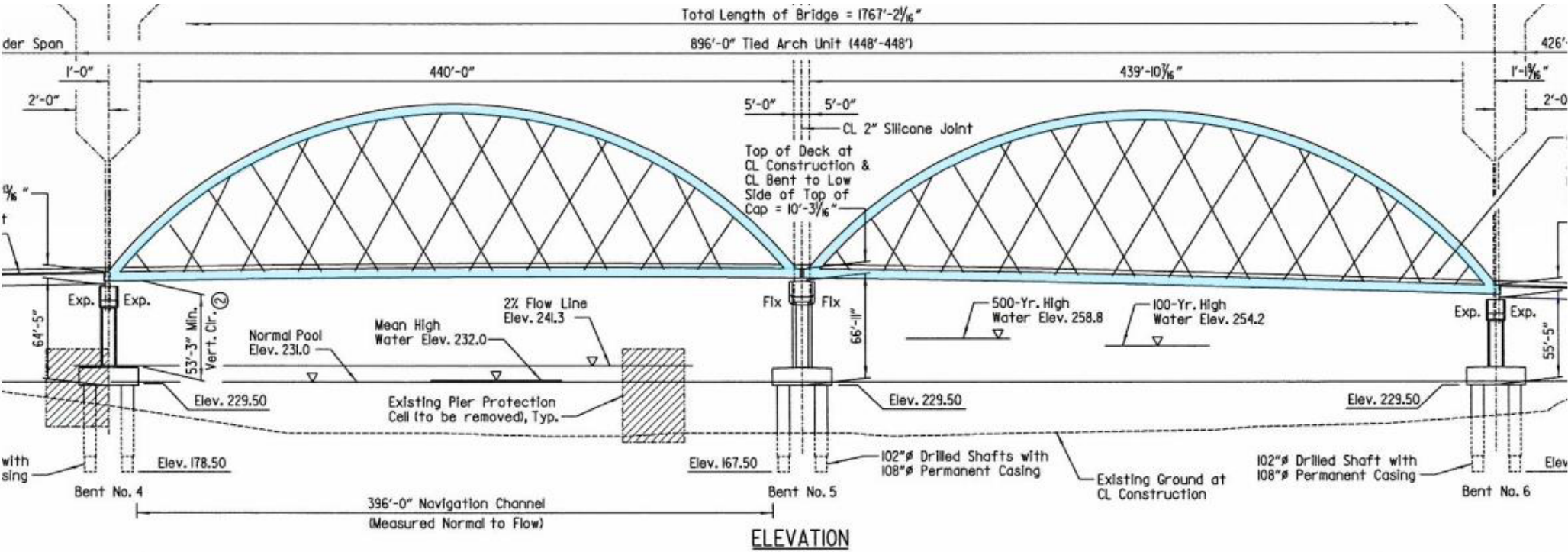


Main Span Plan



- Plate Girder
- Delta Plate Girder
- Tied Arch
- Cable Stay

Main Span Elevation



T1

T2

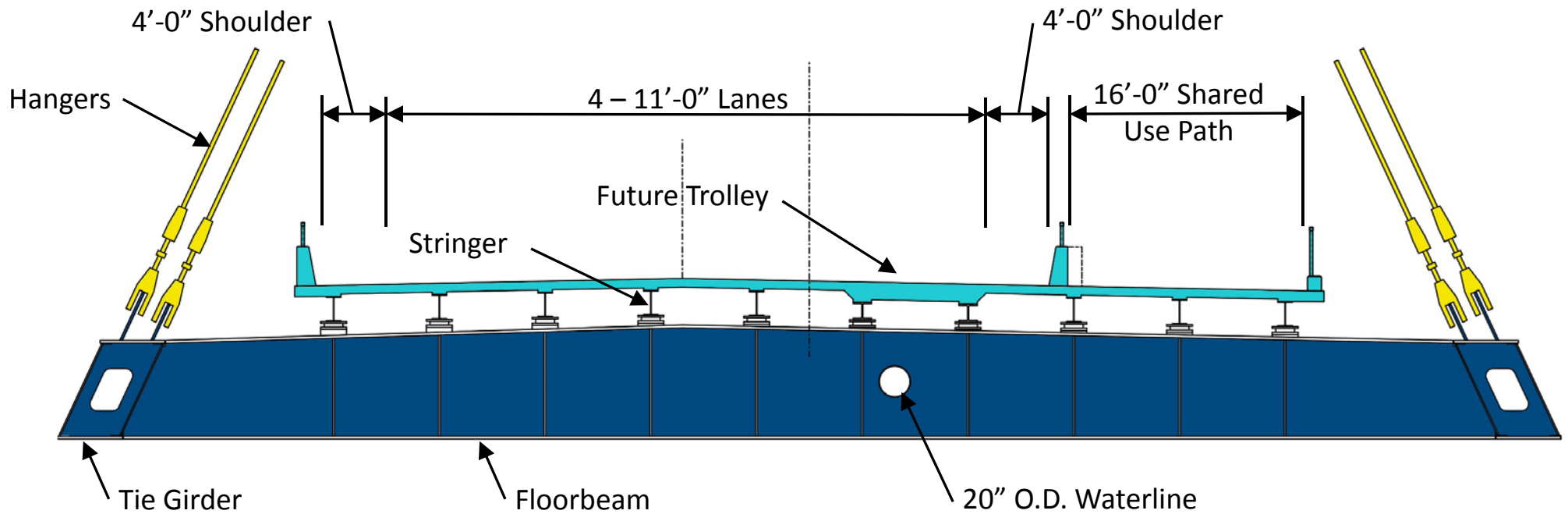
T3

T4

TOPIC 2

Original Design Criteria

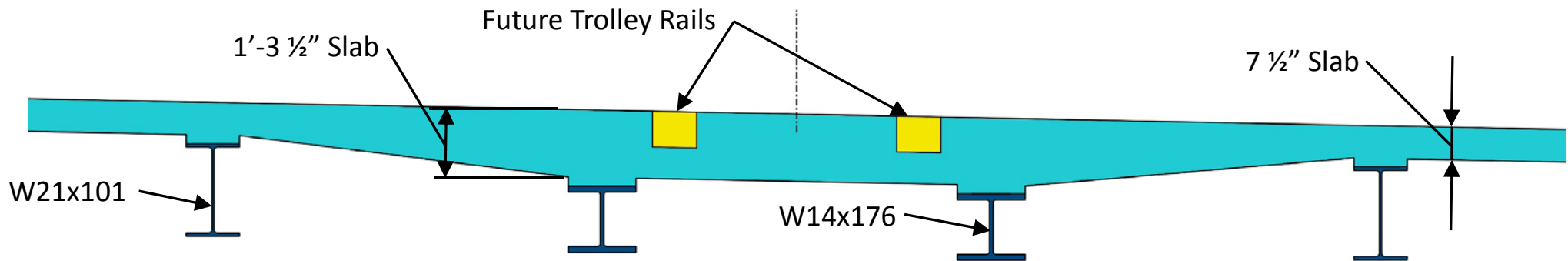
Cross Section



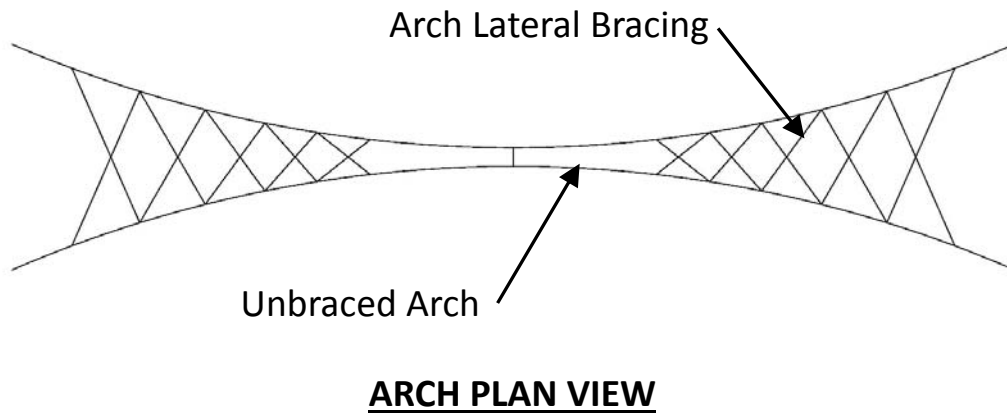
- ADT = 34,000 (1% trucks)

Future River Rail Trolley

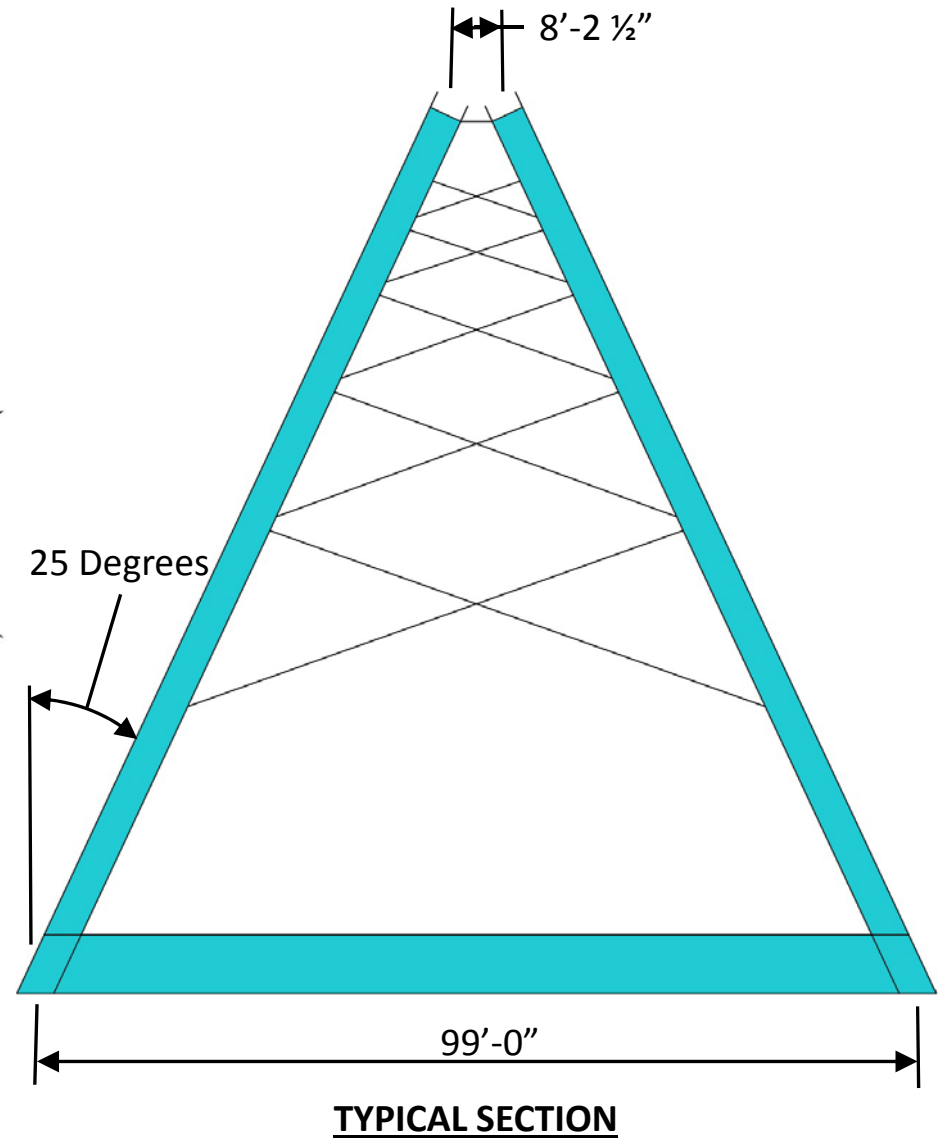
- 8" slab increase
- Stringer/ floorbeam floorsystem



Basket Handle Arches



- 7'-0" non-composite FB
- 7'-0" tie girders





TOPIC 3

Value Engineering

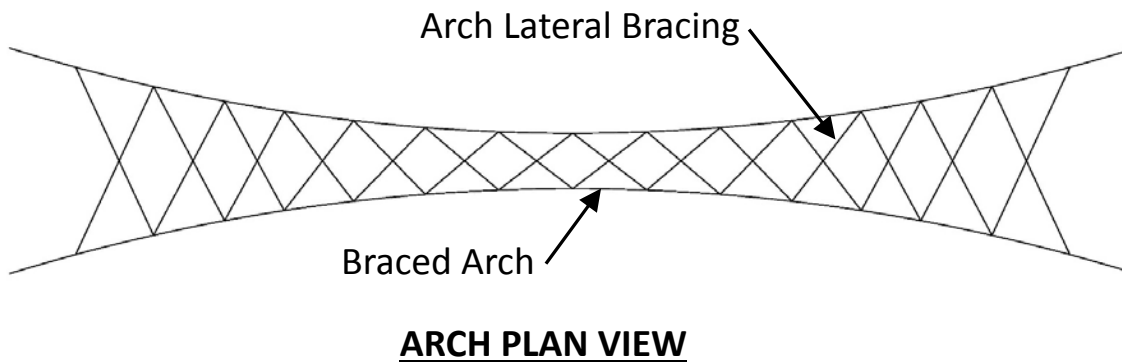
T1

T2

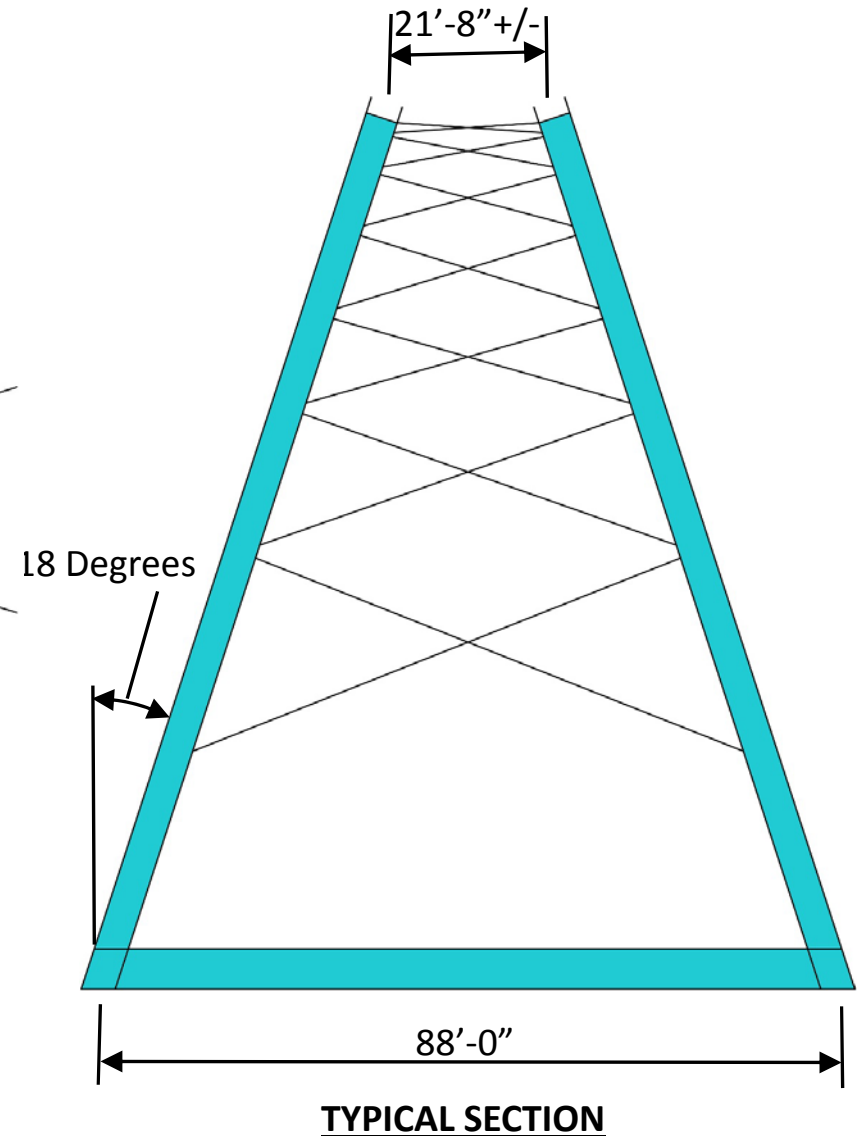
T3

T4

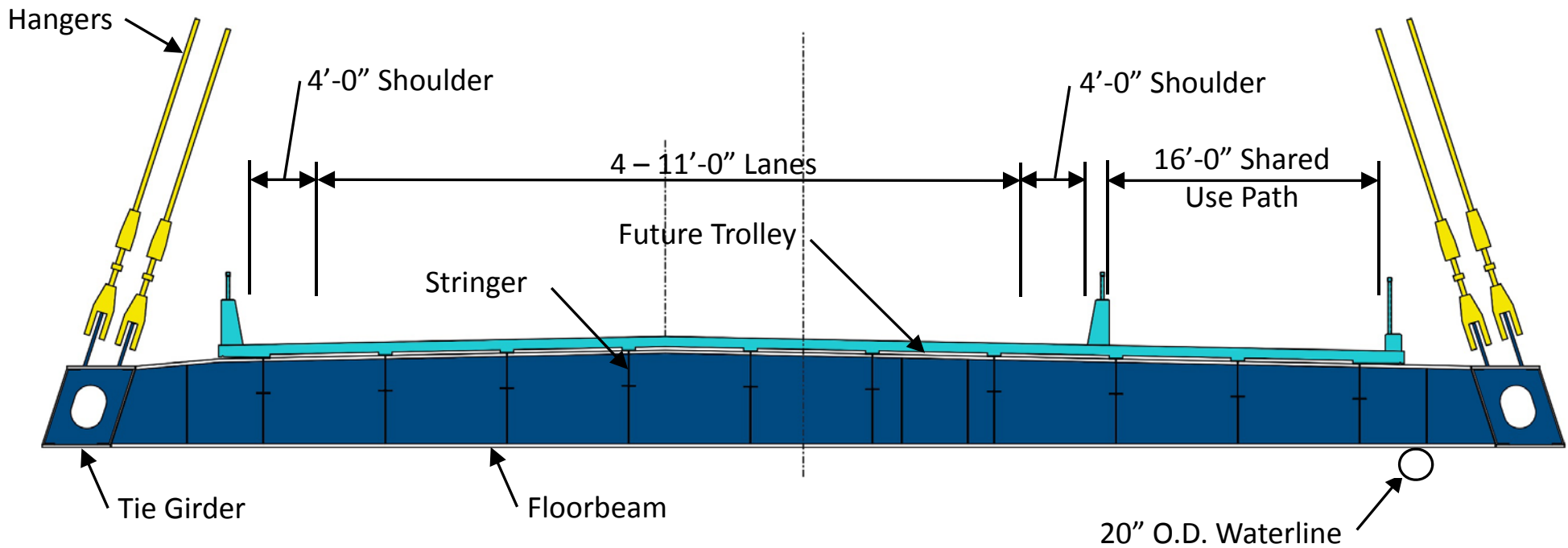
Basket Handle Arches



- Decreased FB length by 11'-0"
- Decreased FB height to 5'-0"
- Decreased TG height to 5'-0"



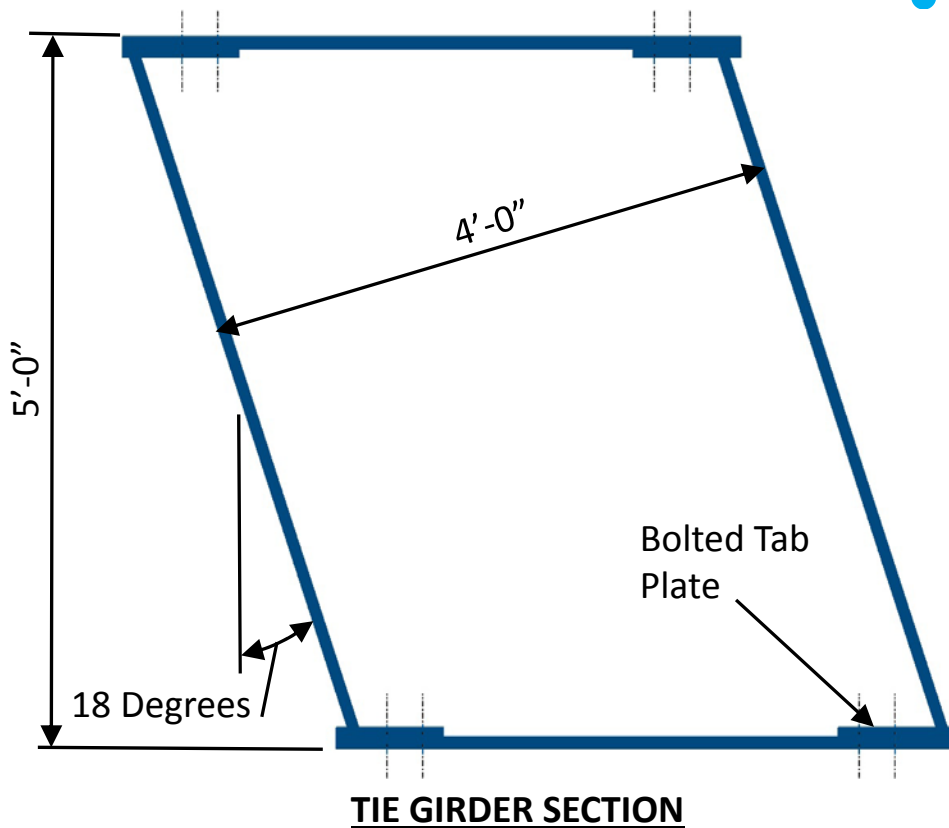
Typical Section



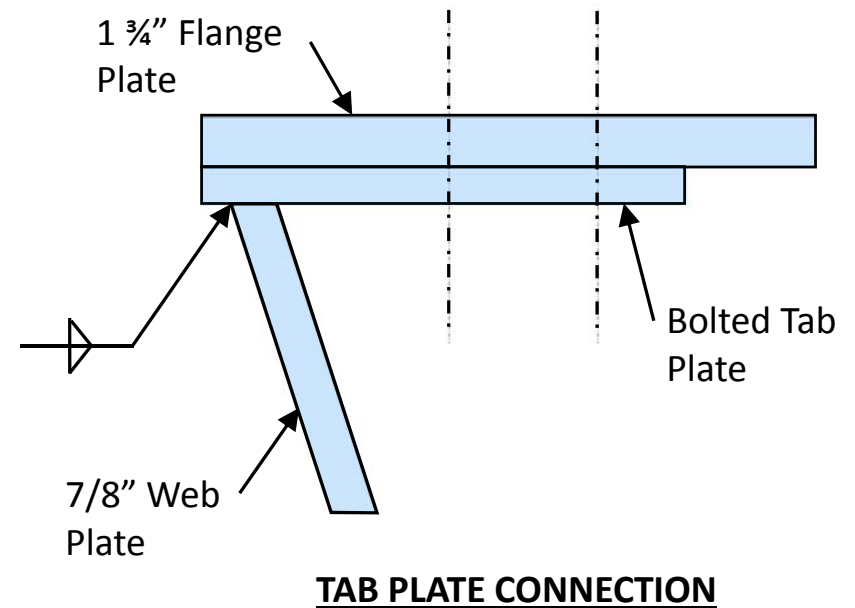
- 17'-6" VC over roadway lanes

- 14'-0" VC over shared use path

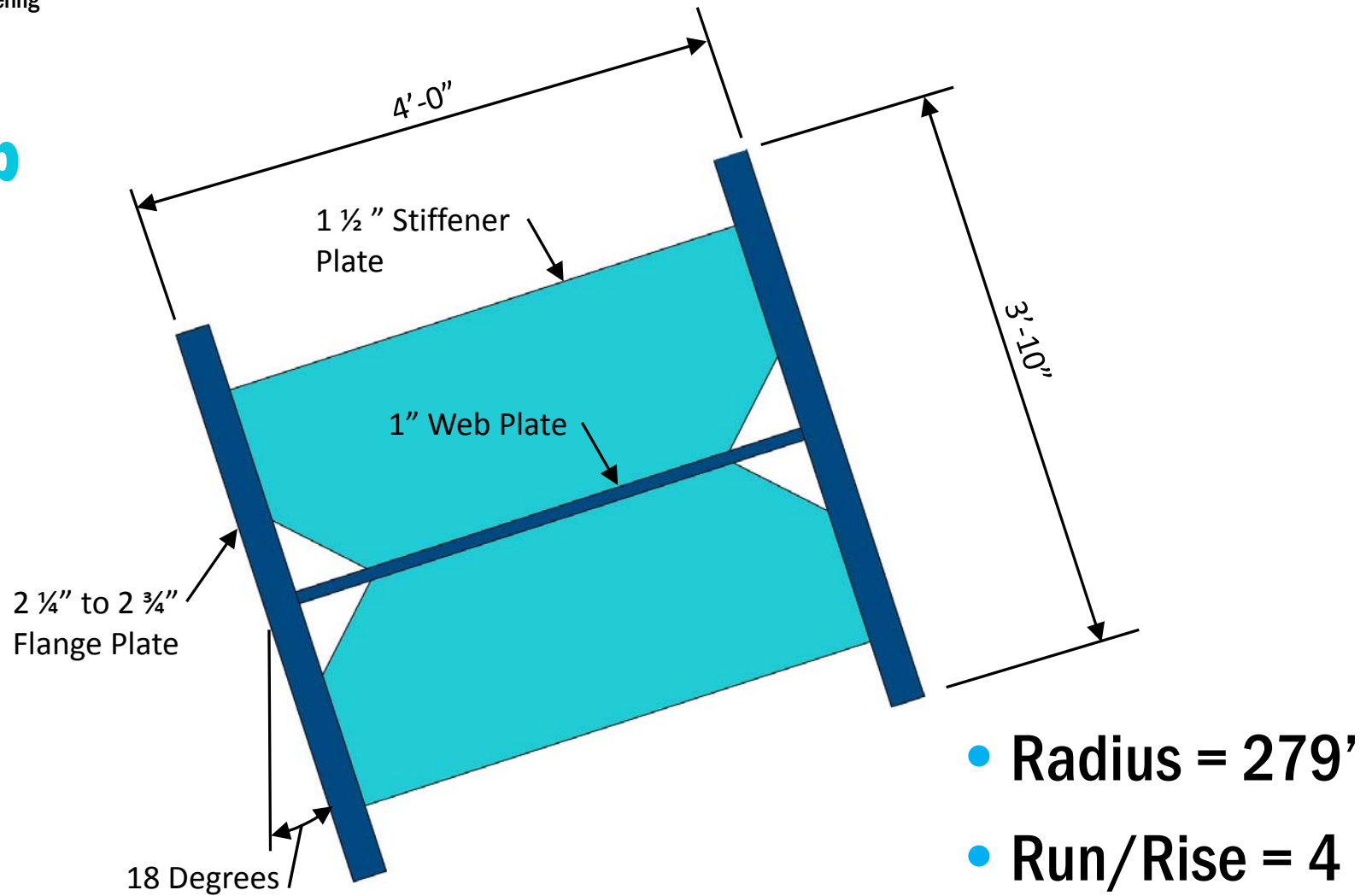
Tie Girder



- Plate Loss Criteria
- $1.25 DC + 1.5 DW + 1.3 (LL + IM)$



Arch Rib

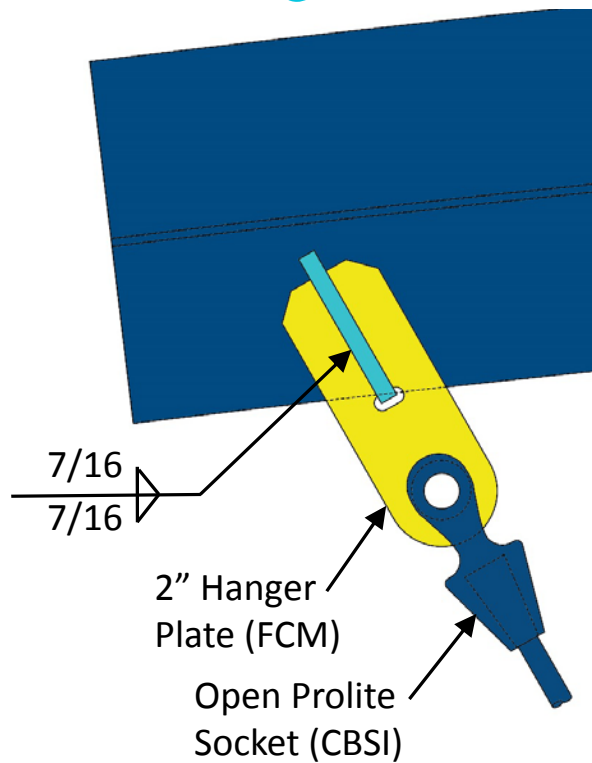


Hangers

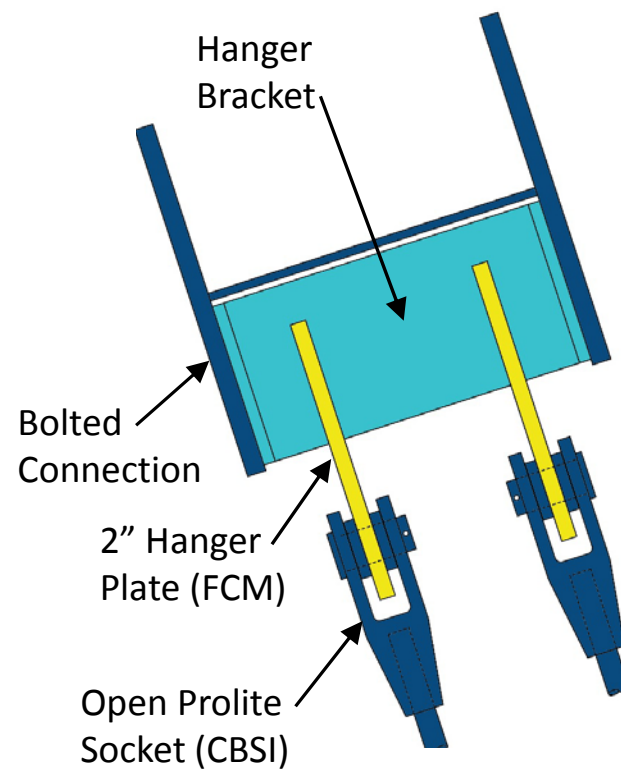


- 2 3/8" Diameter
- ASTM A586
- Grade 2 wire
- Class C Coating Throughout
- Grade 1, Class A = 688 k
- Specified = 714 k
- Actual = 789 k

Arch Rib Hanger

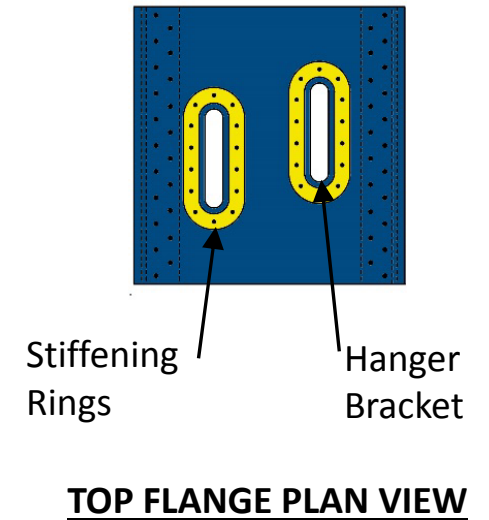
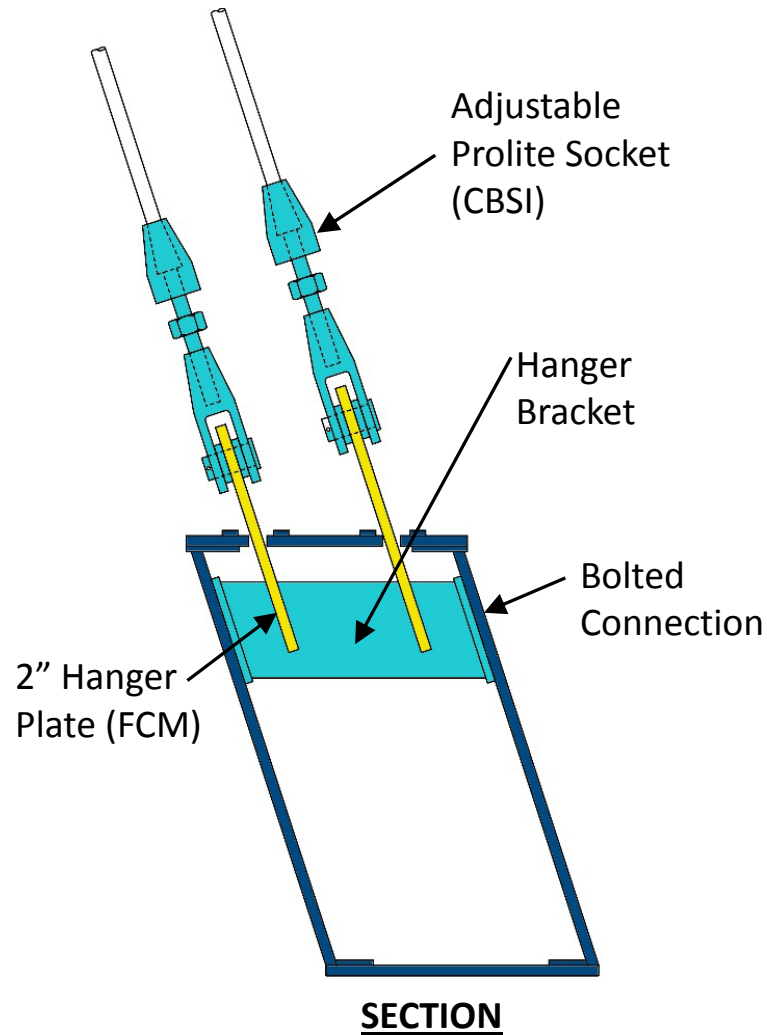
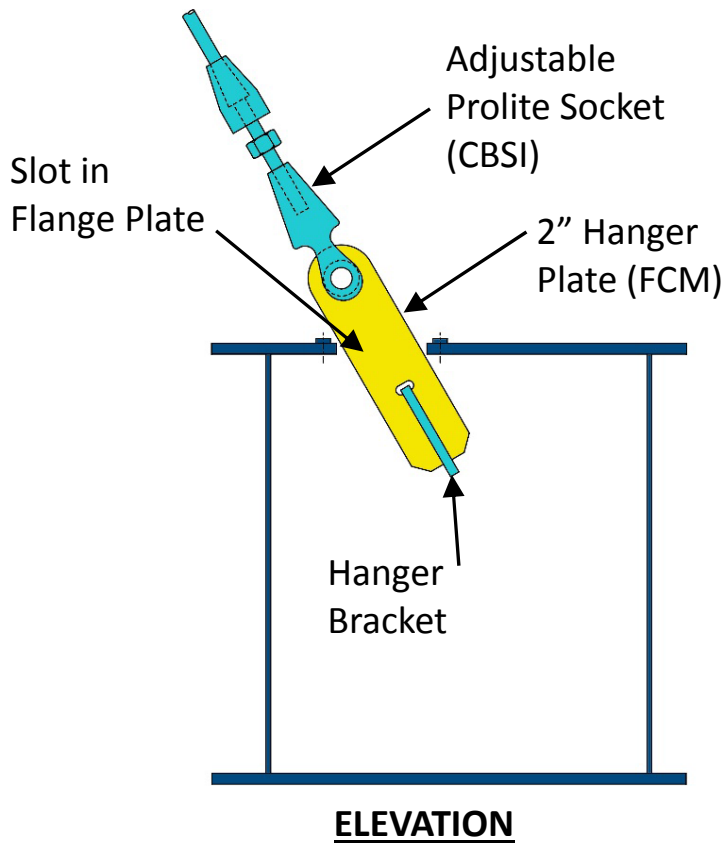


ELEVATION

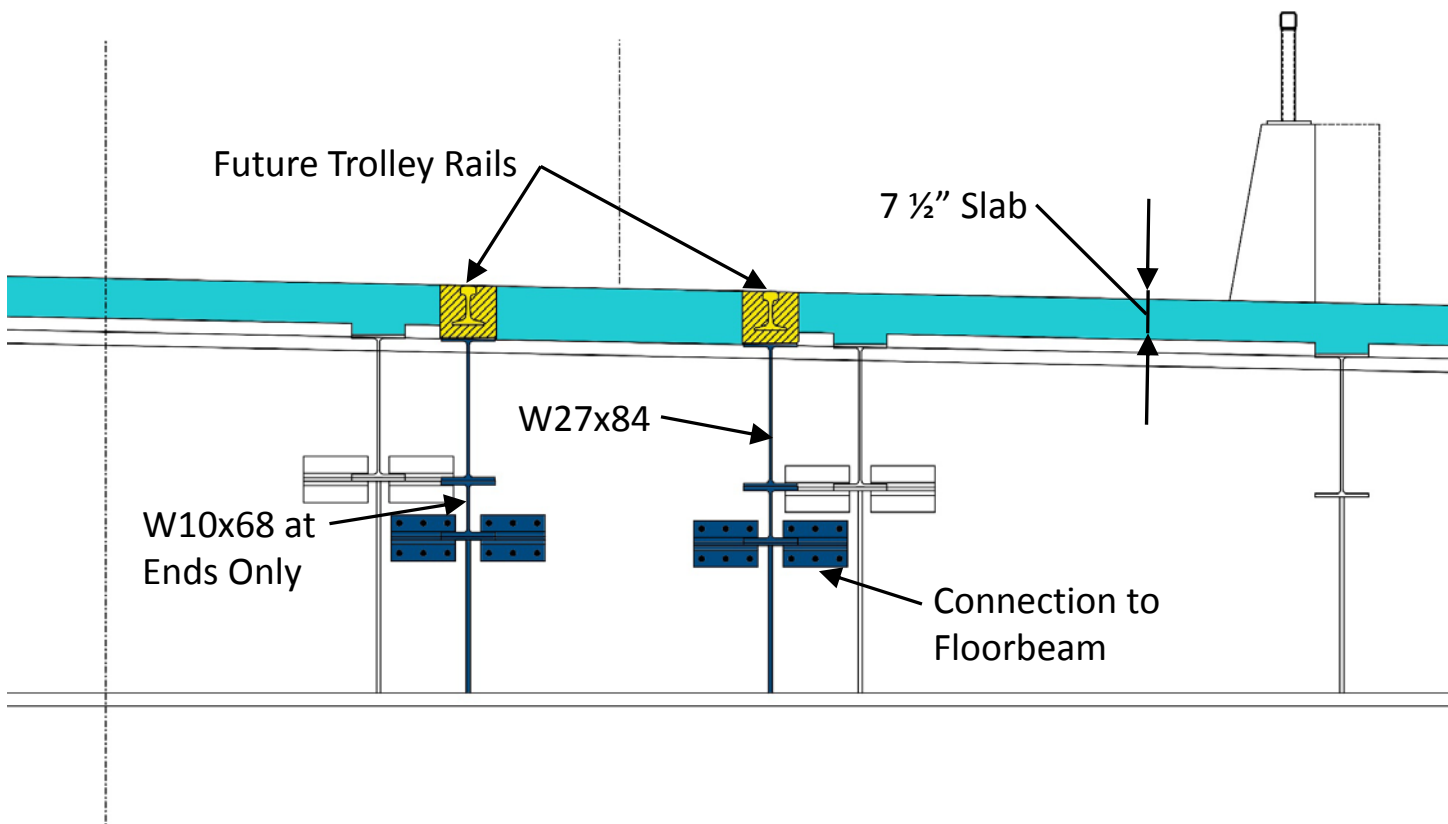


SECTION

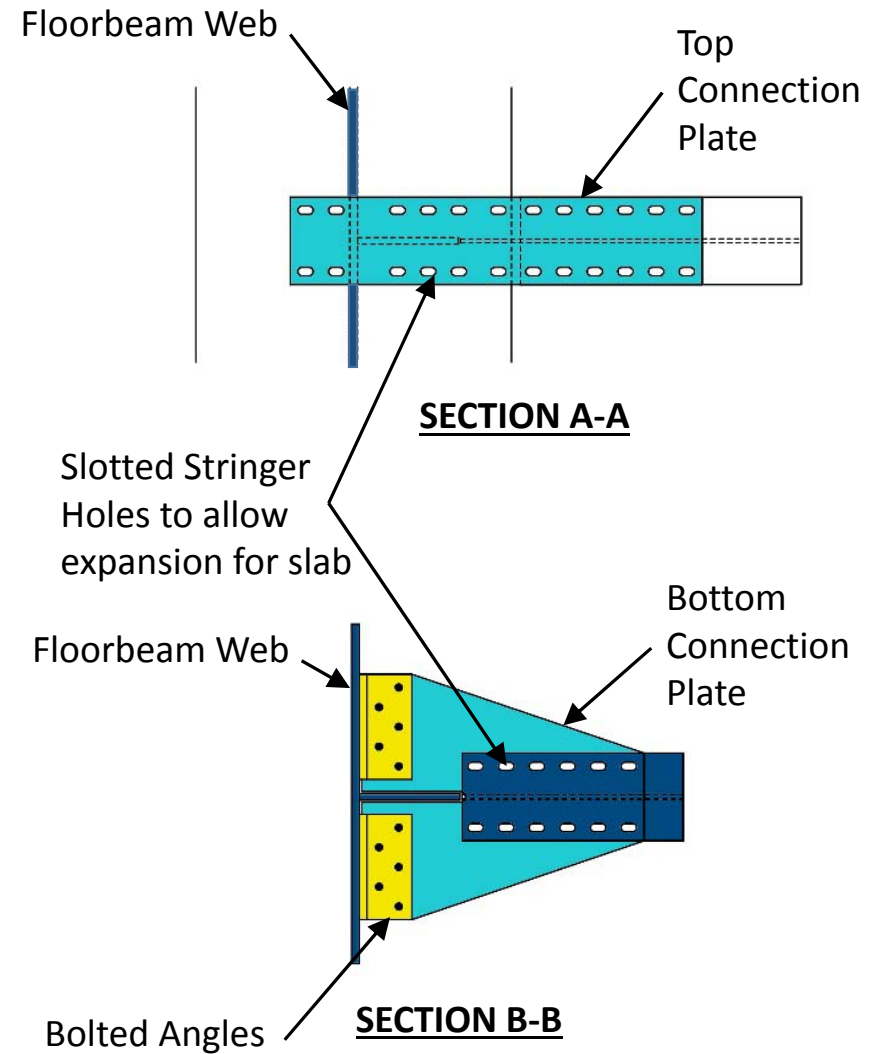
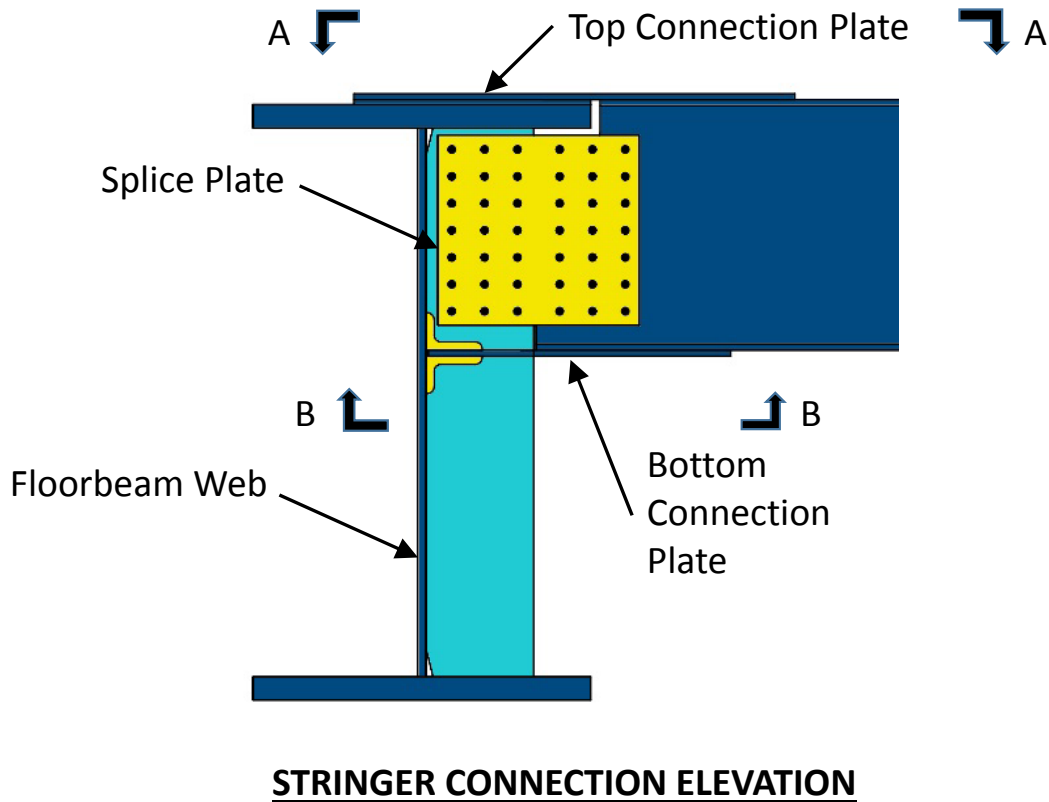
Tie Girder Hanger



Future River Rail Trolley



Framed-in Floor System



Value Engineering Results

- **Composite Floorbeams and Stringers**
- **Shorter floorbeams**
- **Deeper and lighter stringers**
- **Decreased the angle of inclination**
- **Removed inspection access**
- **Saved 5 Millions Pounds of steel**

TOPIC 4

Construction

T1

T2

T3

T4

Letting

- **September 22, 2014**
- **Massman Construction Company**
- **\$98.4 Million**
- **8.2 Million pounds of Structural Steel**
- **\$3.66 per pound for Arch Span Structural Steel**
- **About \$20 Million per arch superstructure**

Knuckles



Tie Girder and Hanger Plates



Arch Rib and Hanger Plates



T4

Construction

Floorbeams



Stringers



Bracing



Two Mega-Lifts on Barges



Erection Arch Struts



Closing The Arch



Hanger Tensioning



Arch Float-In



- **5-month closure**
- **\$80,000 per day**

T4

Construction

Questions



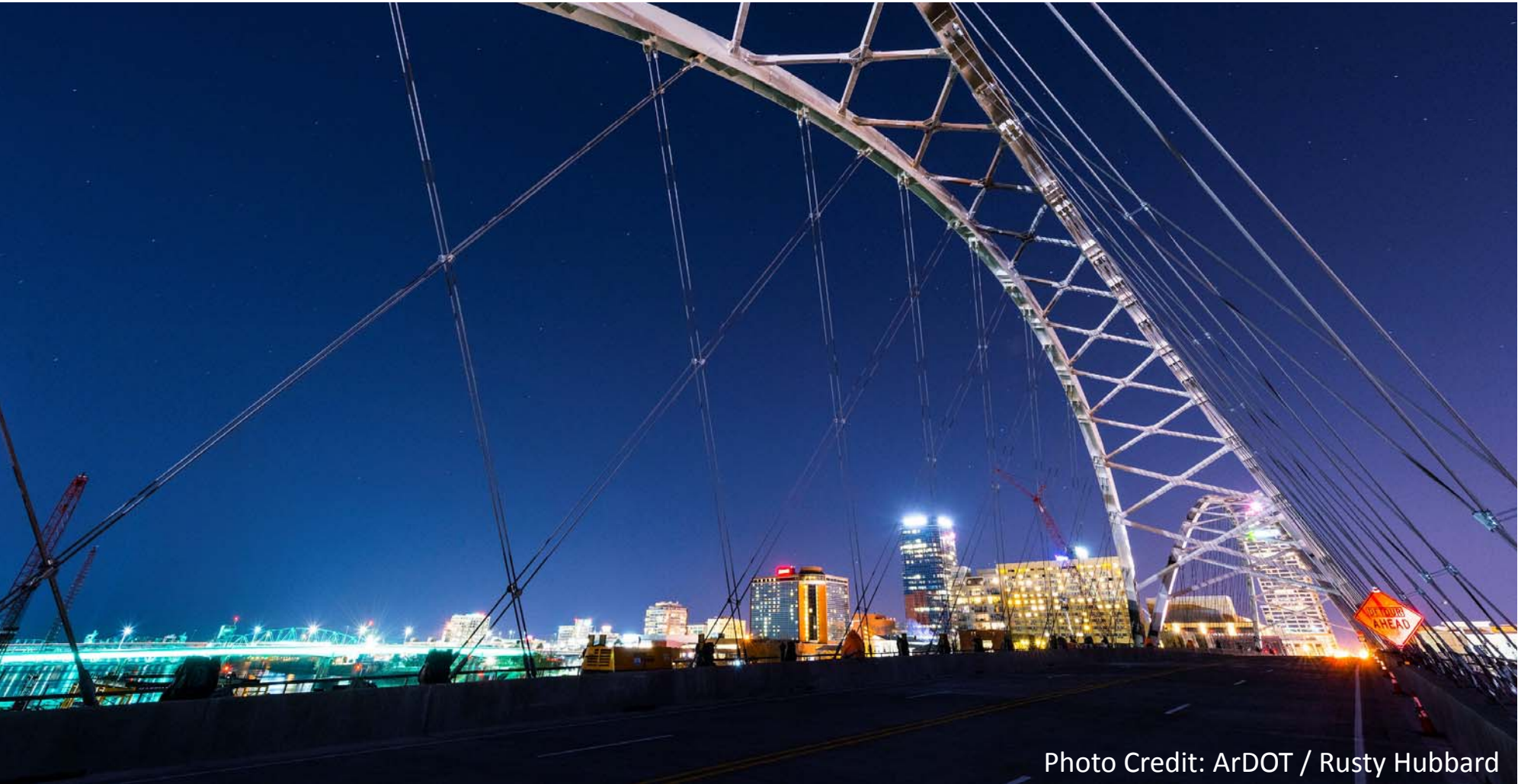


Photo Credit: ArDOT / Rusty Hubbard