Economical Details over Piers Using Simple-for-Dead-Load and Continuous-for-Live-Load Design

Part 3: ABC Steel Girder Bridges

Field Application of Typical and Simplified Details

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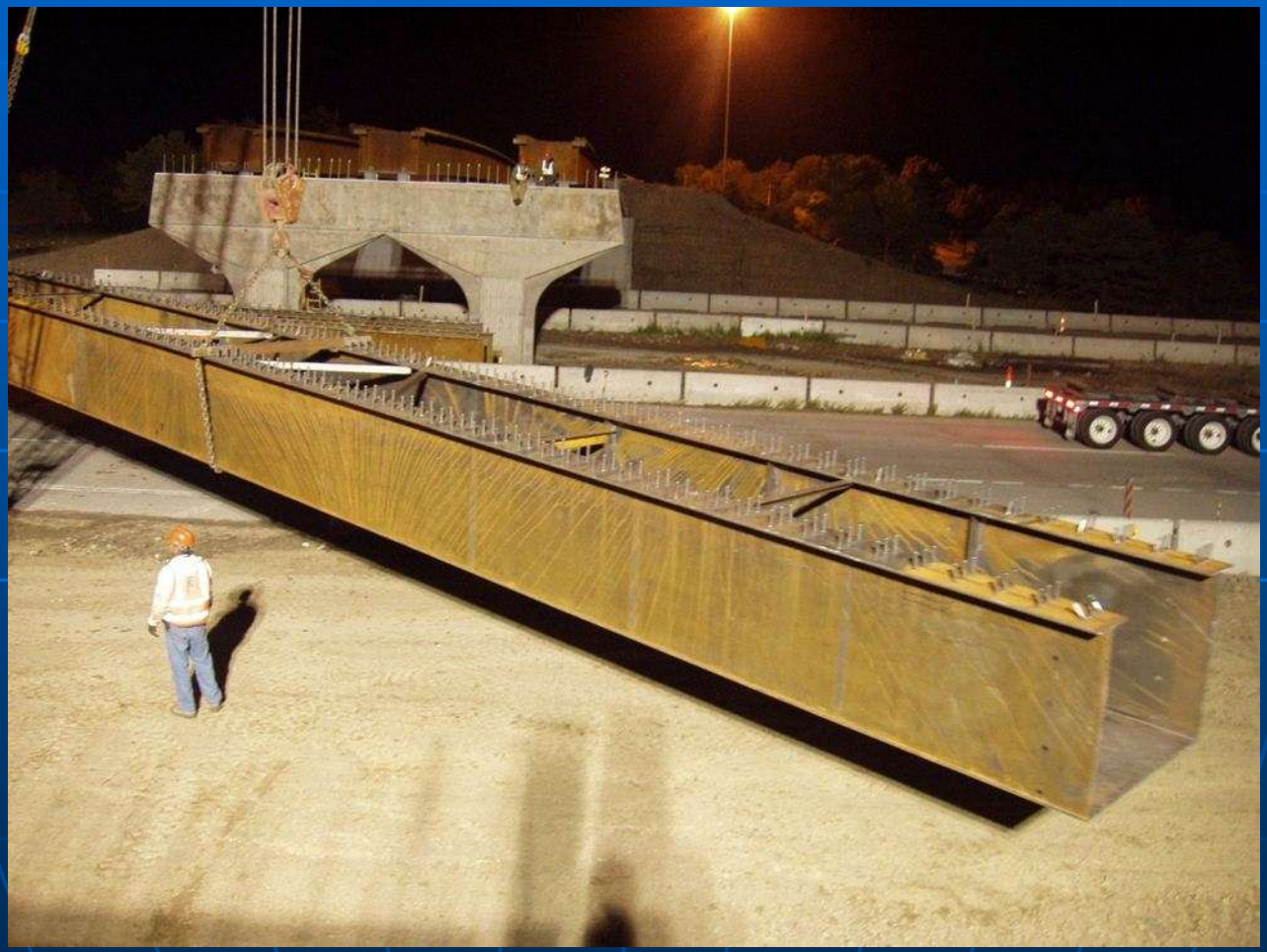
History in Nebraska

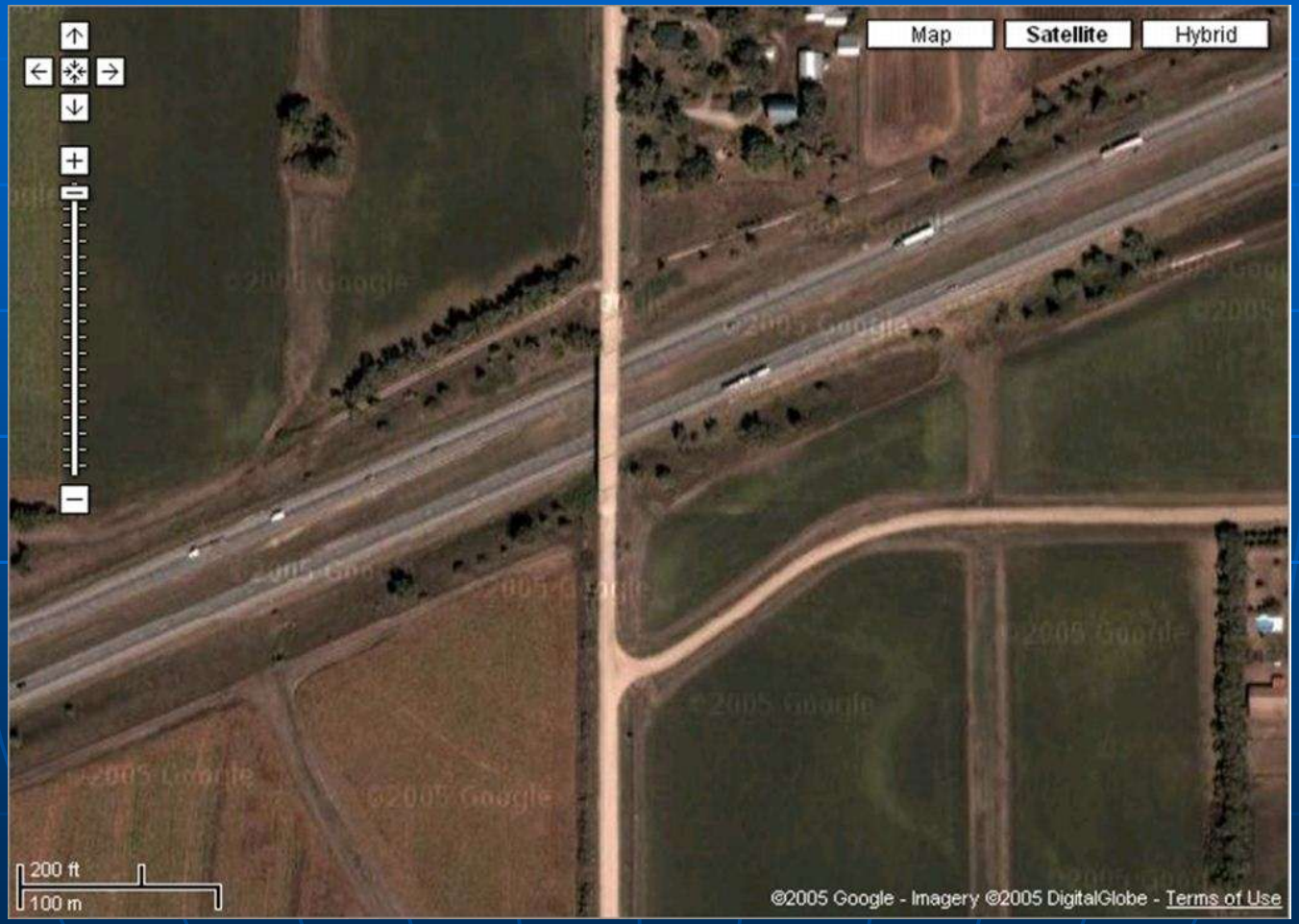
- 2003 Steel Tub Girders with cast-in-place concrete deck – Central Nebraska over I-80 (Phillips Interchange)
- 2004 Steel Rolled Girders with cast-in-place concrete deck – Omaha, NE over I-680 (Sprague Street)

Phillips Interchange - 2003



Sprague Street - 2004

262nd over I-80
Near Lincoln, Nebraska

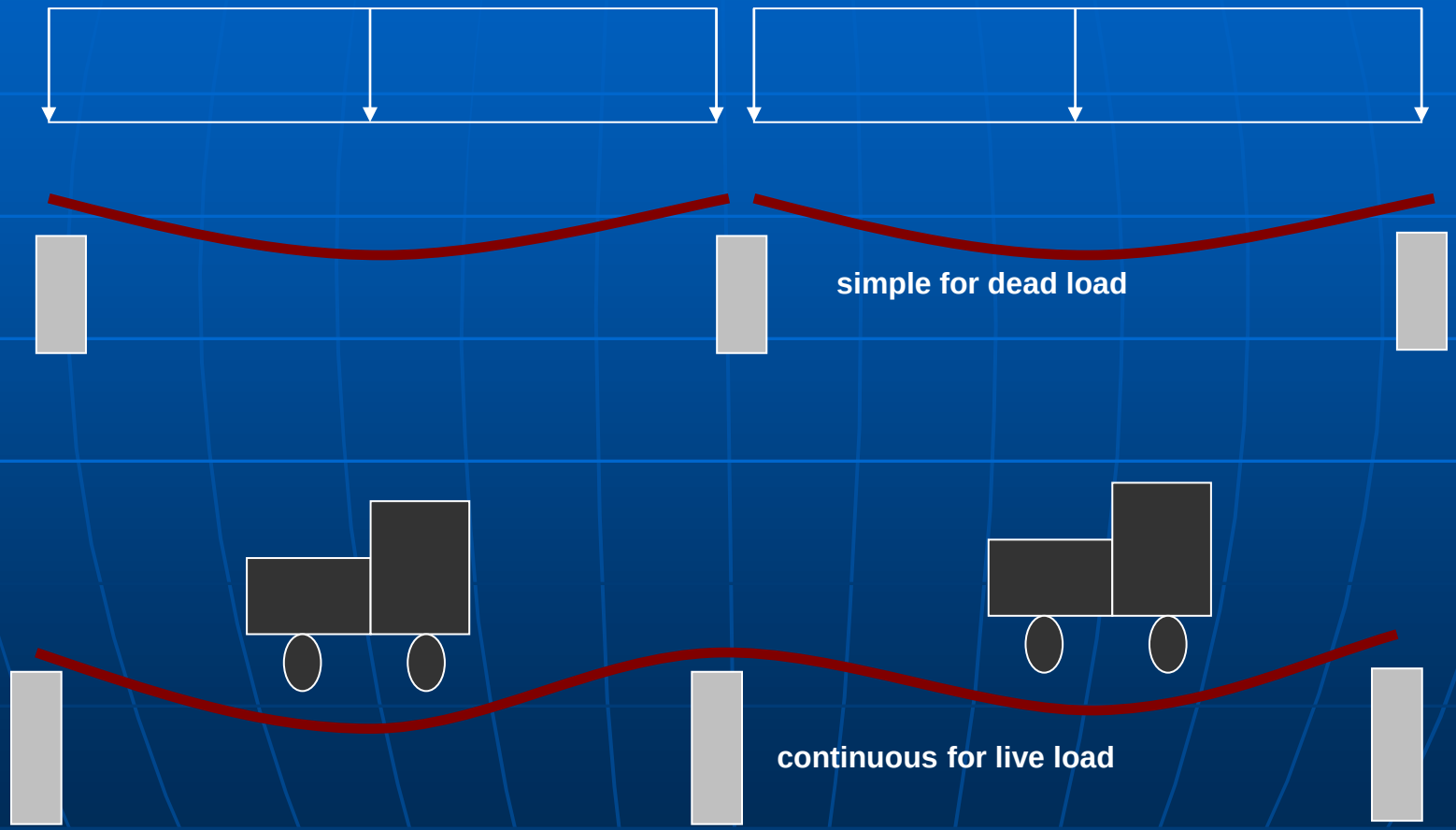


Bridge Geometry

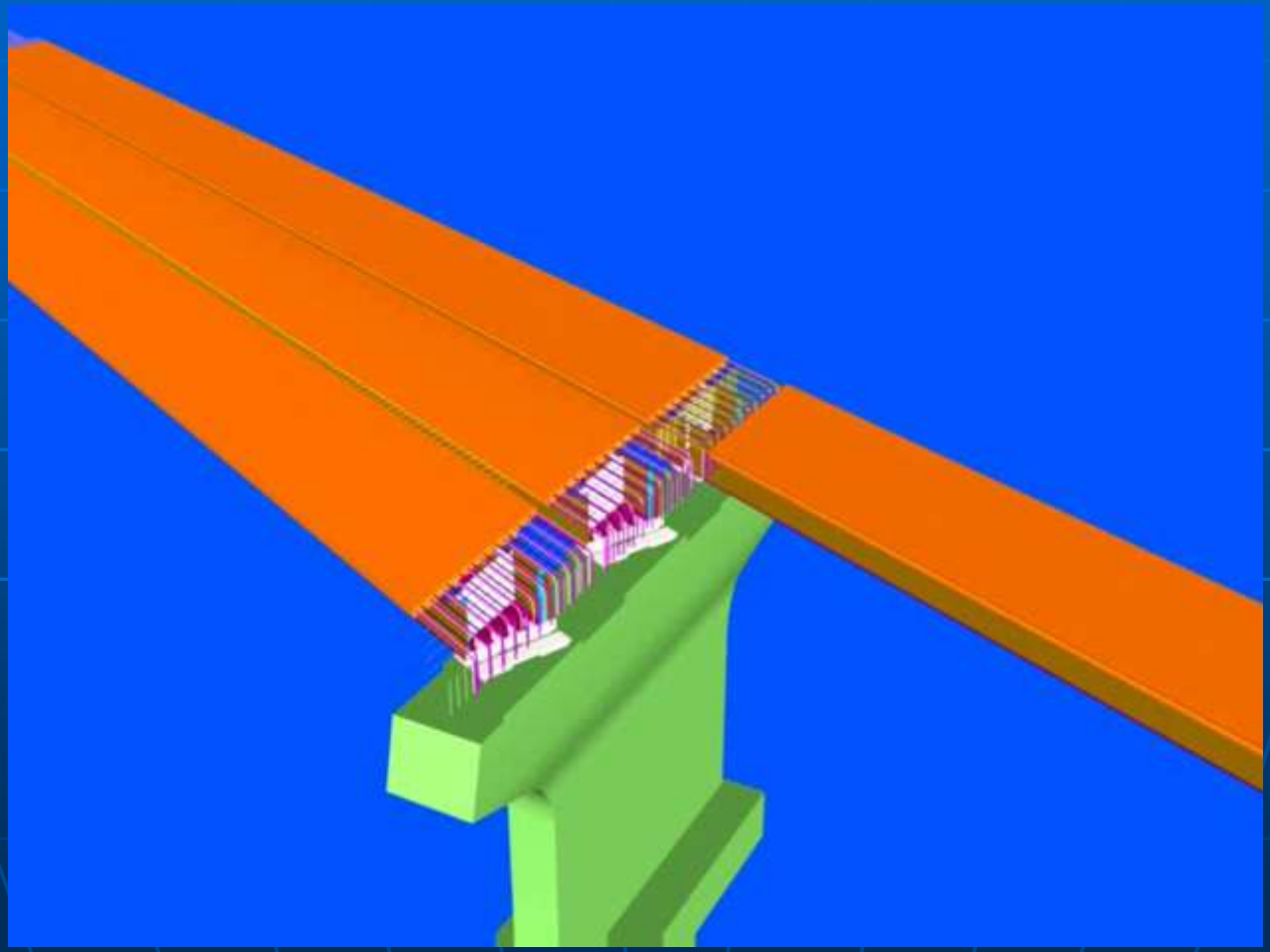
- Two 136’ – 10” Spans
- 20 degree skew
- 30 ft. clear roadway width
- Bridge over Interstate 80

Bridge System

Simple for Dead Load & Continuous for Live Load



Bridge System

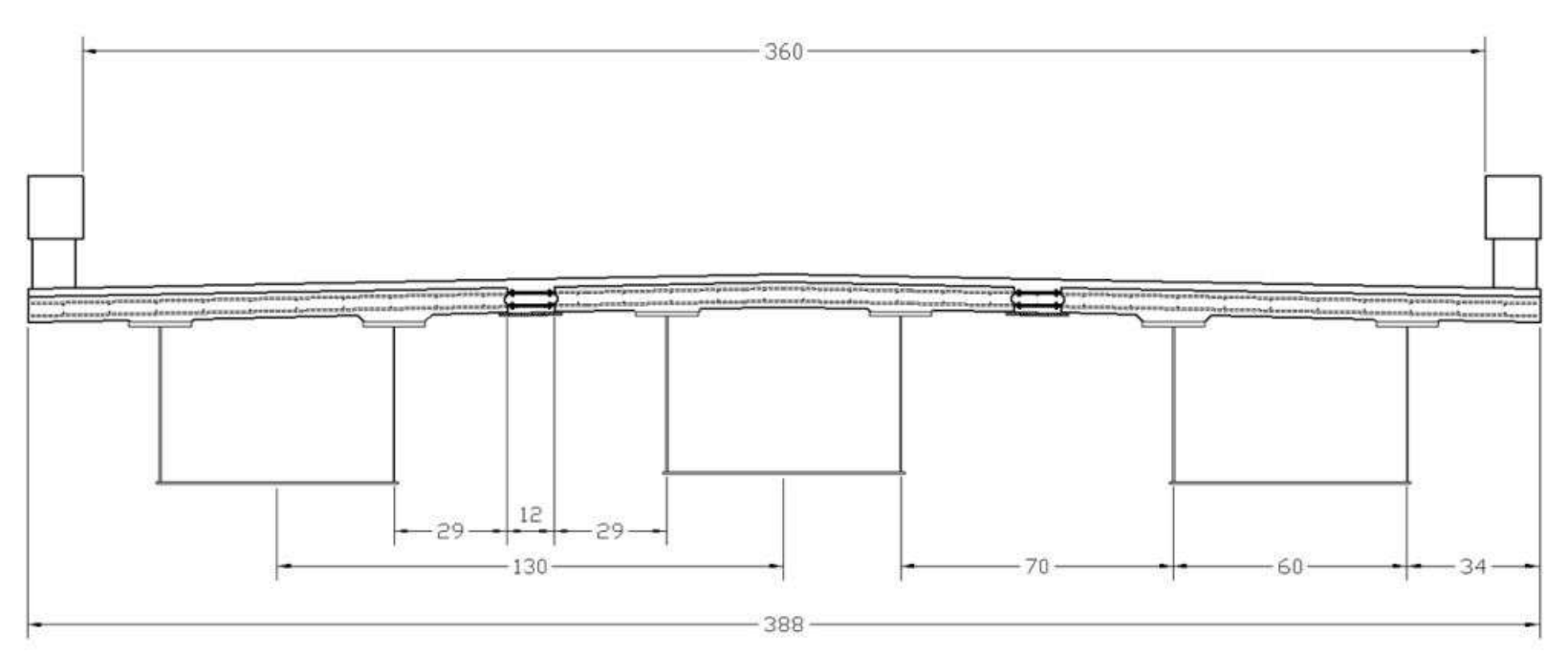


Bridge System

- Top Flanges and Webs – 50 ksi WS
- Bottom Flange – 70 ksi HPWS

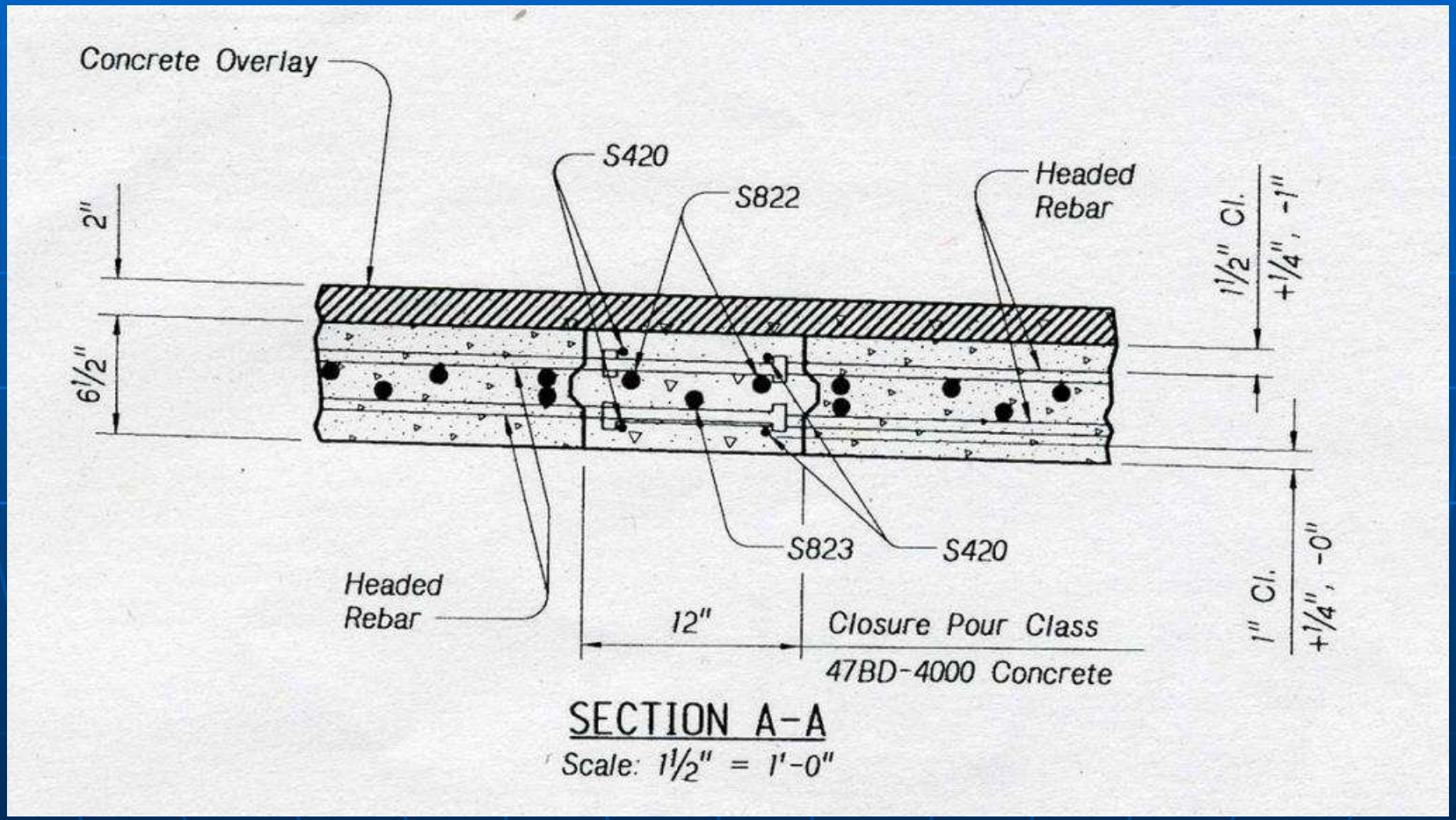
- Each span consists of three tub girders
- With 6.5 inch pre-top deck
- Two inches of silica fume overlay

Adjacent Box System



Girders delivered to site for placing deck

Longitudinal Joints



Headed Reinforcement

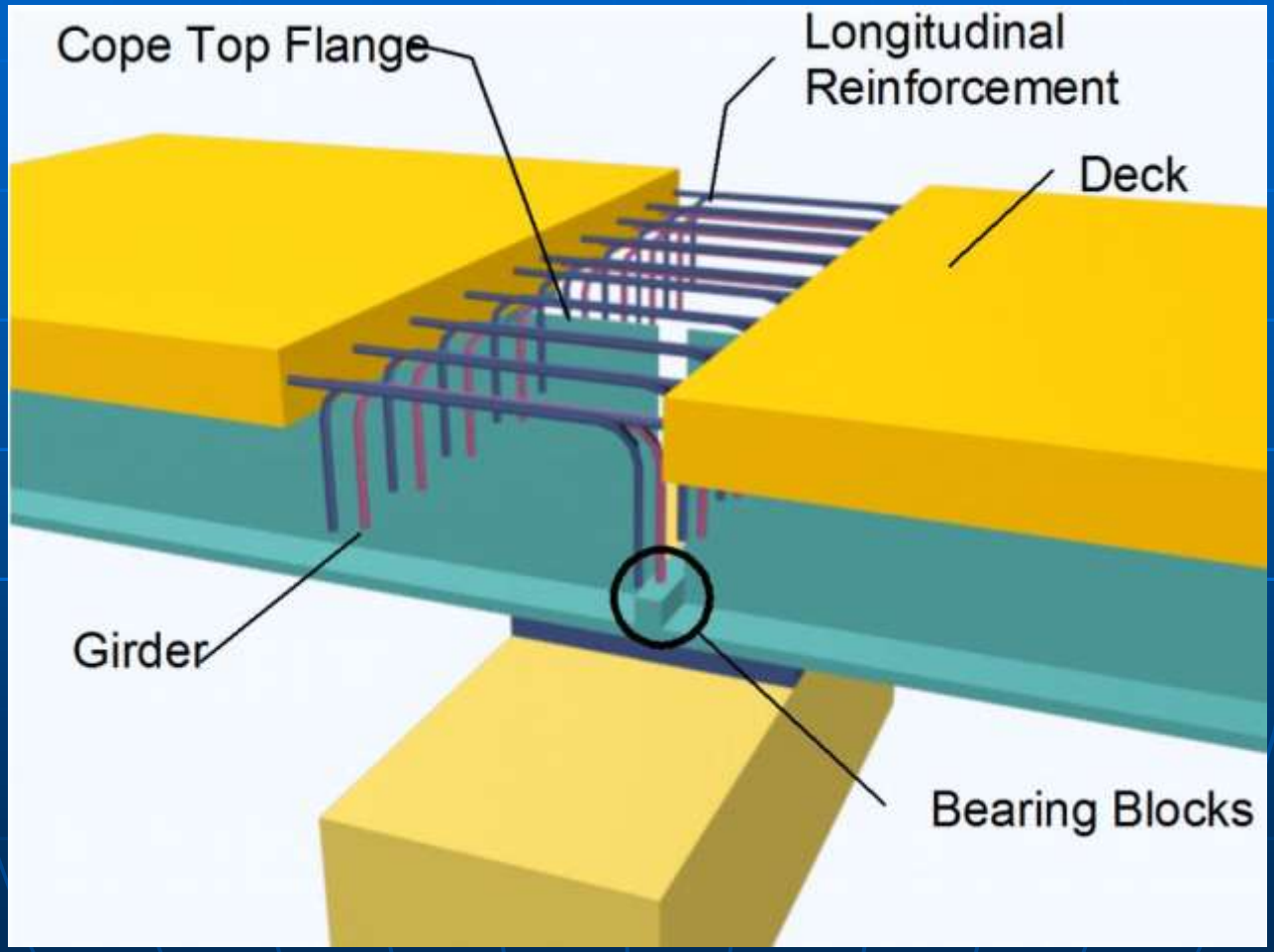
Headed Reinforcement

Transverse Joint over Pier

Negative moment reinforcement (over the Pier) – hooked inside the concrete diaphragm

This detail has been laboratory tested

Transverse Joint over Pier



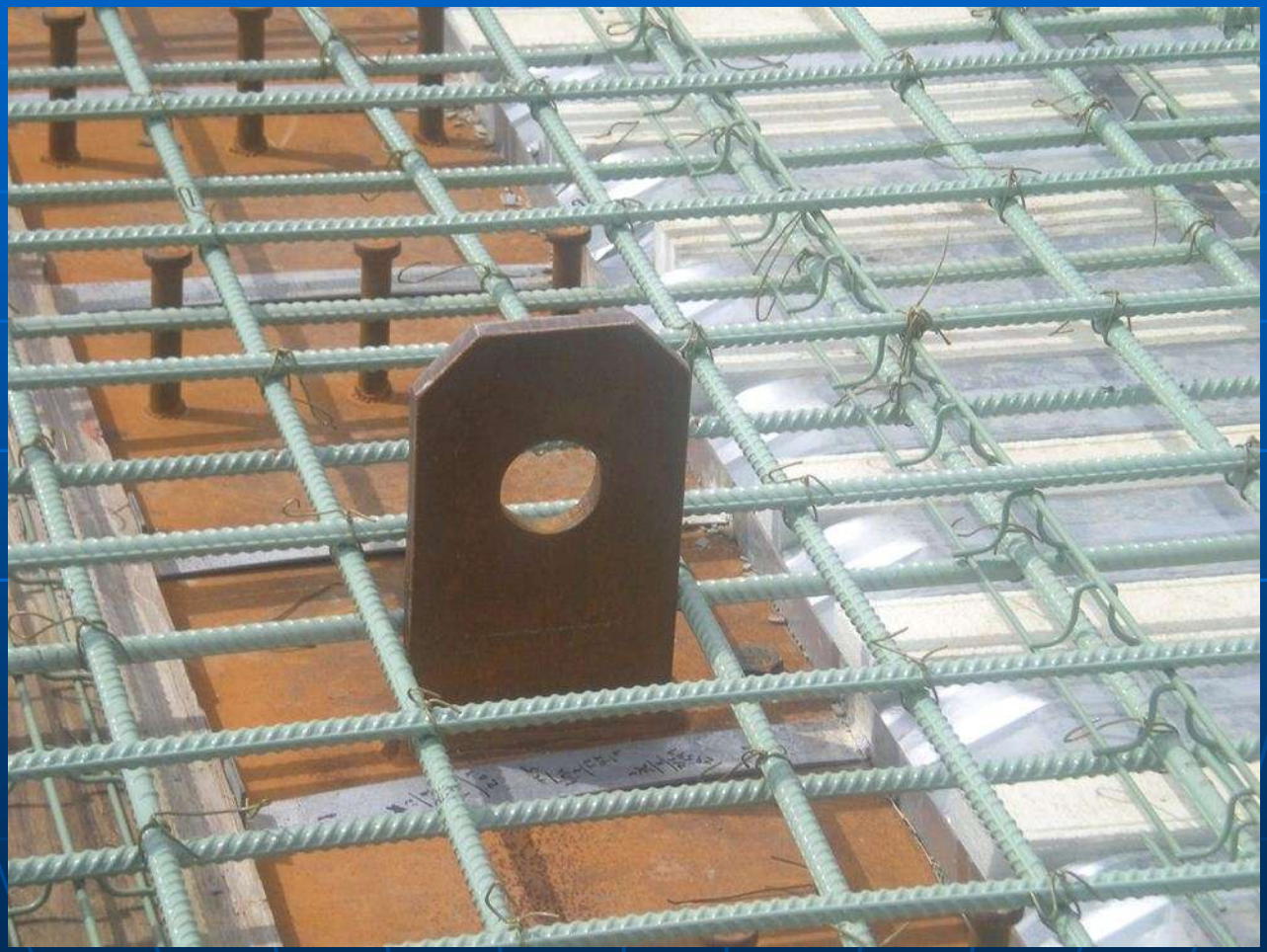
Testing

Transverse Joint over Pier

Girder End Detail Over Pier

Lifting devices

Lifting devices



Lifting devices

Lifting Weights (Tons)

- 25.6 – Steel Tub
- 58.1 – 6.5” Concrete Deck

- 83.7 – Total (each section)

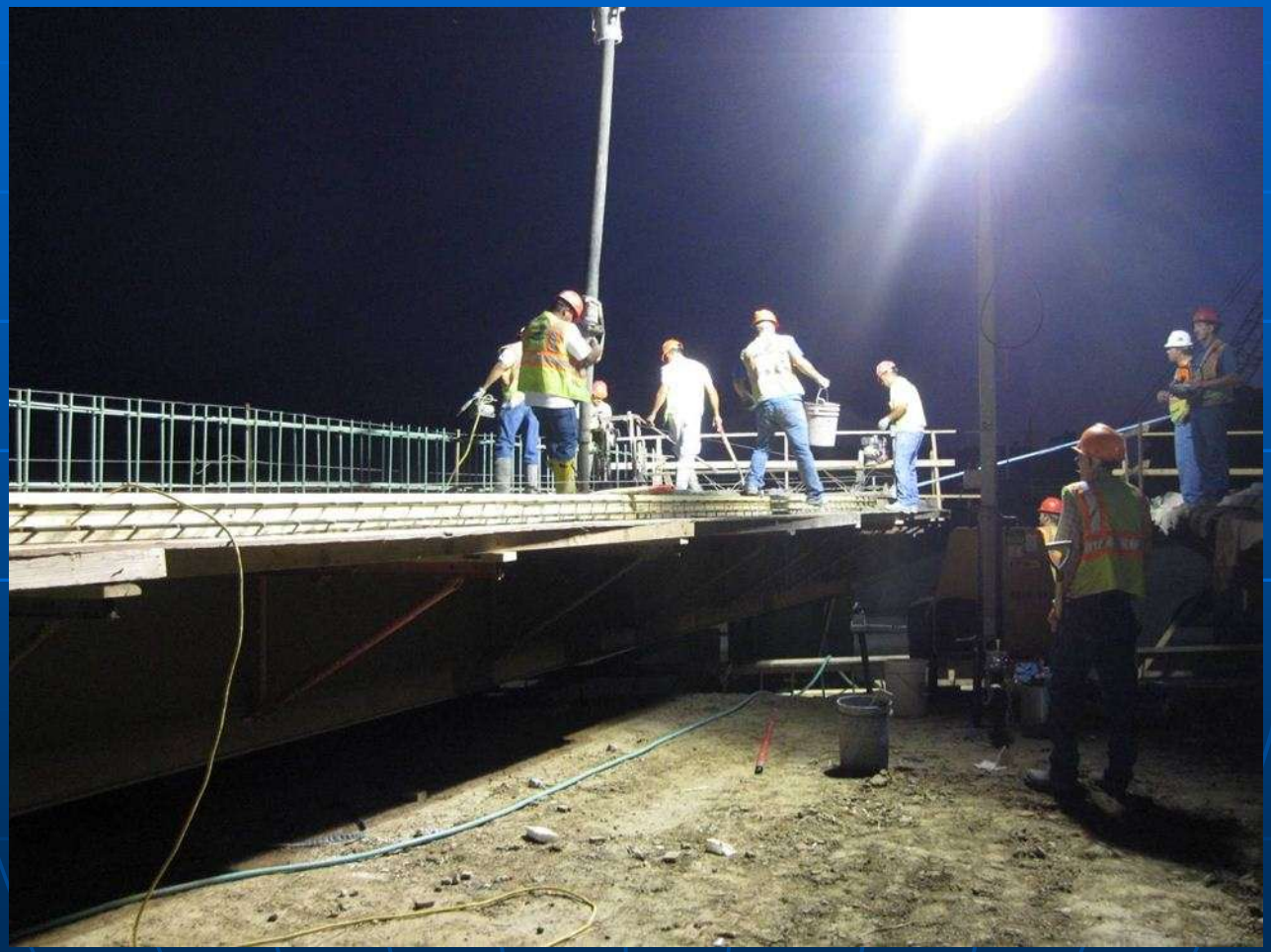
Pre-top girders were kept off the road, until Contractor was ready to move them into final position

Easy access for deck casting

Safe System

Small finishing machine

Casting each deck section – under 40 minutes



Intermediate external bracing was not required

Temporary bracing was not used

Girder/Deck Erection

Longitudinal Joint in Place

All Girder/Deck elements in place

Closure Pour

Closure Pour

Closure Pour

Silica Fume Overlay

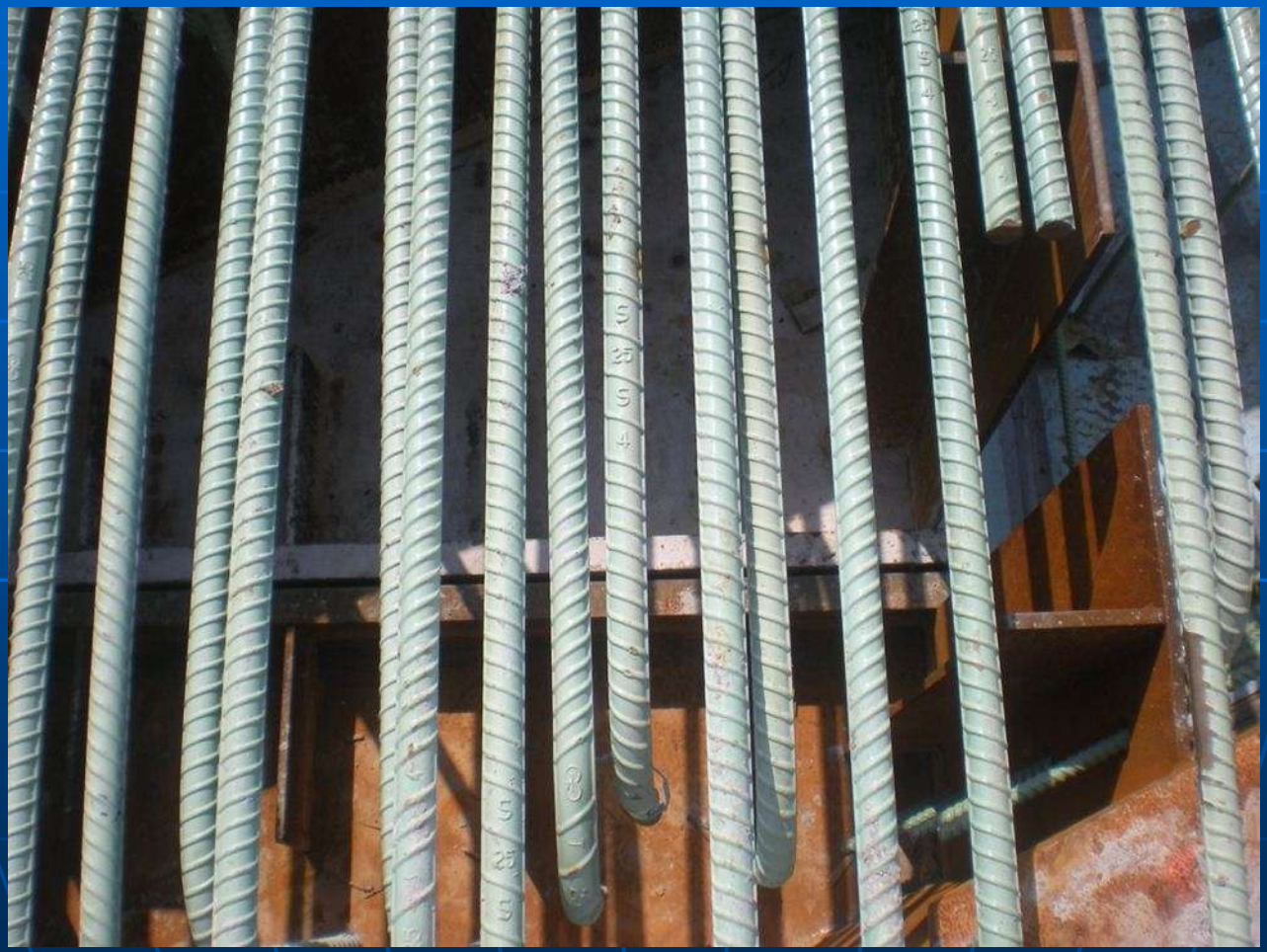
Silica Fume Overlay

Construction Challenges

Construction Challenges

- The headed reinforcing bars were not considered to be economical

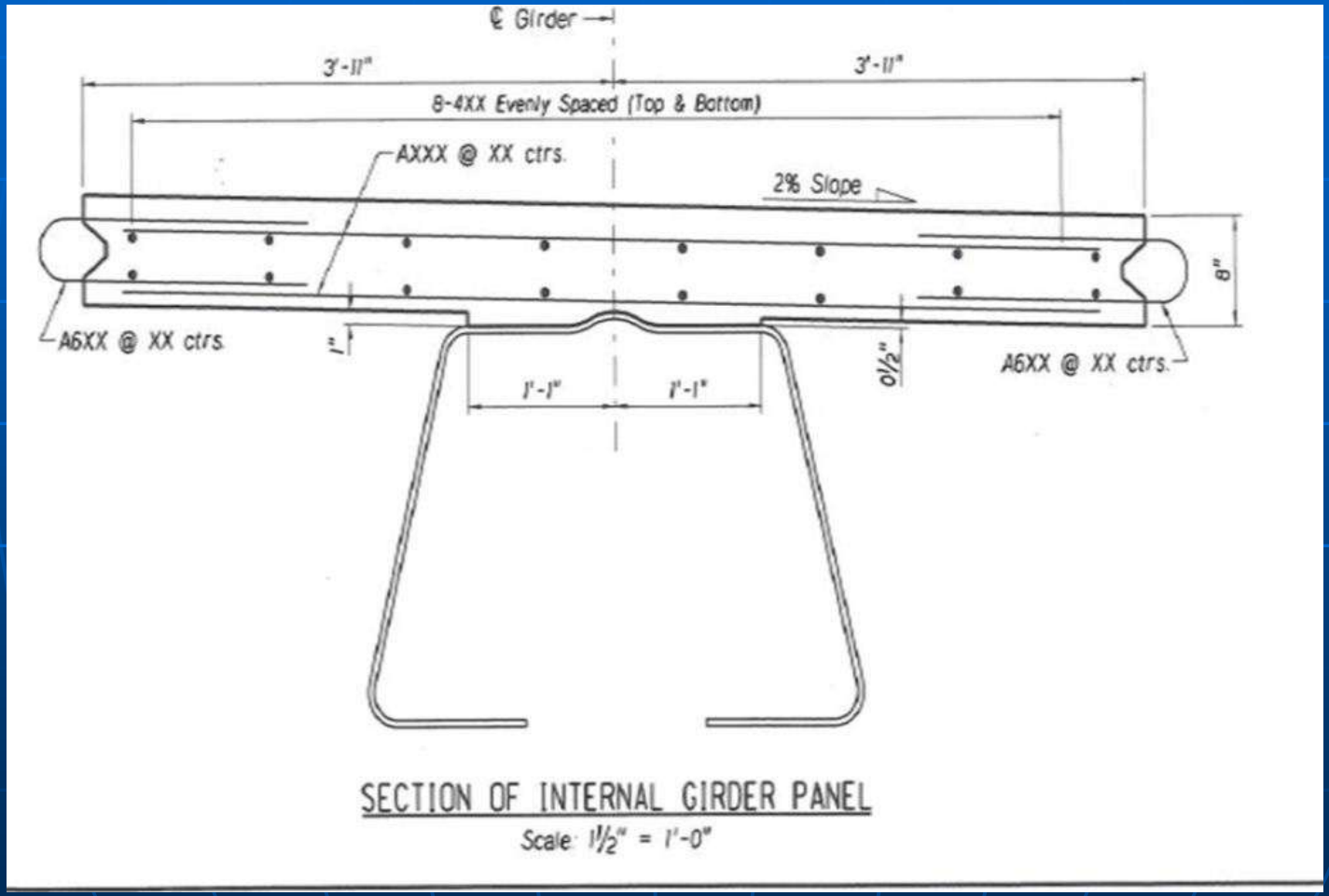
Construction Challenges
reinforcing at pier



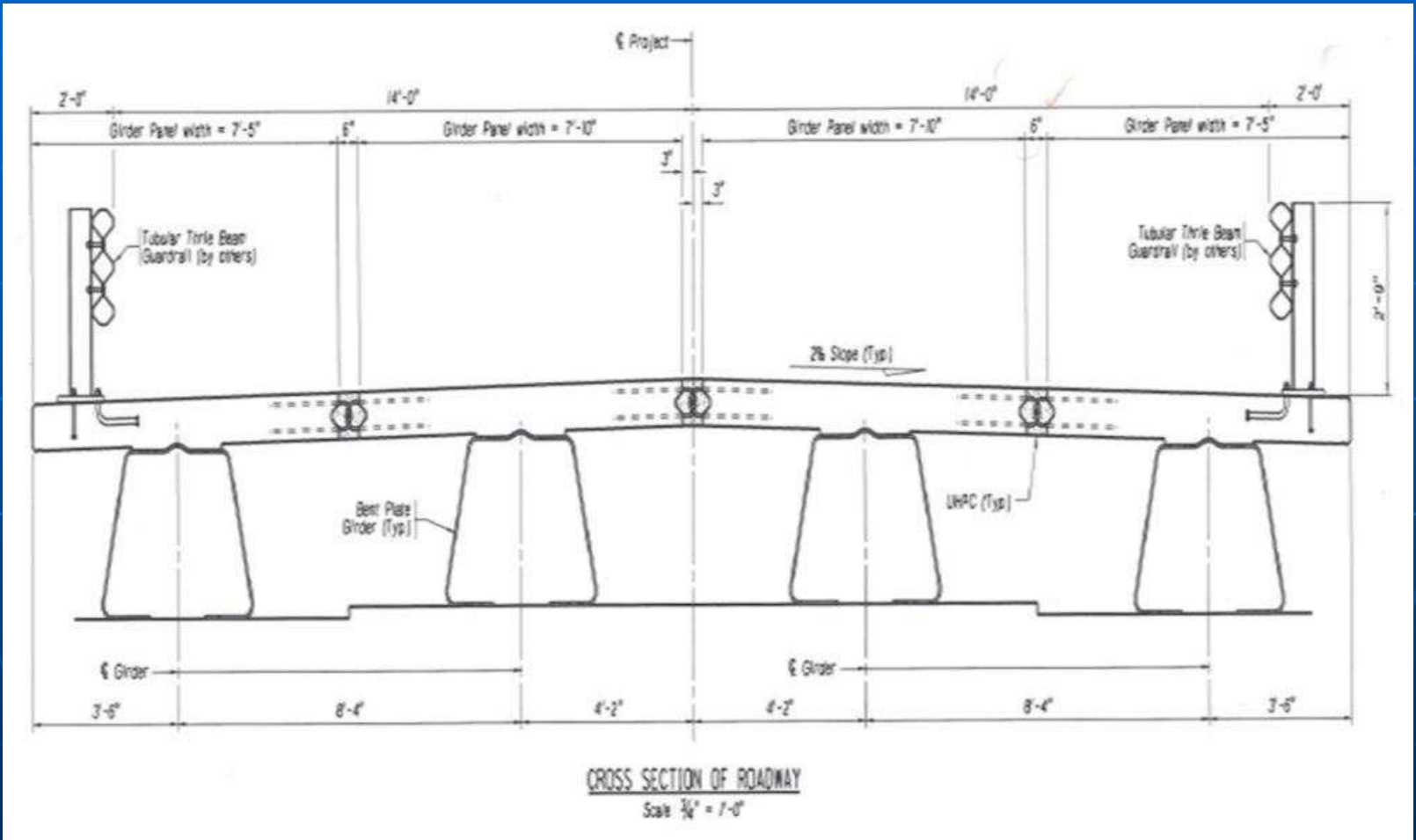
Finished Deck

Finished Bridge

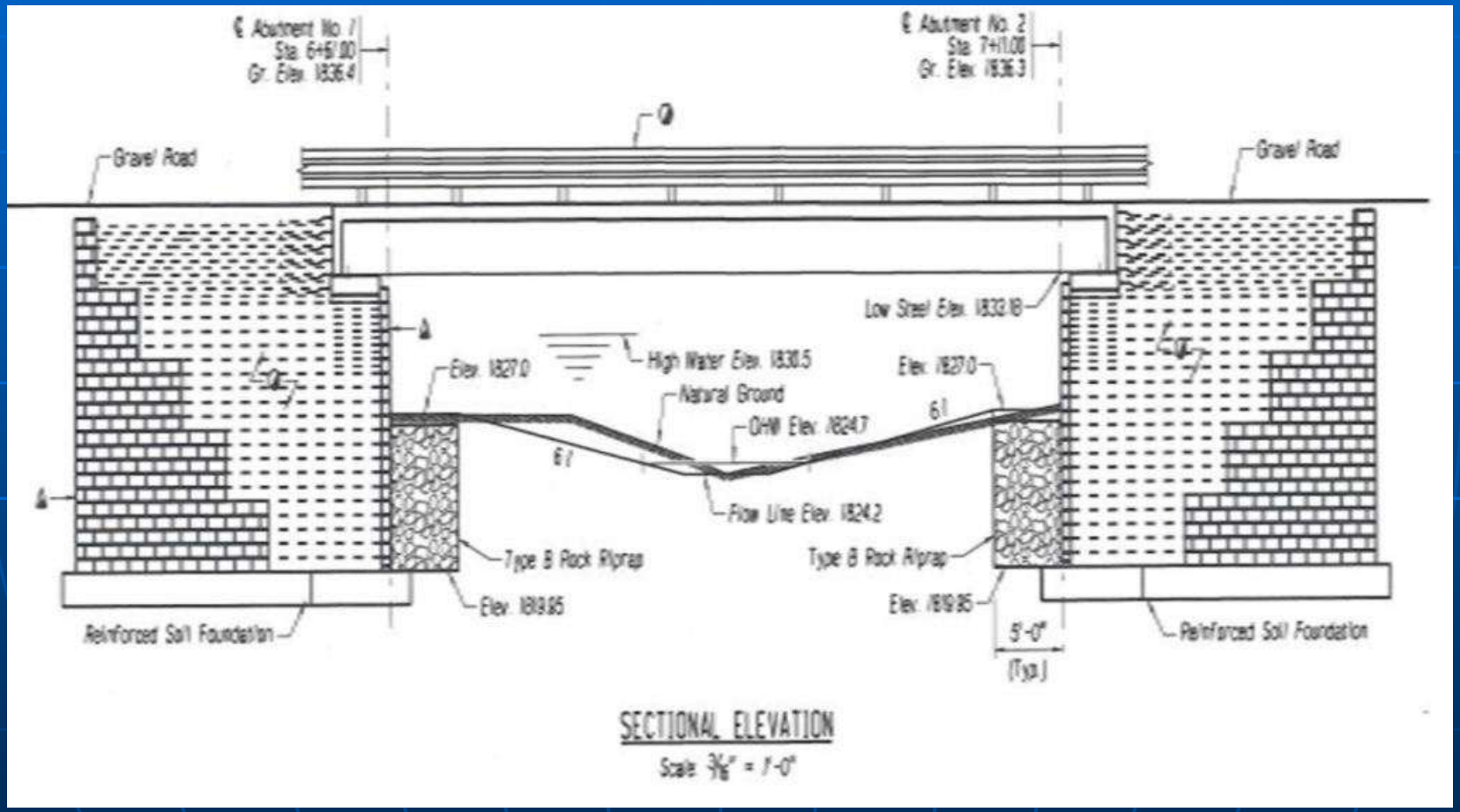
Folded Plate Girder with Deck



Folded Plate Girder with Deck



CROSS SECTION OF ROADWAY

Scale 3/4" = 1'-0"

Including GRS