



Precast Girder and Integral Bent Cap for the Sunset Blvd and Skirball Center Drive Overcrossing Bridges

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WESTERN BRIDGE ENGINEERS SEMINAR 2013

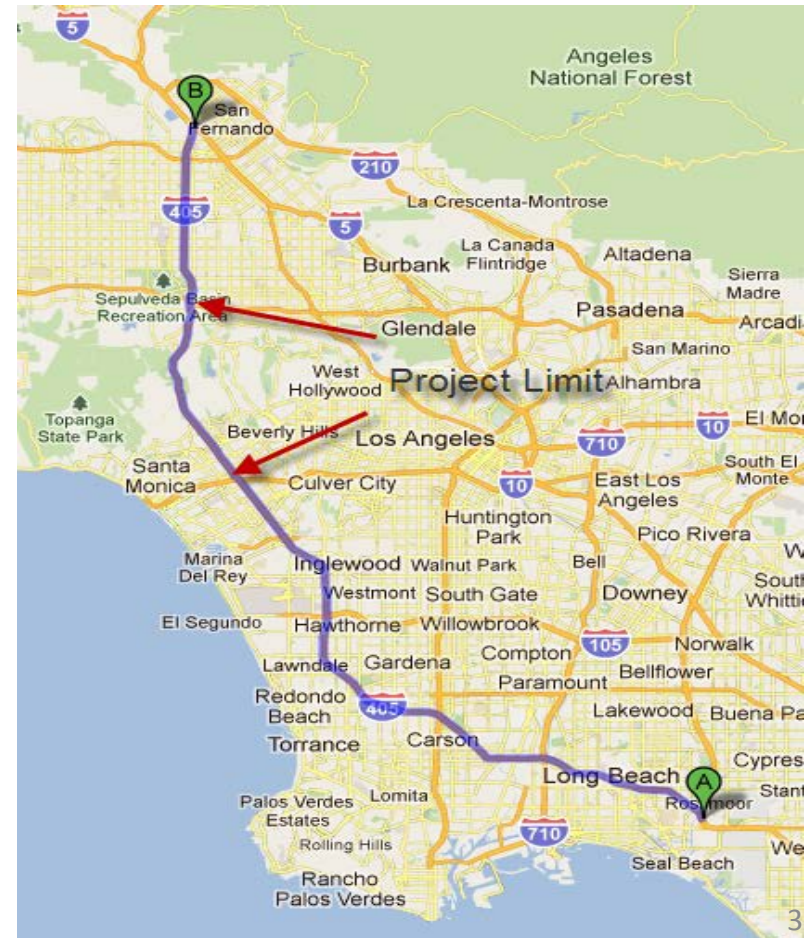
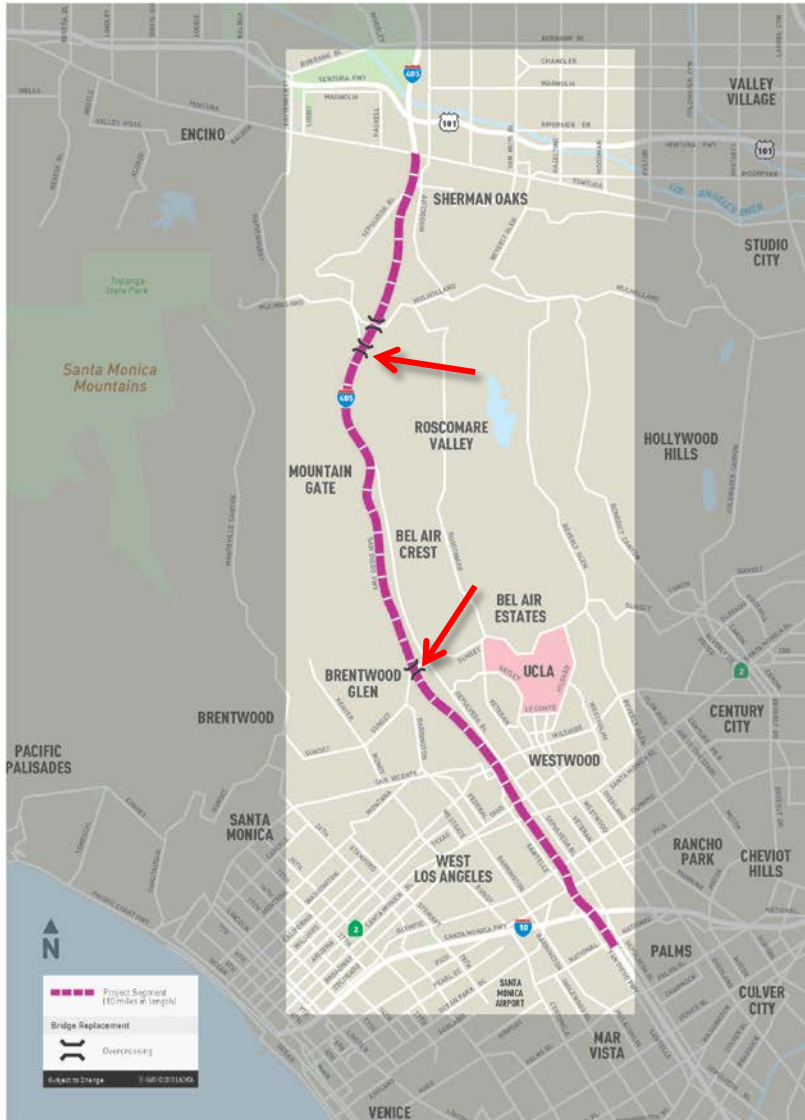


Outline

- 
- Project overview
 - Criteria for new bridges
 - Benefits
 - Complexities
 - Q & A
- } of Precast girder + Integral bent cap

Project Overview

- 10 Miles HOV Lane**
- 26 Bridges**
- Rebuild 28 ramps**
- Build 18 miles of retaining walls**



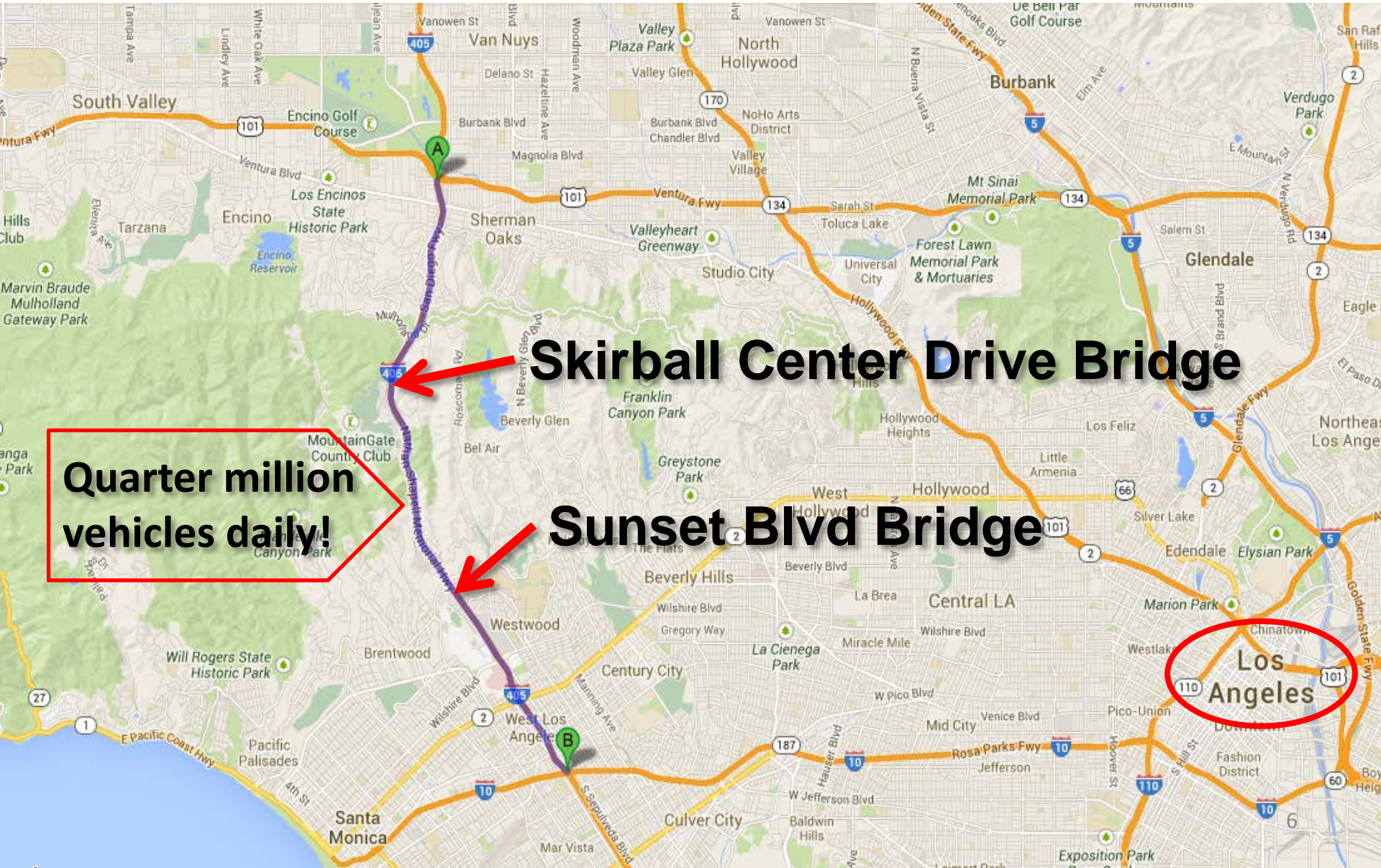
Project Overview



Project Overview



Project Overview



Skirball Center Drive Bridge

Sunset Blvd Bridge

Quarter million vehicles daily!

Los Angeles

Criteria for New Bridges

- Longer Span
- Vertical Clearance
- Vertical Profile
- Limit Disruption to Traffic

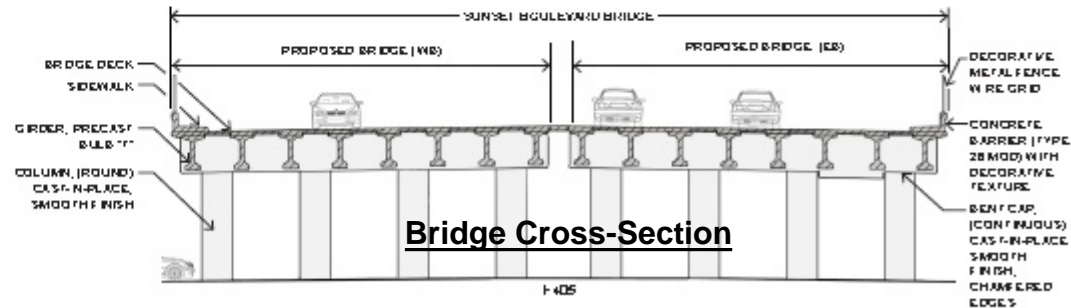


Criteria for New Sunset Blvd Bridge



Conceptual Visual Simulation (South Elevation)

- 346 ft Total length
- 126 ft Total width
- 3 Spans
- 2 Multi-column bents



New

Sunset Blvd Bridge

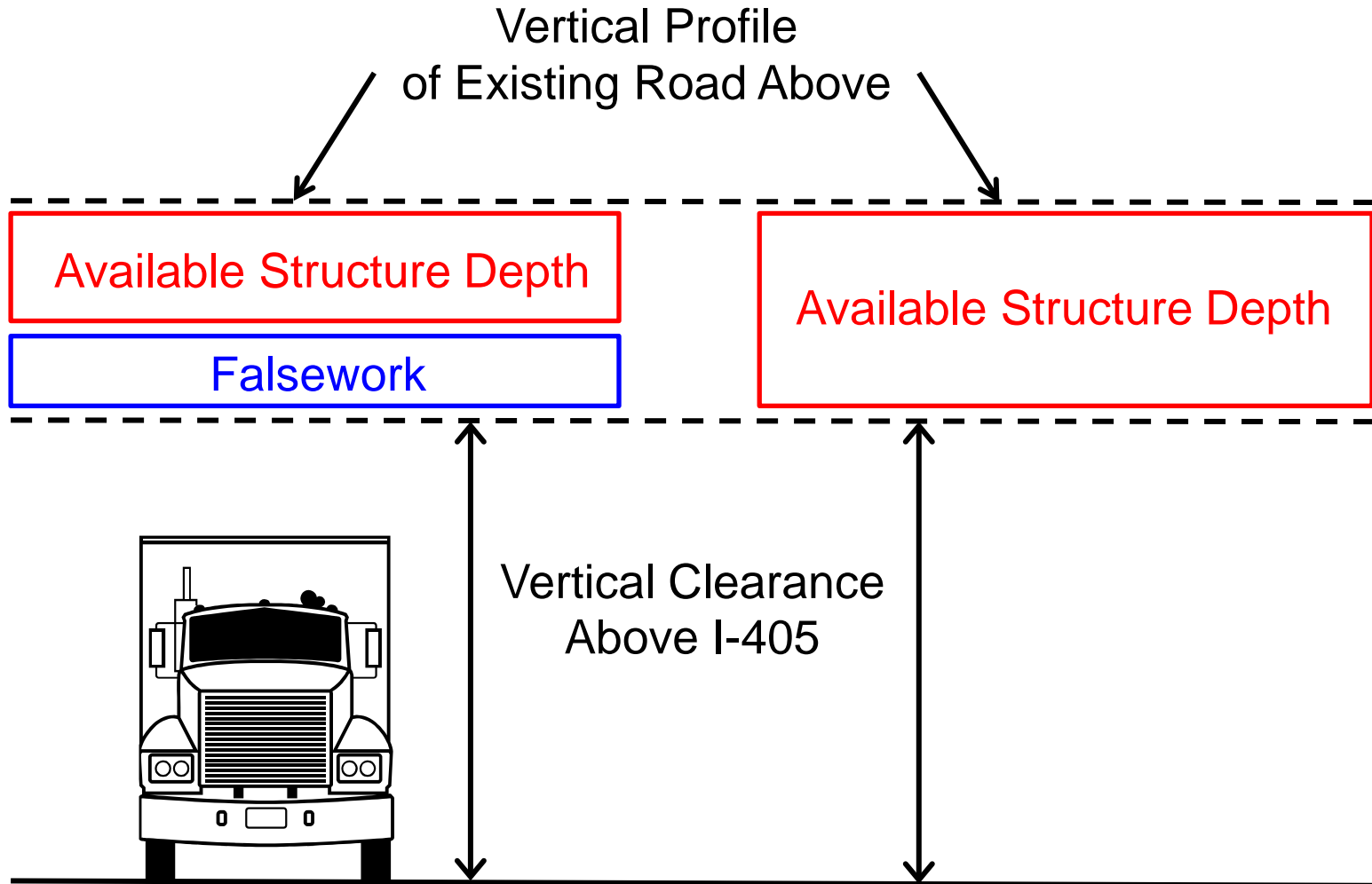


Criteria for New Skirball Center Drive Bridge

- 266 ft total length
- 90 ft total width
- 3 Spans
- 2 Multi-column bents



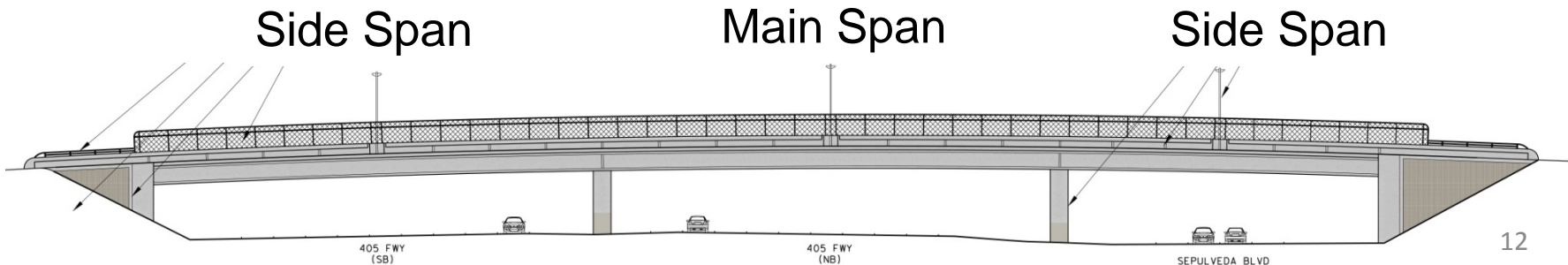
Criteria for New Bridges



Criteria for New Bridges

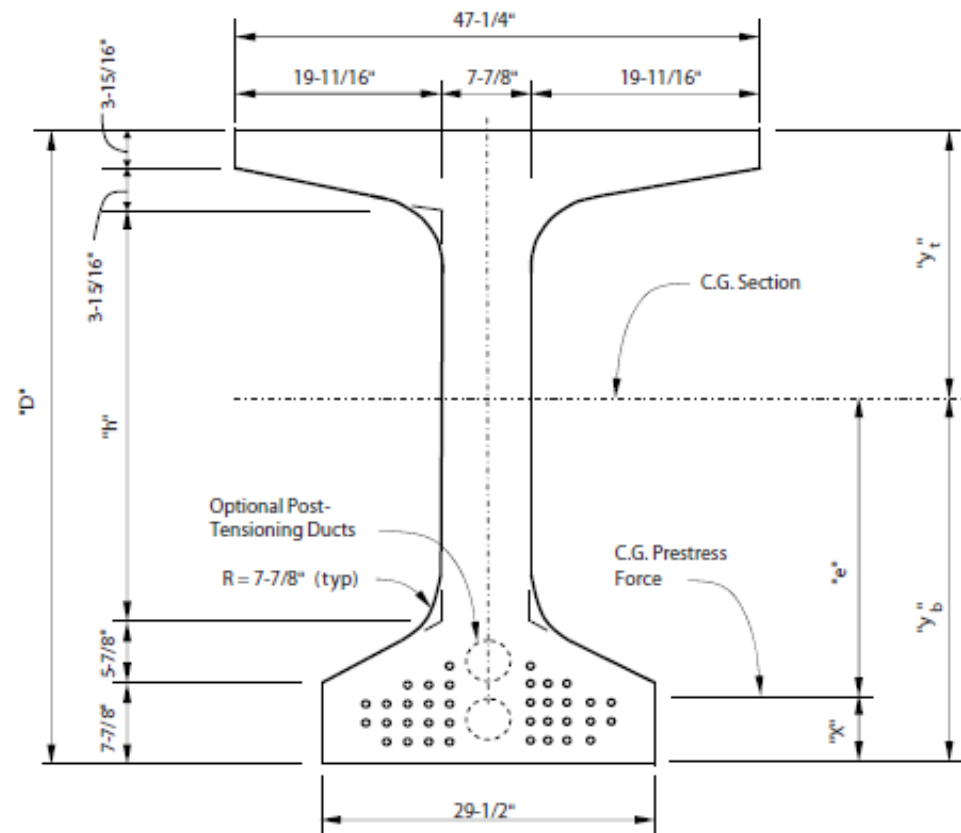
Bridges	Side Span (ft)	Main Span (ft)	Side Span (ft)
Sunset Blvd	127	128	91
Skirball Center Drive	118	102	45

Girder Type	Possible Span Length	Preferred Span Length
California I-Girder	50' to 125'	50' to 95'
California Bulb-Tee Girder	80' to 150'	95' to 150'
California Bath-Tub Girder	80' to 150'	80' to 120'



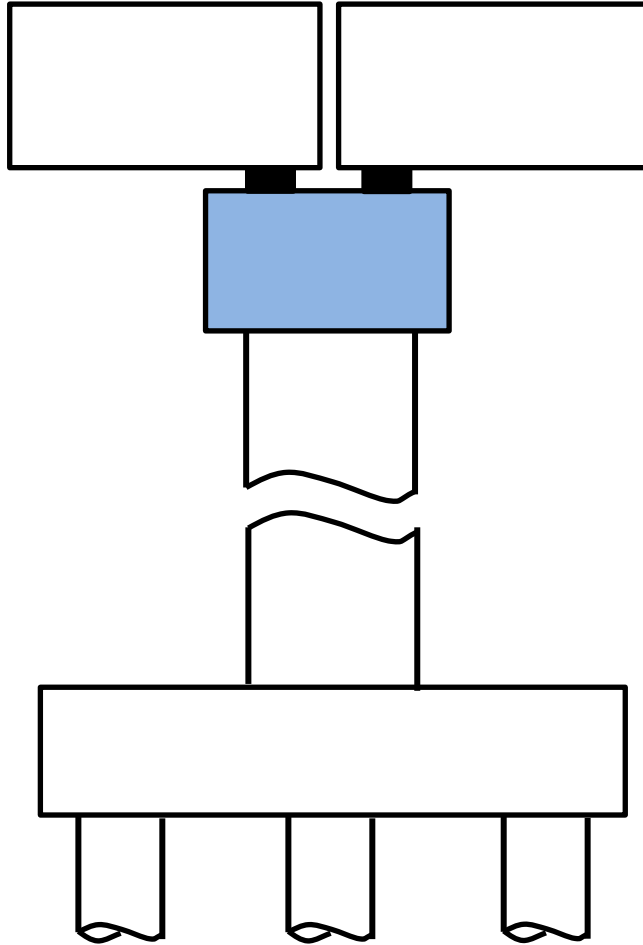
Precast Girder Features

- Eliminate falsework over traffic
- Construction speed
- Structure depth
- Maintain vertical clearance

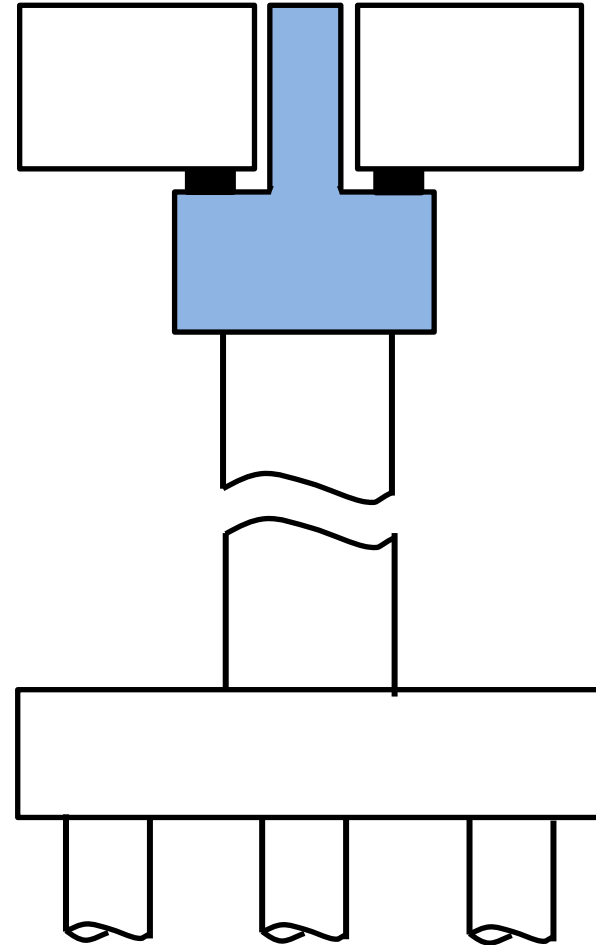


Options Considered

Drop Cap



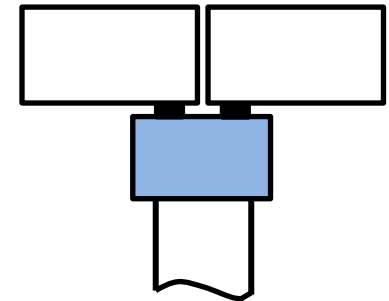
Inverted Tee Cap



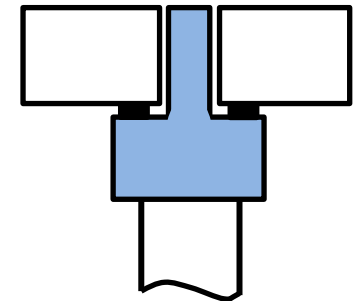
Options Considered

Drop Cap & Inverted Tee Cap

- Pros:
 - Easy to construct
 - No temporary support at Bents
- Cons:
 - No longitudinal continuity
 - Column pinned at top, fixed at base



Drop Cap



Inverted Tee
Cap

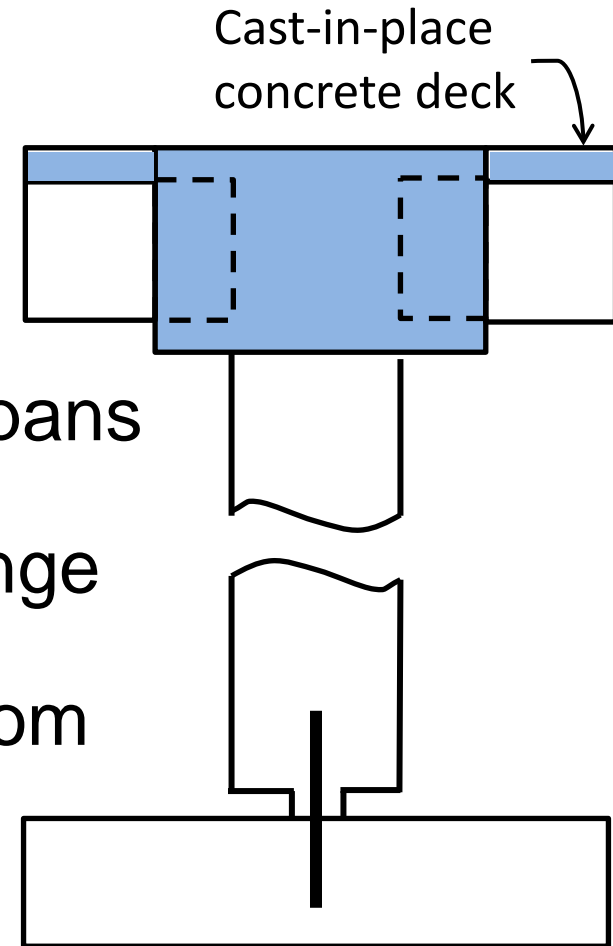
Integral Bent Cap

Pros: Longitudinal continuity

- Gravity/Live Load - Continuous spans
- Seismic - resist column plastic hinge
- Foundation - Column pinned bottom

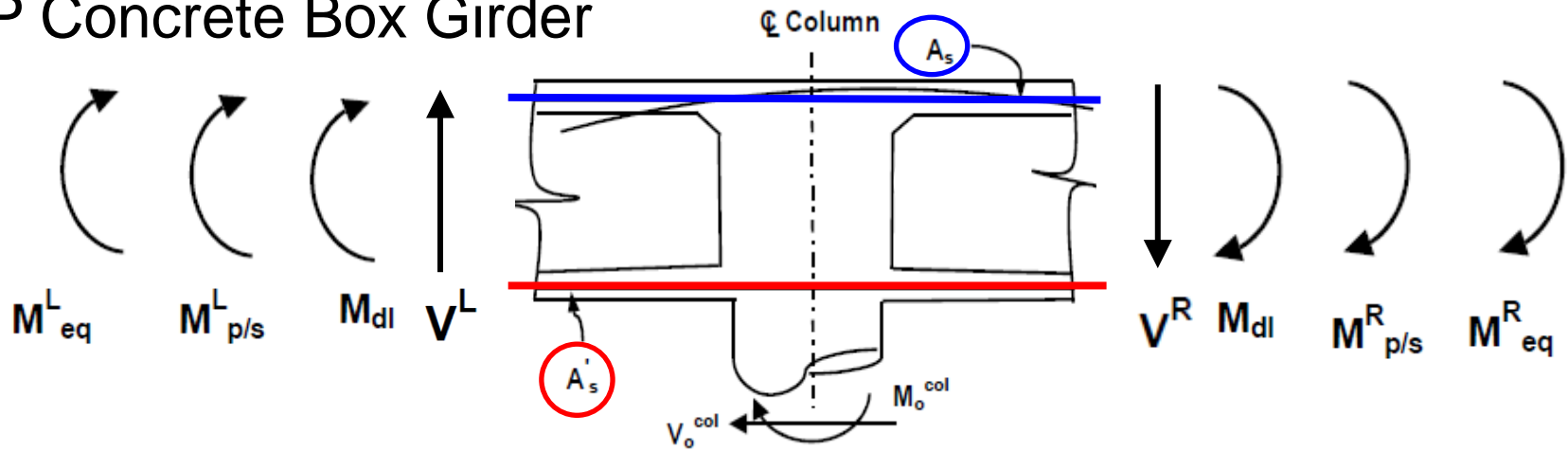
Cons:

- Added complexities

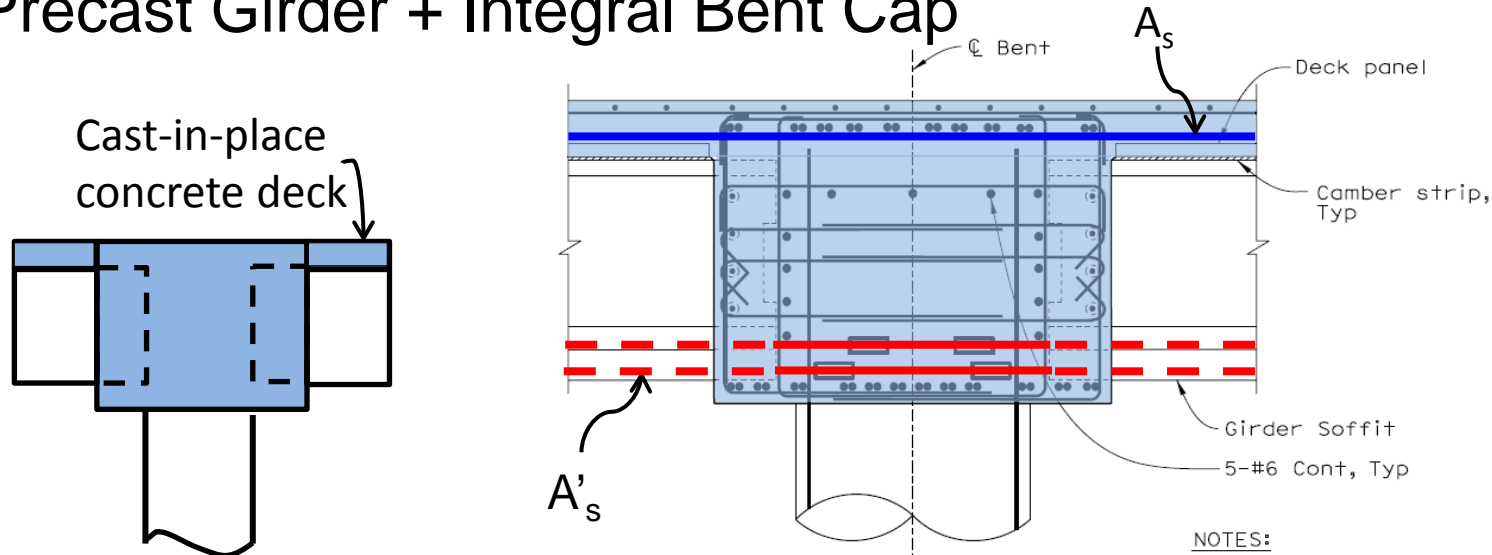


Resist Column Plastic Hinge

- CIP Concrete Box Girder

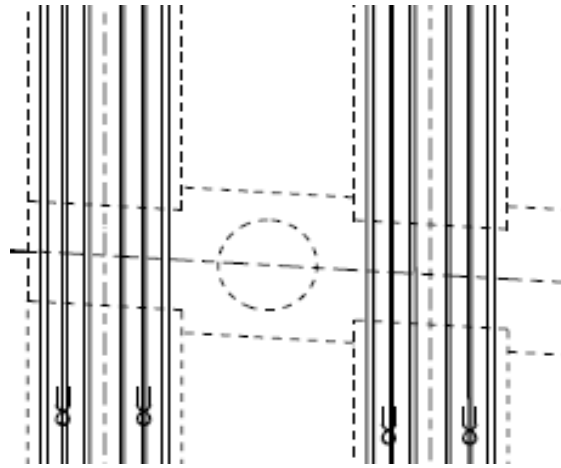


- Precast Girder + Integral Bent Cap

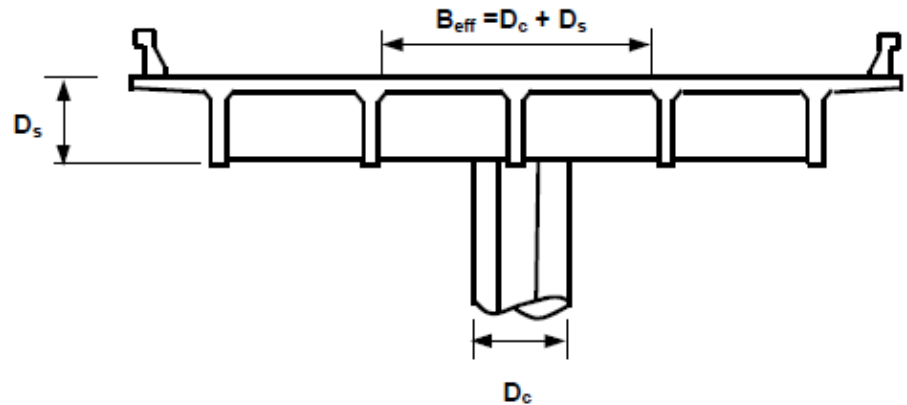


Resist Column Plastic Hinge

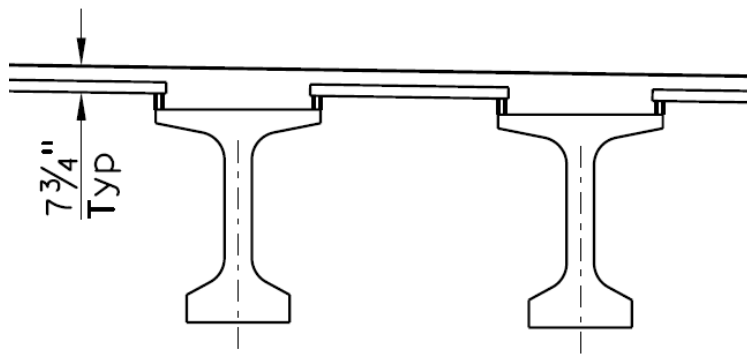
- Longitudinal continuity



Plan View



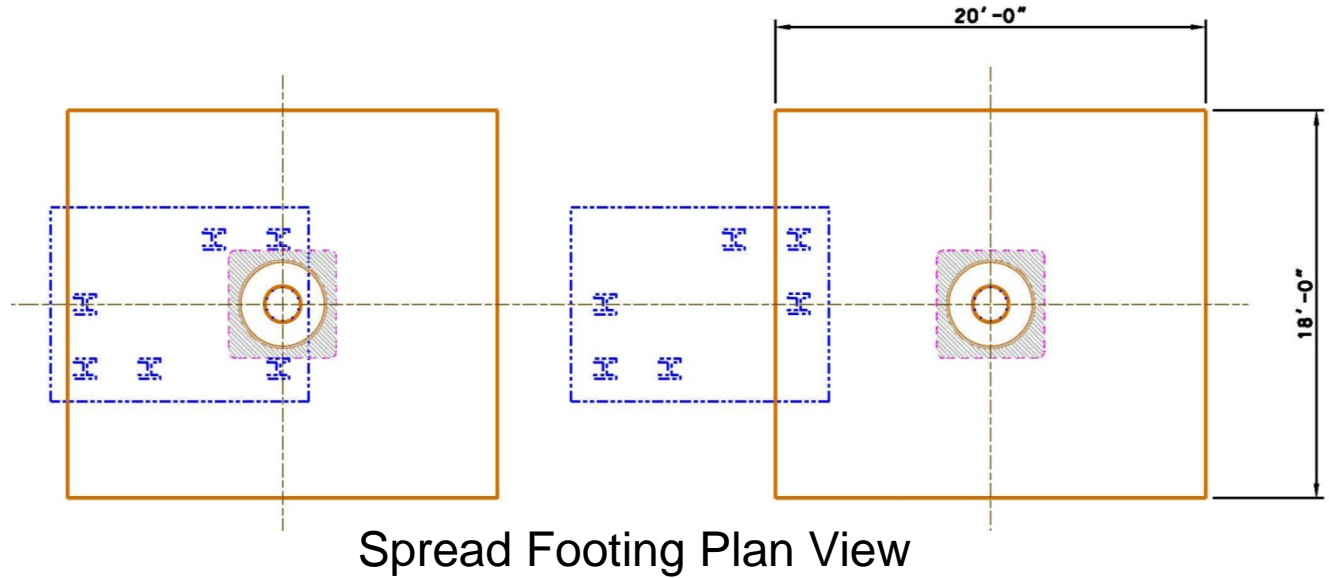
Elevation View



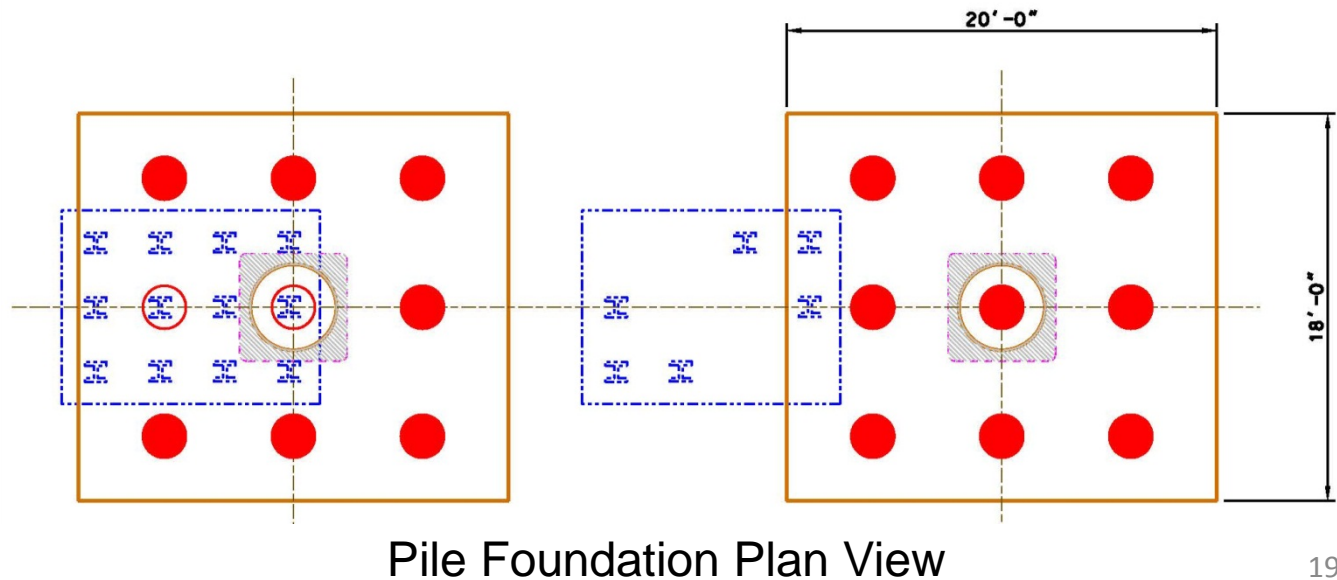
Elevation View

Foundation Benefit

Pinned
Column Base



Fixed
Column Base



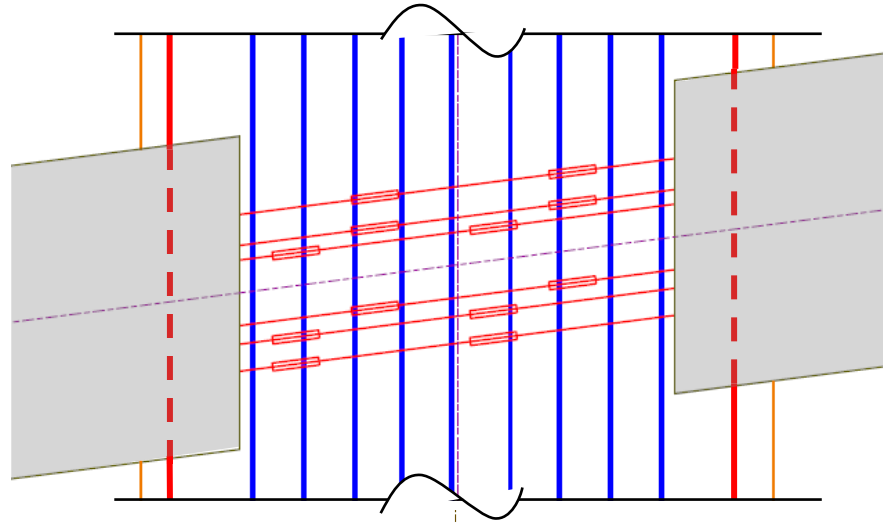
Complexities of Precast Girder + Integral Bent Cap

- Bent cap details
- Falsework
- Deck pour sequence

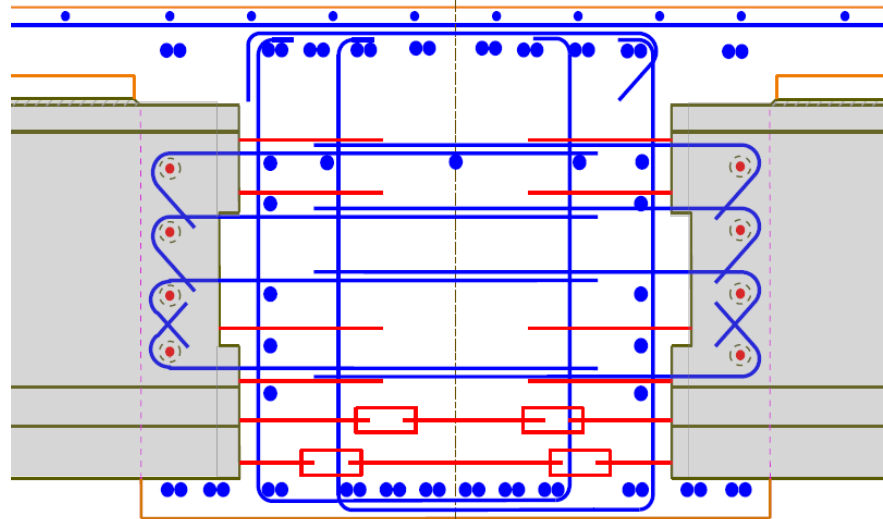


Bent Cap Details

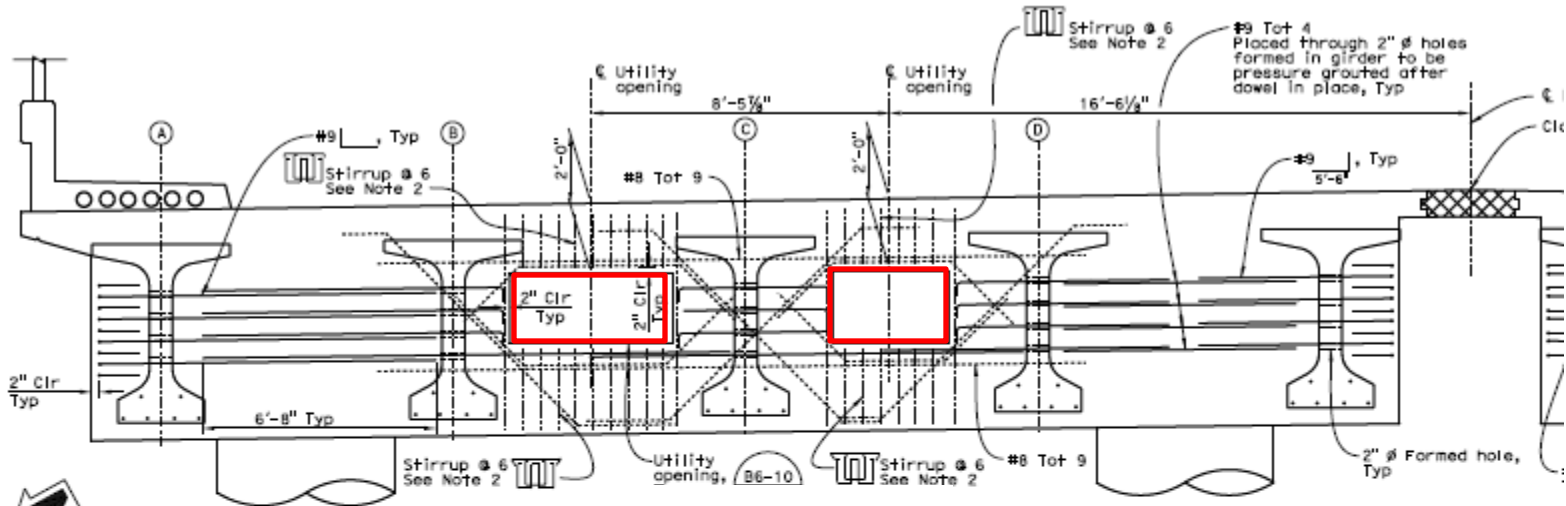
Plan View



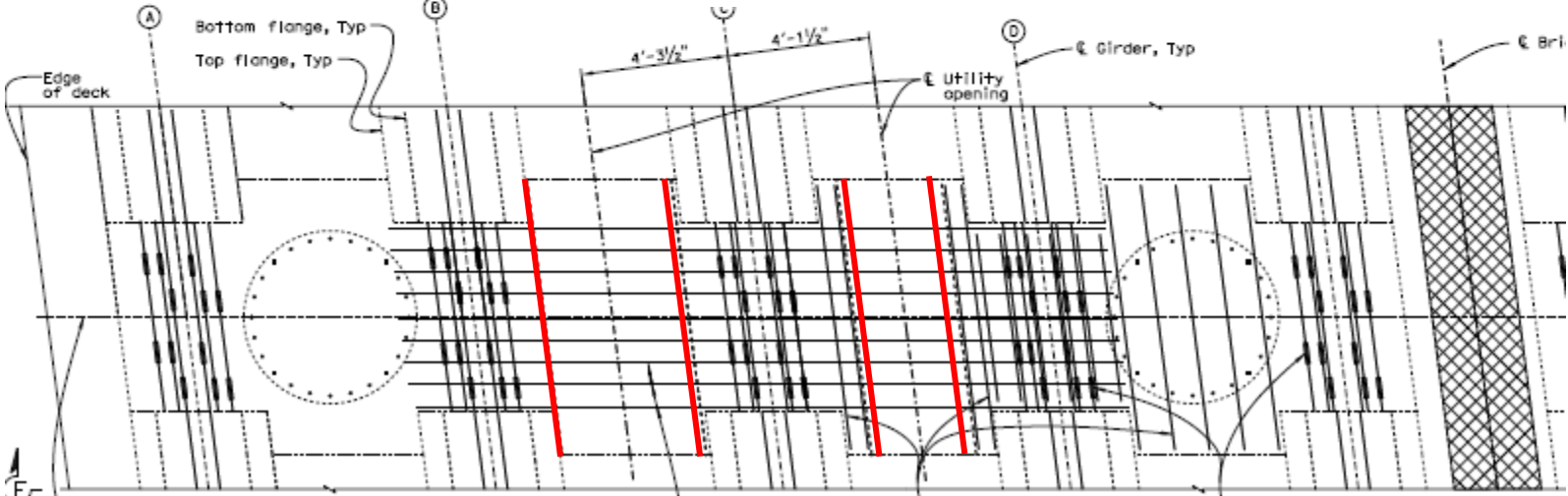
Section View



Bent Cap Details



Section View SECTION F-F
1/2"=1'-0"



Plan View

Falsework

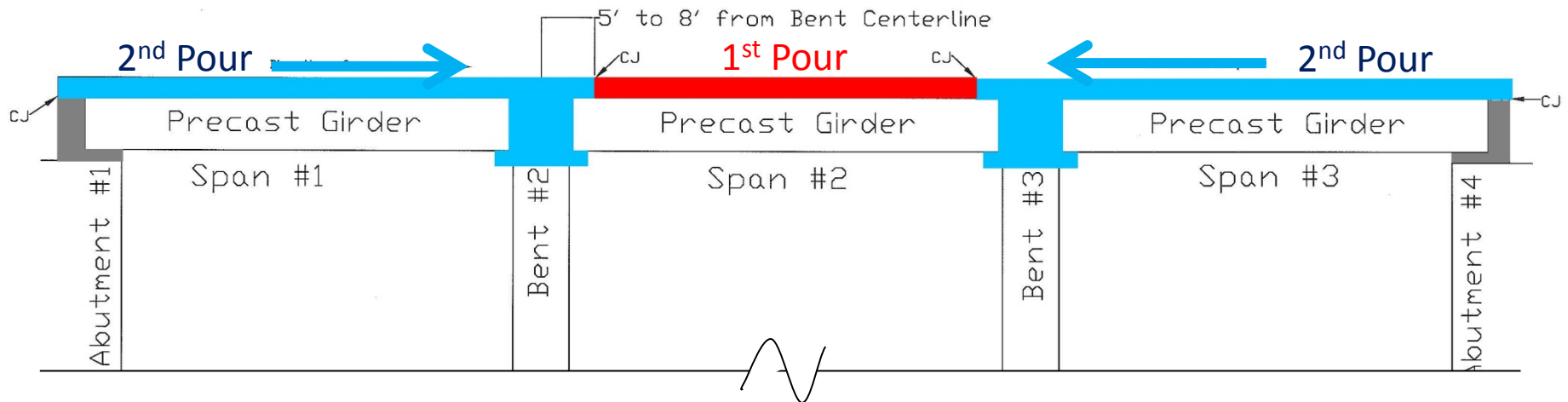
- Settlement monitoring
- Vertical clearance
- Final deck surface



Deck Pour Sequence

Things to consider

- Monolithic bent cap and deck
- Deck cracking



Results

- Sunset Blvd Bridge opened to traffic on Sep. 24, 2012
- Skirball Center Drive Bridge phase 2 nears completion

Precast girder + Integral Bent cap

- Pros:
 - No falsework over traffic
 - Resist column plastic hinge moment
 - Spread footing saves foundation cost
- Cons:
 - Complex bent cap details
 - Falsework settlement at bents
 - Deck pouring sequence

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Questions ?

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