



Precast Spliced U beams PCI Zone 6 Standards

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Orlando, FL
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Purpose and Outline

- How can these new products help my team? They will get you quantities quickly.
- Review of standards and details provided for Spliced curved and straight concrete U beams





PCI Zone 6 U Beam Go By Sheets

INDEX OF DRAWINGS

U-1	GENERAL INFORMATION
U-2	TYPICAL BRIDGE CROSS SECTIONS
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LRFD plus FDOT SDG with HL-93 Live Loading

1.7 Design Lane distribution factor

Staged construction analysis

SDL includes 3" of FWS

Flexural checked at SLS; ULS;

0 tension under DL conditions

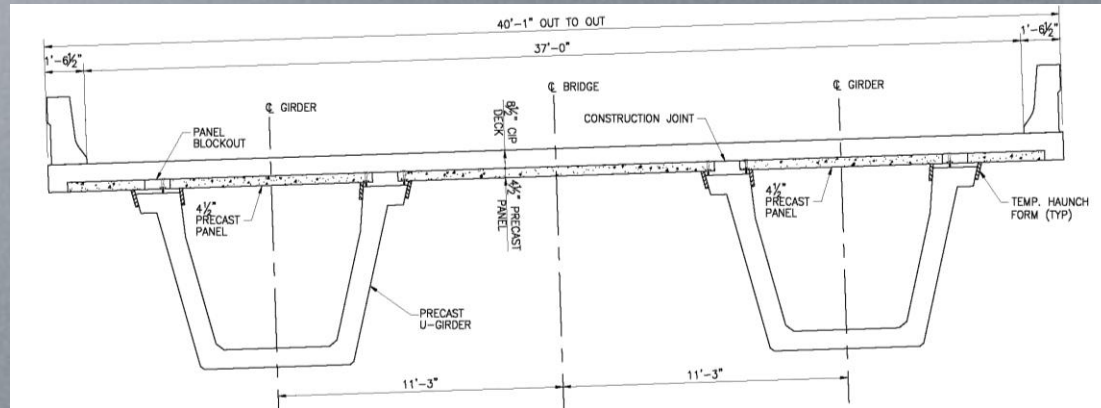
Shear generally controlled by Principal Stress

Torsion $> T_{cr}/2$ for open cross section

Deck steel stresses > 24 KSI tension



Typical Cross Section (U-3)



Typical section with constant bottom slab thickness

Typical section with variable bottom slab thickness

Option 2 with precast panels

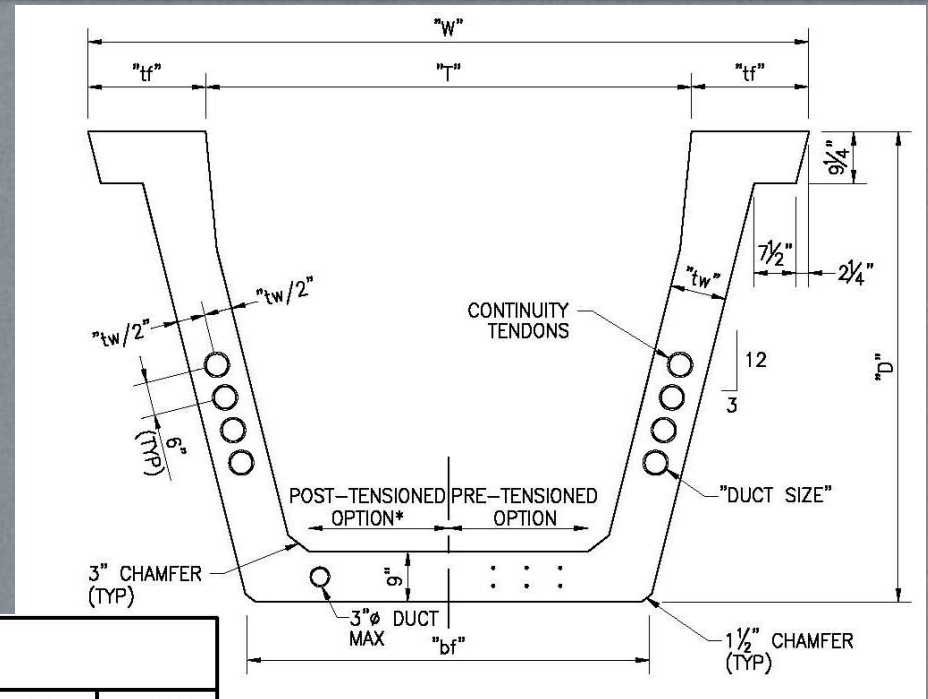
Option 2 CIP Lid Slab

Option 2 Light Weight Concrete

Option 2 19K6 with 10 inch webs



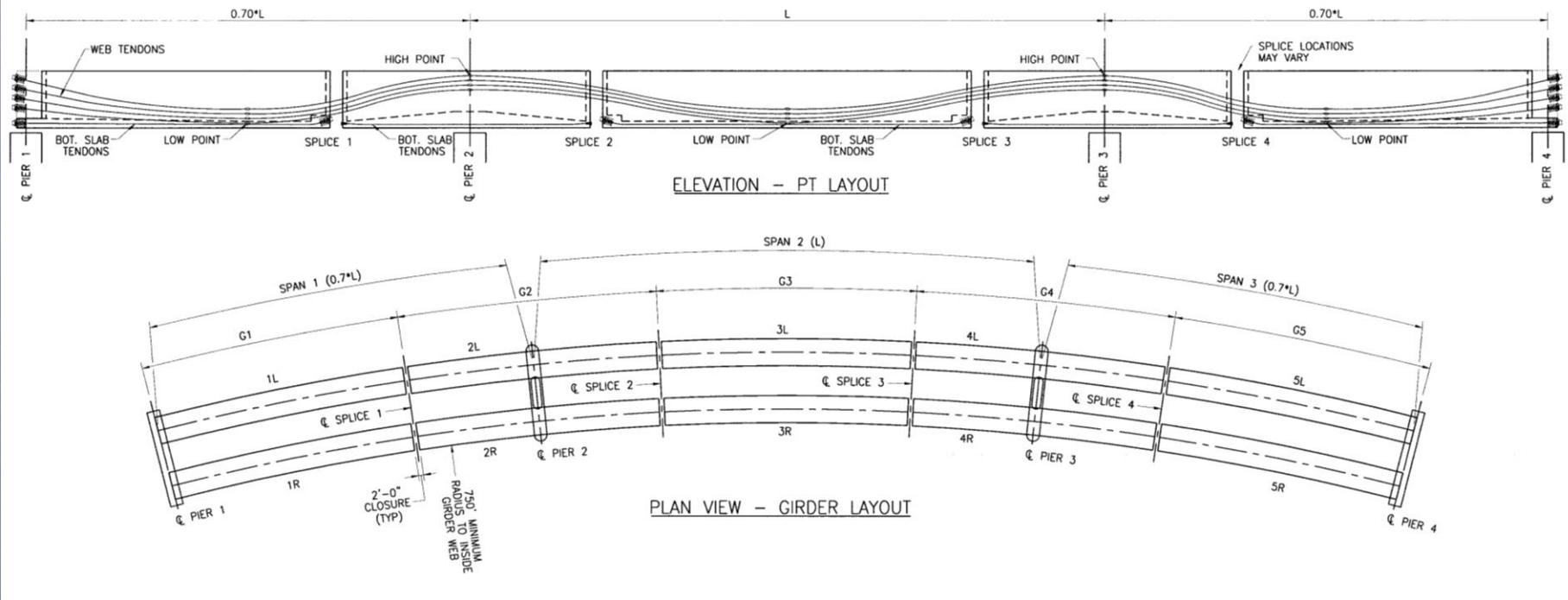
Girder Geometry (U-7)



GIRDER GEOMETRY

GIRDER	D	DUCT SIZE	t_w	W	T	t_f	b_f	WEIGHT
U72-3	6'-0"	3"Ø	9"	10'-1"	6'-9"	1'-8"	5'-10"	2,117 plf
U84-3	7'-0"	3"Ø	9"	10'-7"	7'-3"	1'-8"	5'-10"	2,349 plf
U96-3	8'-0"	3"Ø	9"	11'-1"	7'-9"	1'-8"	5'-10"	2,581 plf
U72-4	6'-0"	4"Ø	10"	10'-3"	6'-9"	1'-9"	6'-0"	2,271 plf
U84-4	7'-0"	4"Ø	10"	10'-9"	7'-3"	1'-9"	6'-0"	2,529 plf
U84/132 HAUNCH	-	4"Ø	-	-	-	-	-	*303 kips
U96-4	8'-0"	4"Ø	10"	11'-3"	7'-9"	1'-9"	6'-0"	2,787 plf

Three Span Unit (U-4)





Three Span Unit (U-4)

Maximum Span Lengths

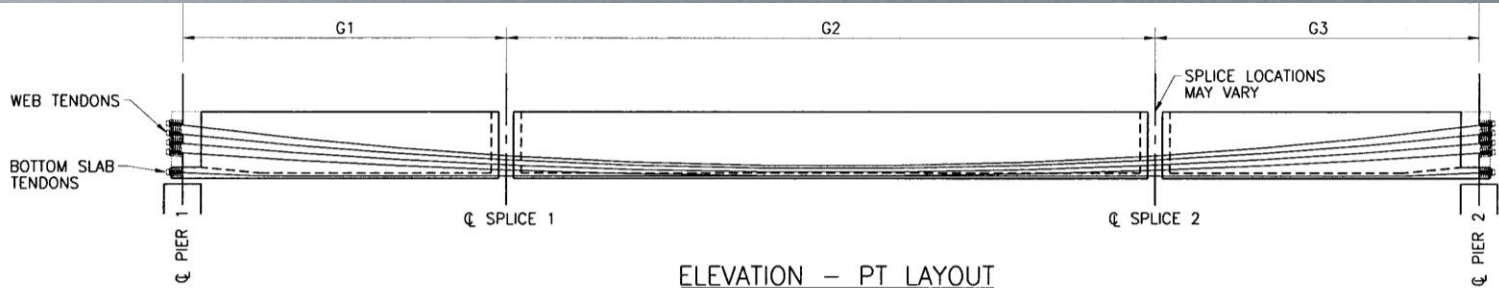
U72					
BOTTOM SLAB	PRECAST PANELS	CIP LID SLAB	CONCRETE	TENDONS (PER WEB)	LMAX
CONSTANT	NO	NO	NORMAL	3 x 12-0.6"φ	185'-0"
VARIABLE	YES	NO	NORMAL	4 x 12-0.6"φ	185'-0"
VARIABLE	NO	NO	NORMAL	4 x 12-0.6"φ	200'-0"
VARIABLE	NO	YES	NORMAL	4 x 12-0.6"φ	205'-0"
VARIABLE	NO	YES	LIGHTWEIGHT	4 x 12-0.6"φ	220'-0"
VARIABLE	NO	NO	NORMAL	3 x 19-0.6"φ	220'-0"

U84					
BOTTOM SLAB	PRECAST PANELS	CIP LID SLAB	CONCRETE	TENDONS (PER WEB)	LMAX
CONSTANT	NO	NO	NORMAL	3 x 12-0.6"φ	195'-0"
VARIABLE	YES	NO	NORMAL	4 x 12-0.6"φ	205'-0"
VARIABLE	NO	NO	NORMAL	4 x 12-0.6"φ	220'-0"
VARIABLE	NO	YES	NORMAL	4 x 12-0.6"φ	225'-0"
VARIABLE	NO	YES	LIGHTWEIGHT	4 x 12-0.6"φ	235'-0"
VARIABLE	NO	NO	NORMAL	4 x 19-0.6"φ	265'-0"

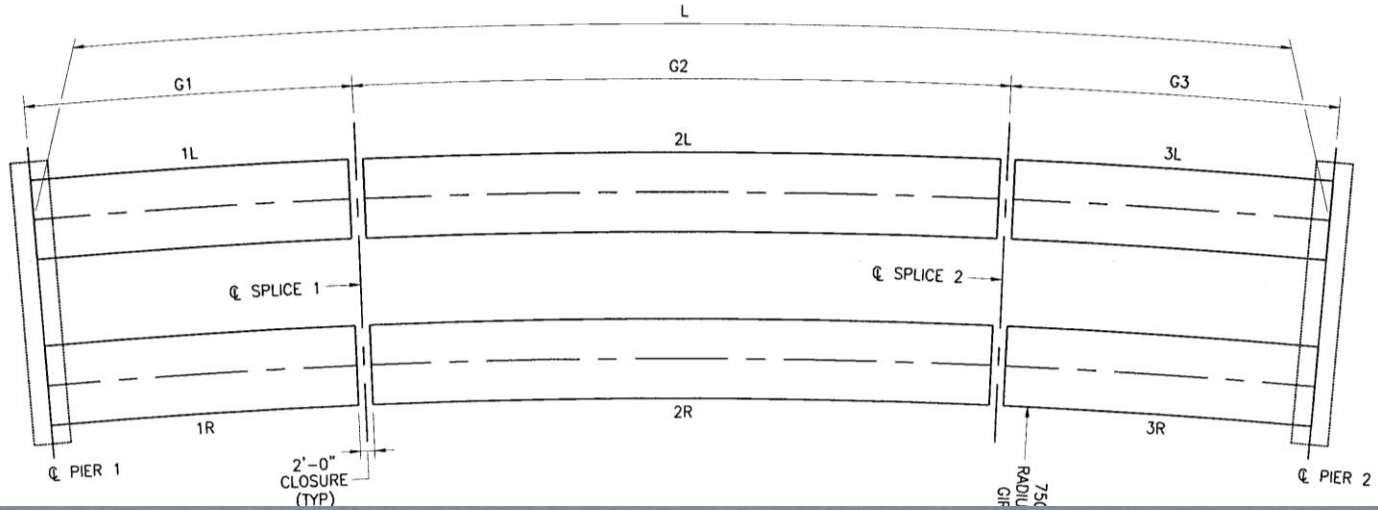
U96					
BOTTOM SLAB	PRECAST PANELS	CIP LID SLAB	CONCRETE	TENDONS (PER WEB)	LMAX
CONSTANT	NO	NO	NORMAL	3 x 12-0.6"φ	205'-0"
VARIABLE	YES	NO	NORMAL	4 x 12-0.6"φ	215'-0"
VARIABLE	NO	NO	NORMAL	4 x 12-0.6"φ	230'-0"
VARIABLE	NO	YES	NORMAL	4 x 12-0.6"φ	240'-0"
VARIABLE	NO	YES	LIGHTWEIGHT	4 x 12-0.6"φ	250'-0"
VARIABLE	NO	NO	NORMAL	4 x 19-0.6"φ	280'-0"



Spliced Simple Spans (U-5)



ELEVATION - PT LAYOUT



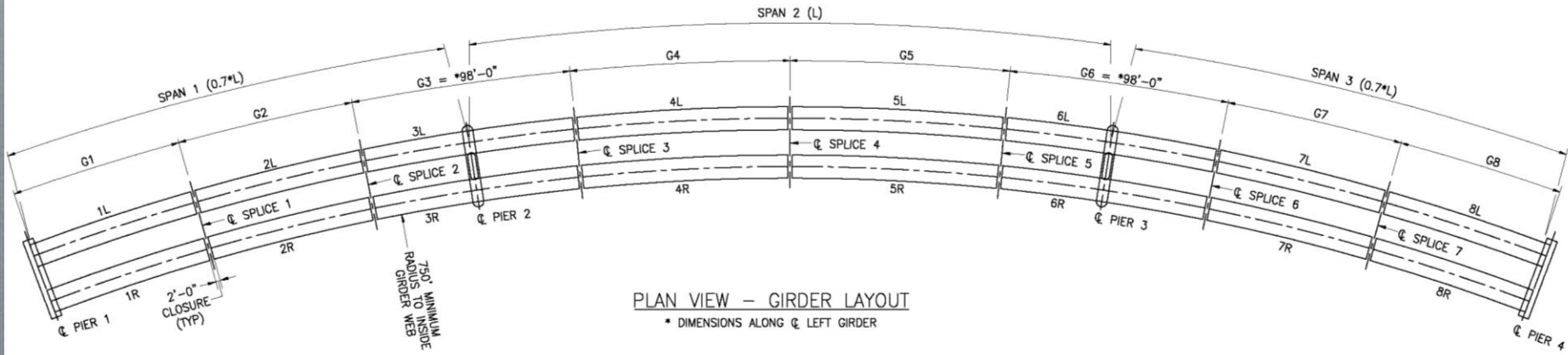
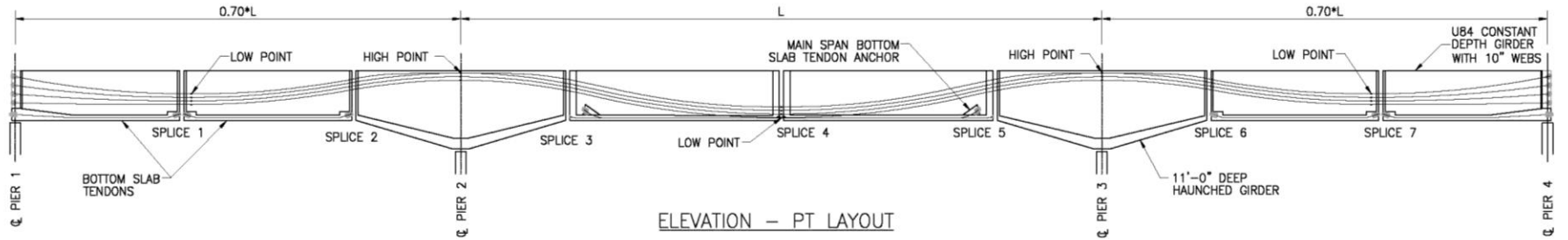


Maximum Simple Span(U-5)

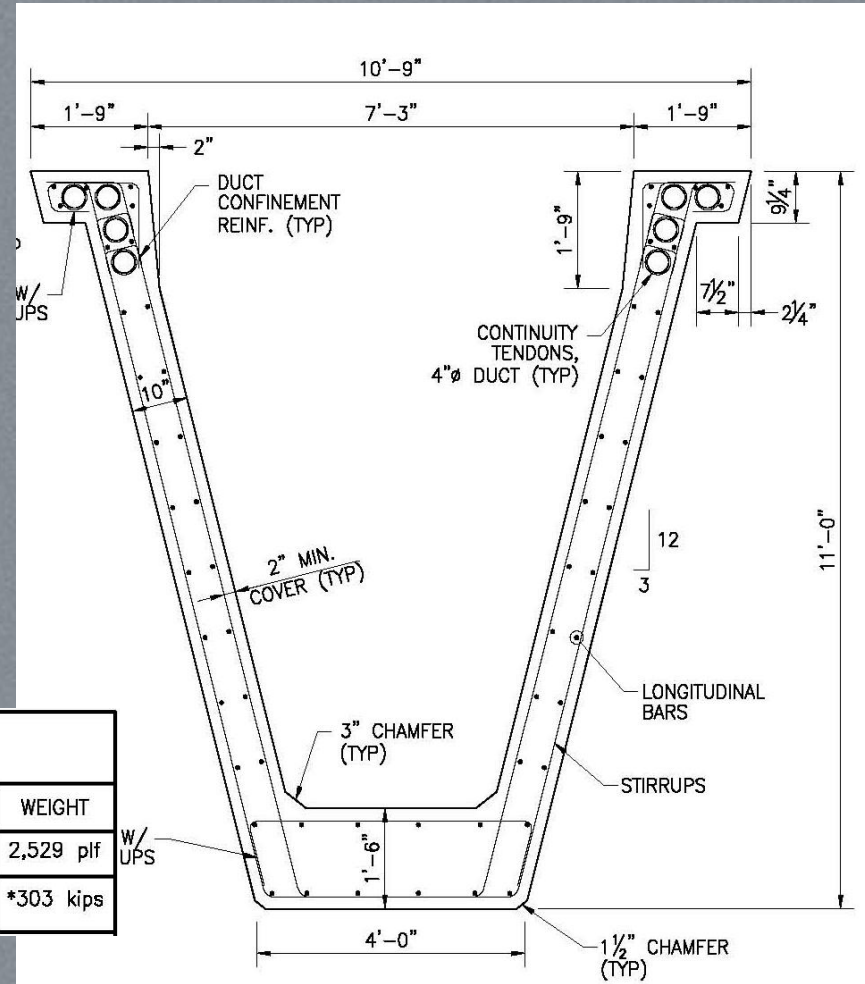
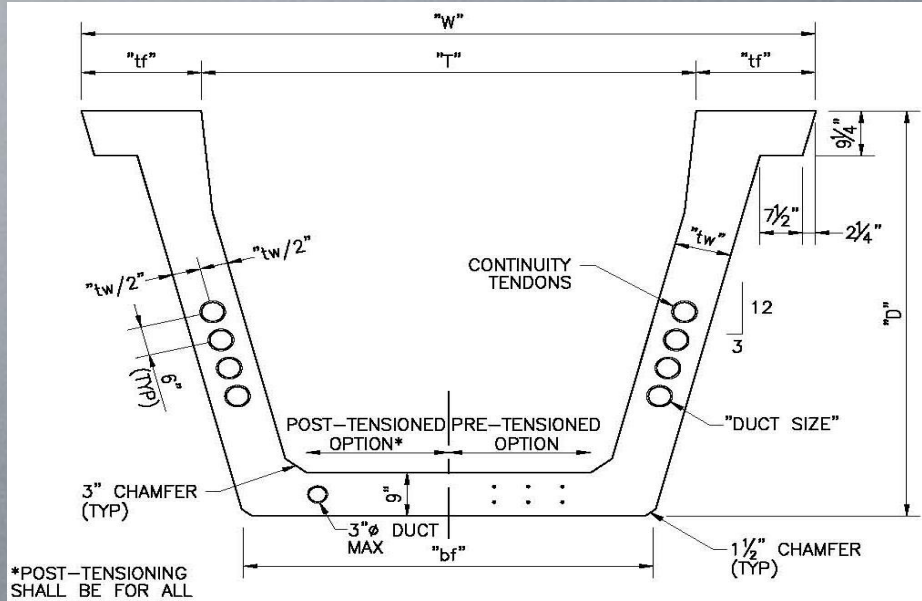
GIRDER TYPE	PRECAST PANELS	CIP LID SLAB	CONCRETE	TENDONS (PER WEB)	BOT. SLAB TENDONS	LMAX
U72	NO	NO	NORMAL	4 x 12-0.6"Ø	4 x 12-0.6"Ø	175'-0"
	NO	NO	NORMAL	4 x 19-0.6"Ø	4 x 12-0.6"Ø	180'-0"
U84	NO	NO	NORMAL	4 x 12-0.6"Ø	4 x 12-0.6"Ø	190'-0"
	NO	NO	NORMAL	4 x 19-0.6"Ø	4 x 12-0.6"Ø	200'-0"
U96	NO	NO	NORMAL	4 x 12-0.6"Ø	4 x 12-0.6"Ø	200'-0"
	NO	NO	NORMAL	4 x 19-0.6"Ø	4 x 12-0.6"Ø	220'-0"



3 Span Haunched Girder (U-6)



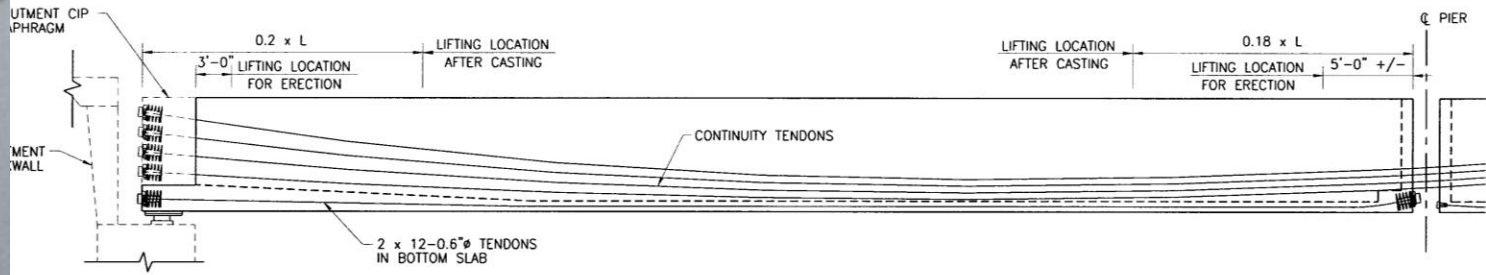
Haunched Girder Geometry (U-7)



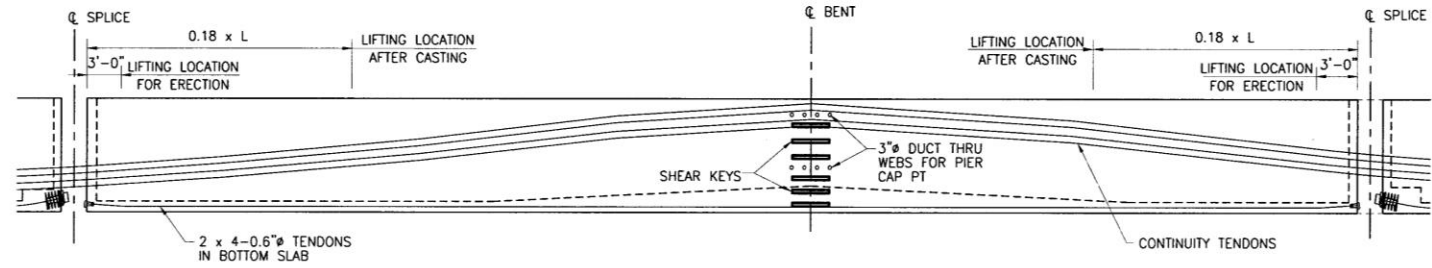
GIRDER GEOMETRY								
GIRDER	D	DUCT SIZE	t_w	W	T	t_f	bf	WEIGHT
U84-4	7'-0"	4" ϕ	10"	10'-9"	7'-3"	1'-9"	6'-0"	2,529 plf
U84/132 HAUNCH	-	4" ϕ	-	-	-	-	-	*303 kips



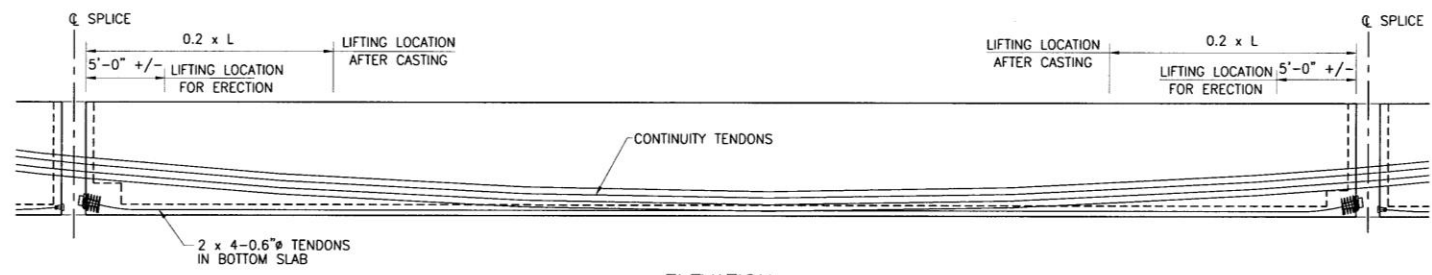
3 span tendon profile (U-9)



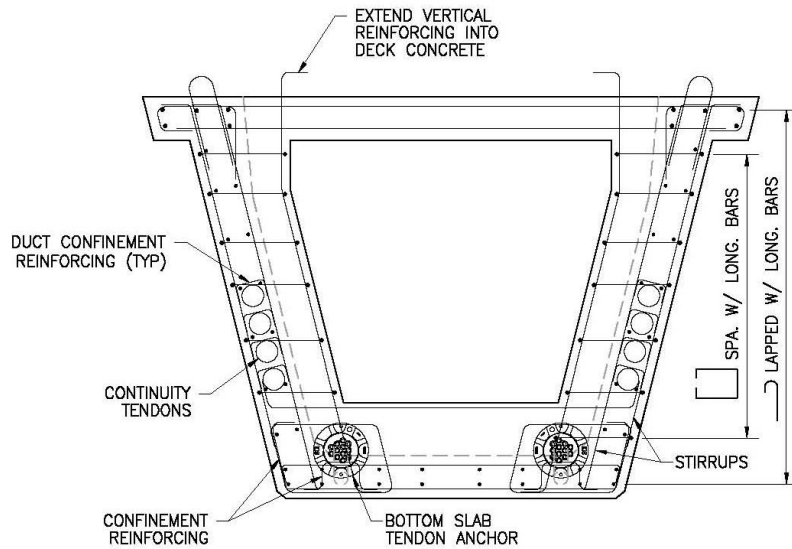
ELEVATION
TYPICAL END GIRDER



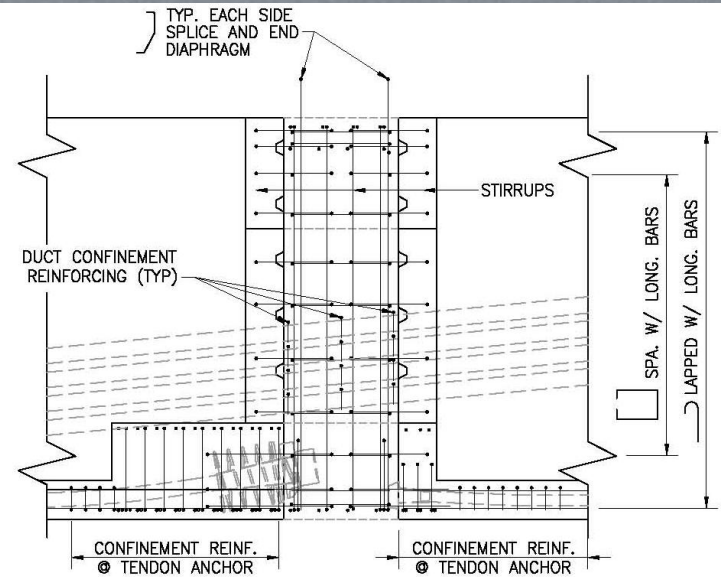
ELEVATION
TYPICAL BENT GIRDER



ELEVATION
TYPICAL MID-SPAN GIRDER

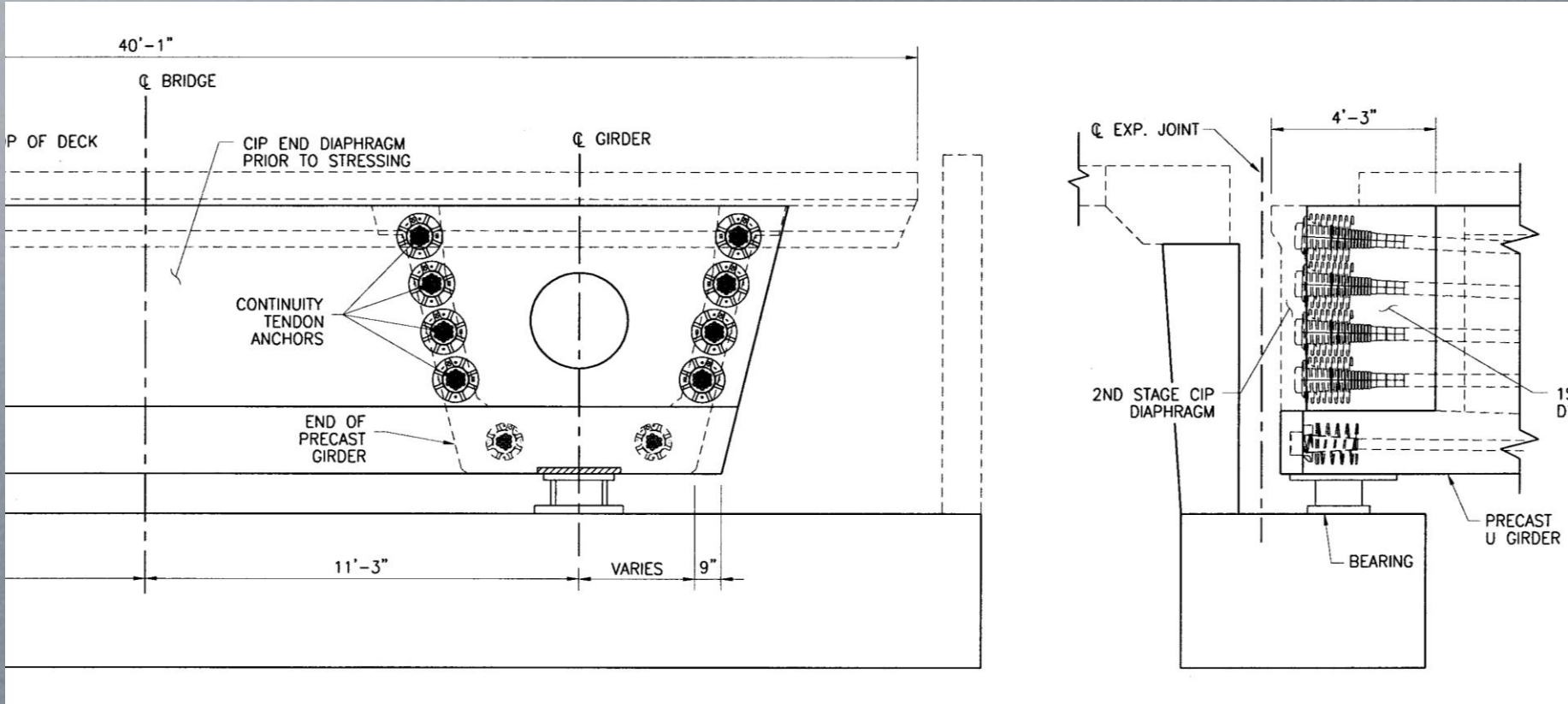


TYPICAL SPLICE REINFORCING

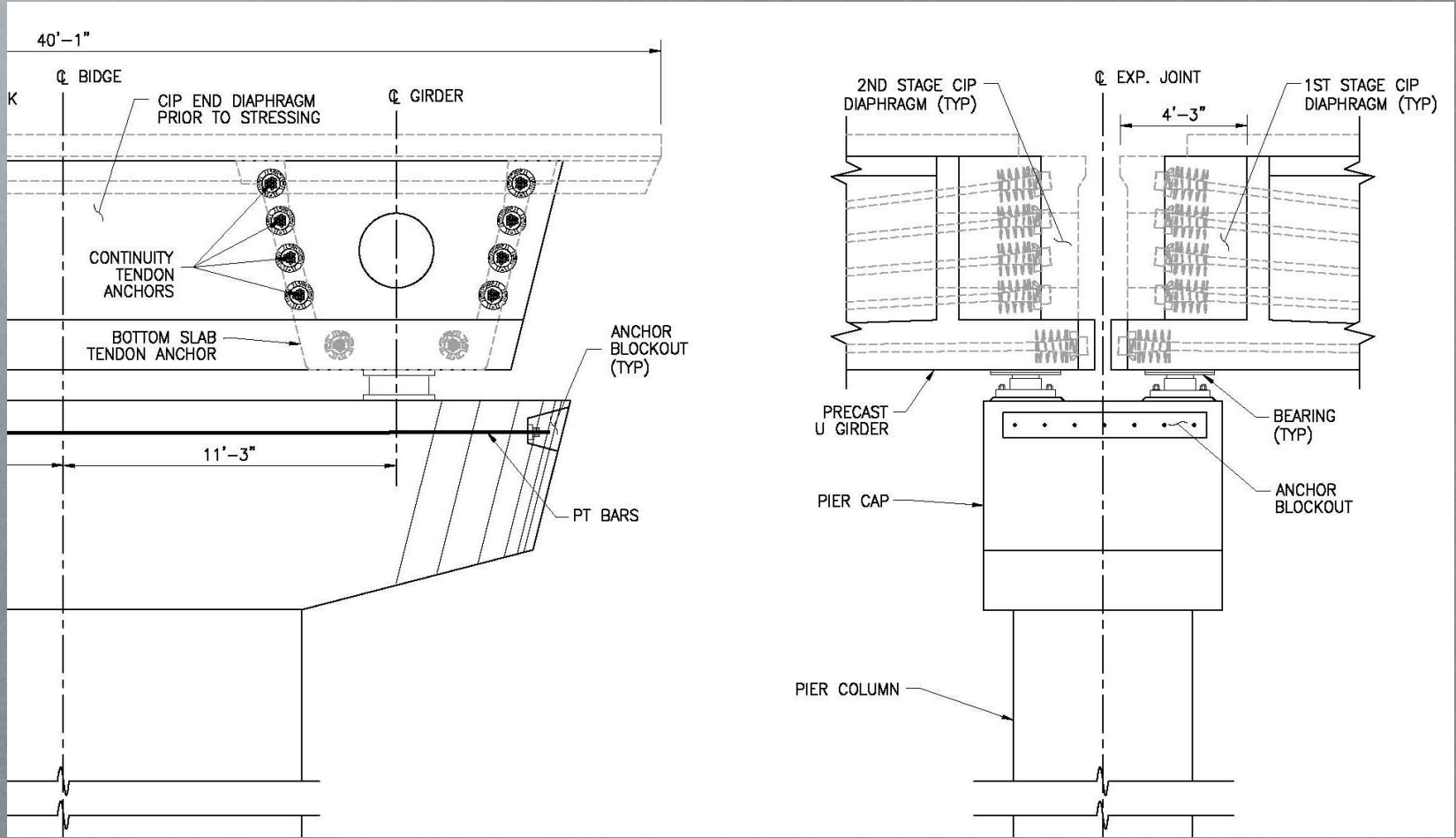


SPLICE REINFORCING SECTION

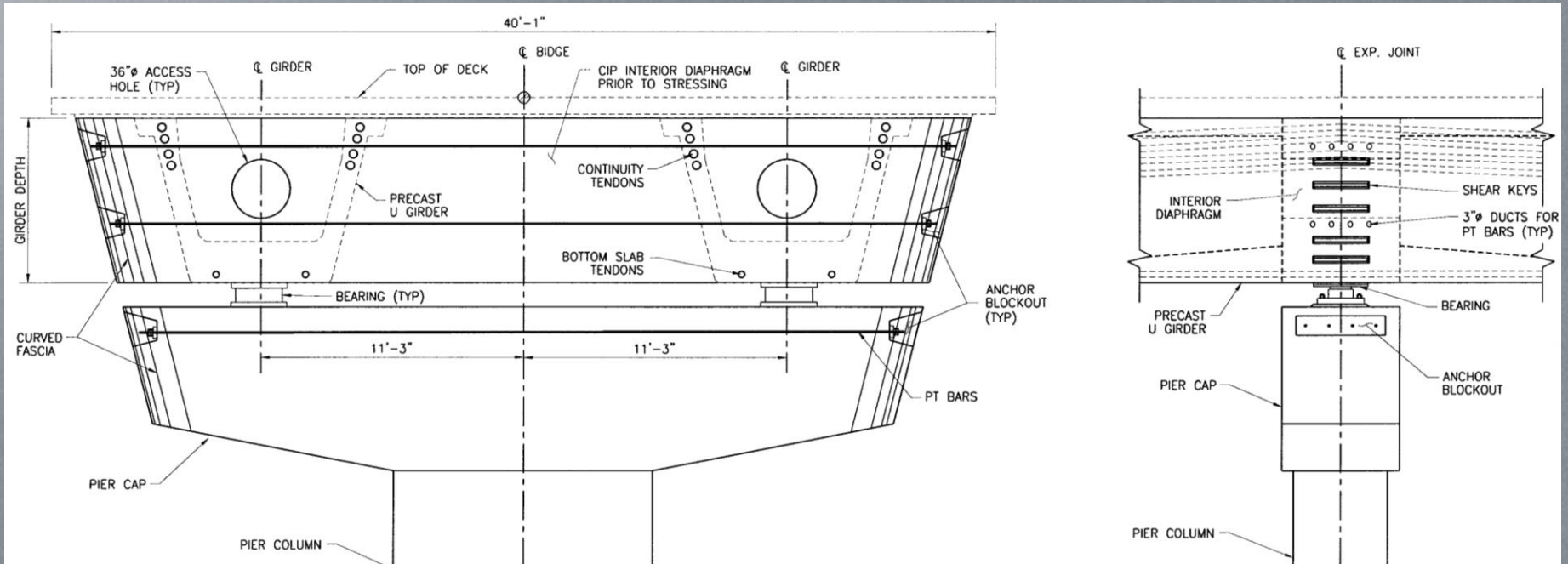
End Abutment Details (U-10)



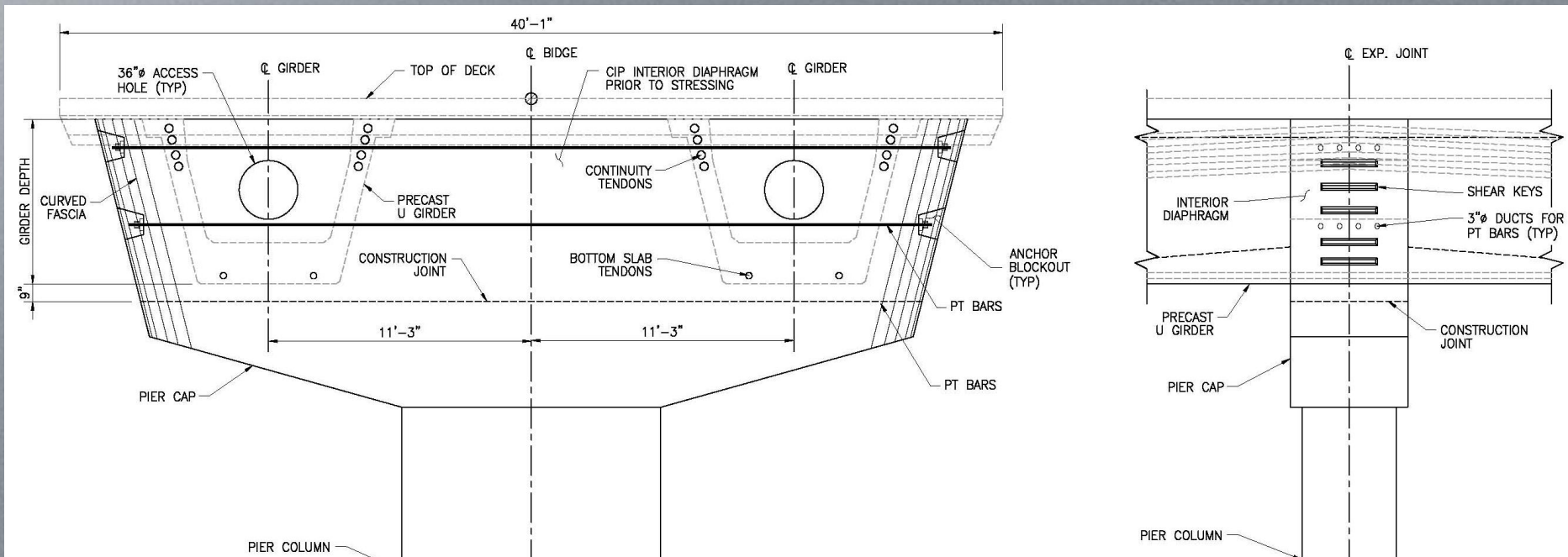
Expansion Pier (U-11)



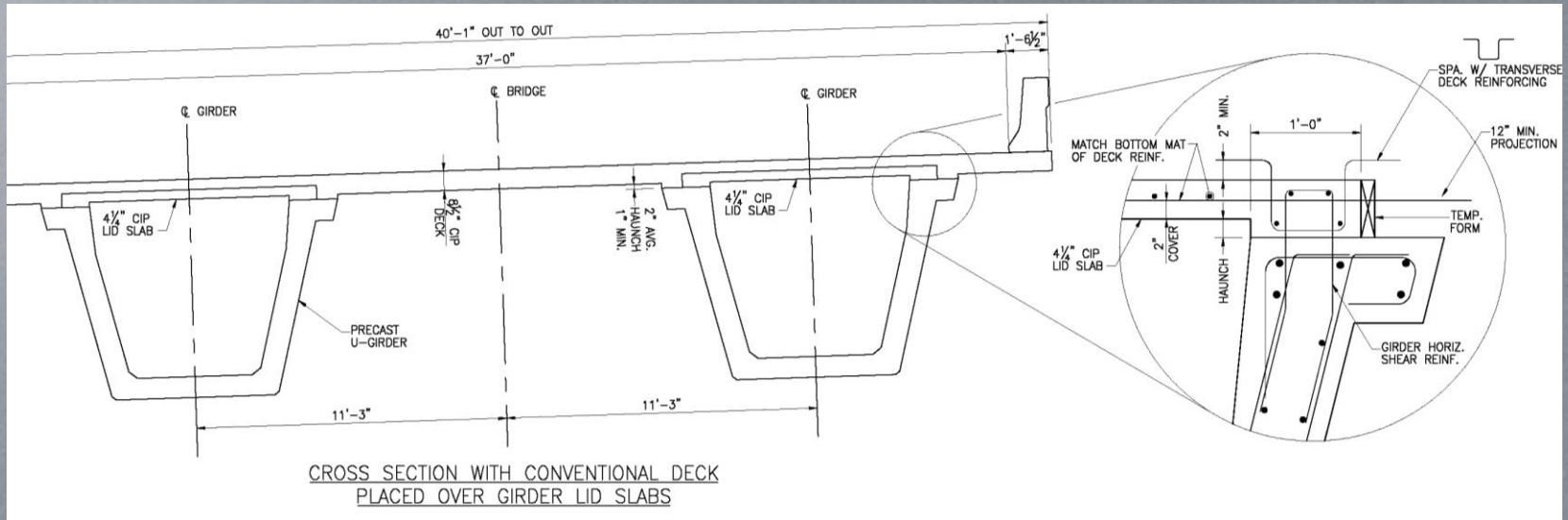
Interior Pier with Bearings(U-12)



Integral Interior Pier (U-13)

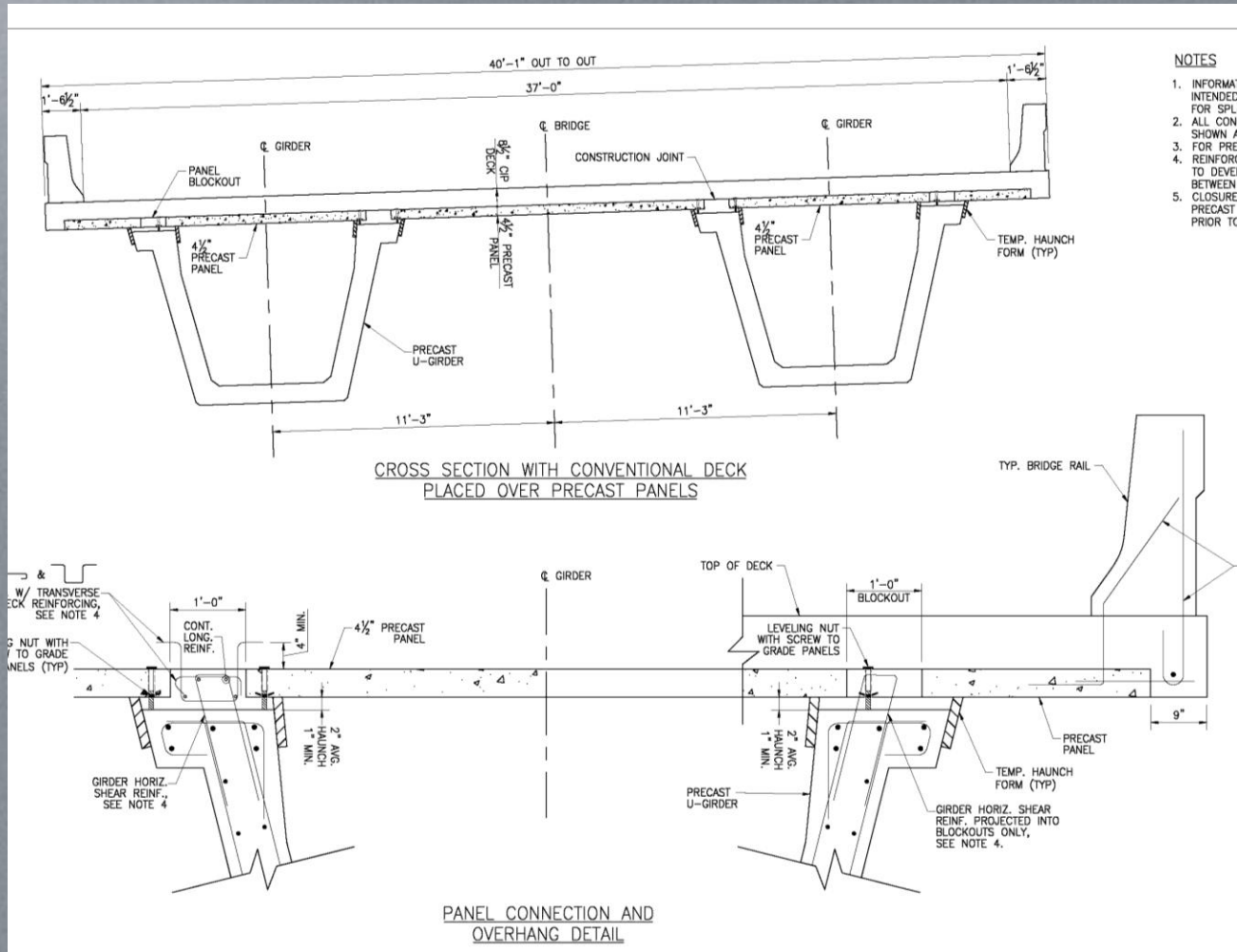


CIP Deck Cross Sections (U-2)



Note: Curved girders require a lid slab before deck placement. Illustrated is a CIP Lid slab that becomes part of 81/2" CIP Deck

Precast Deck Panels (U-3)



Precast Panels (U-14)



Prepared concrete placement



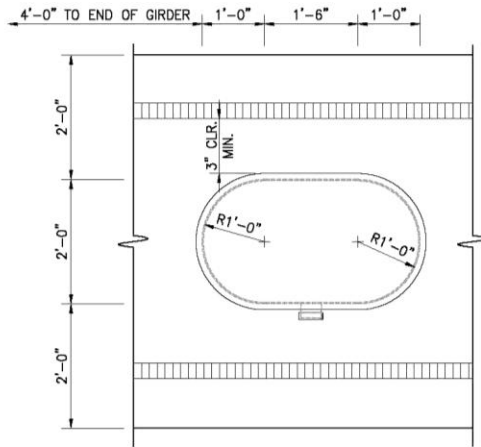
Temporary haunch form (U-3)



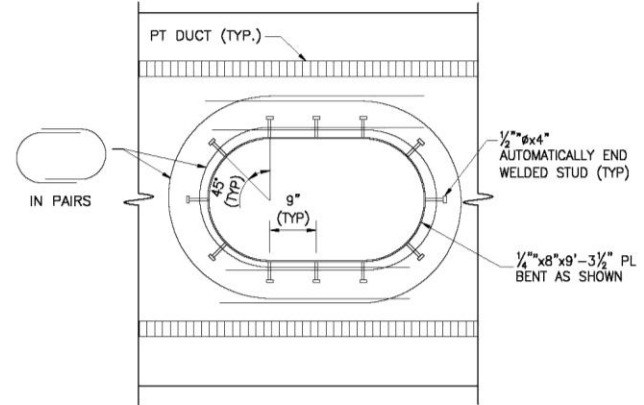
Panels and Curb Forming



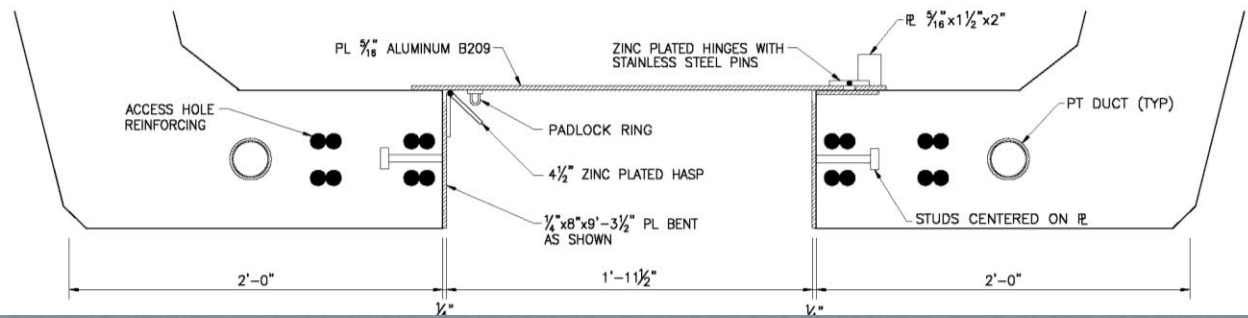
Bottom Slab Access Hatch (U-15)



CONCRETE OPENING

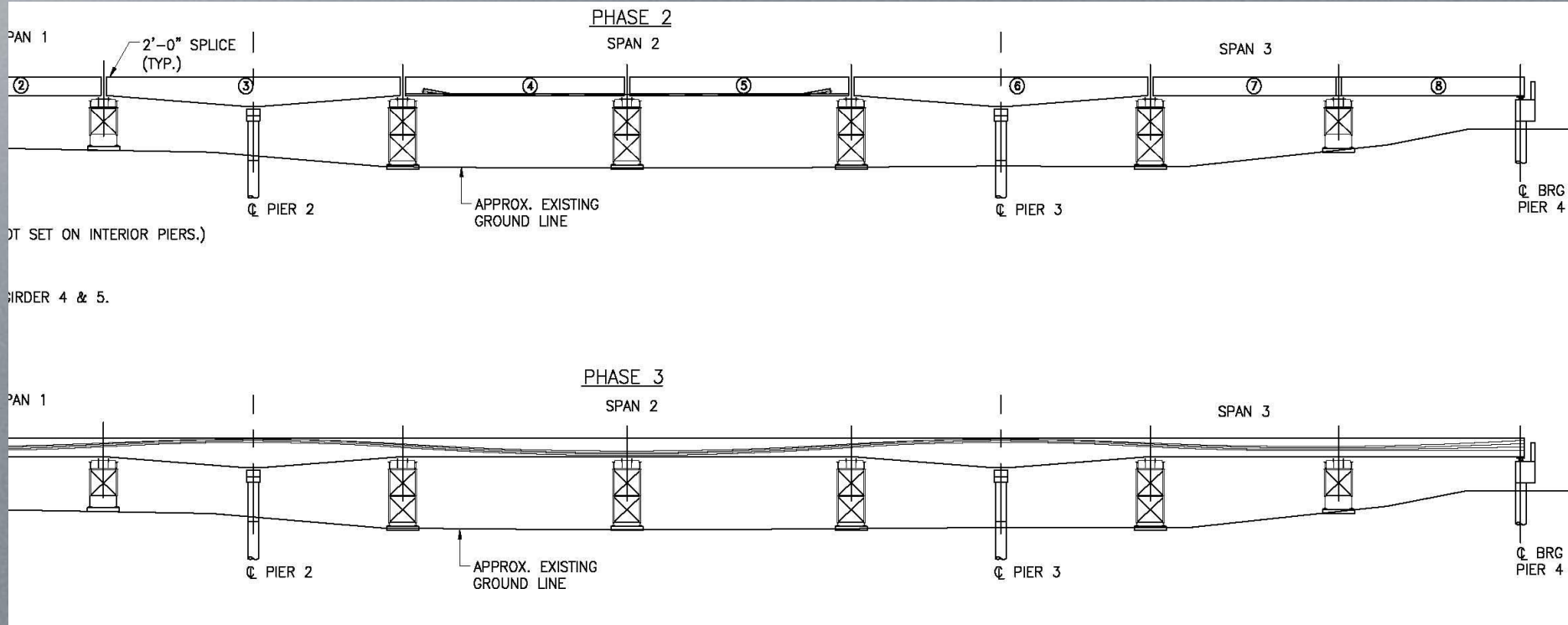


REINFORCING PLAN





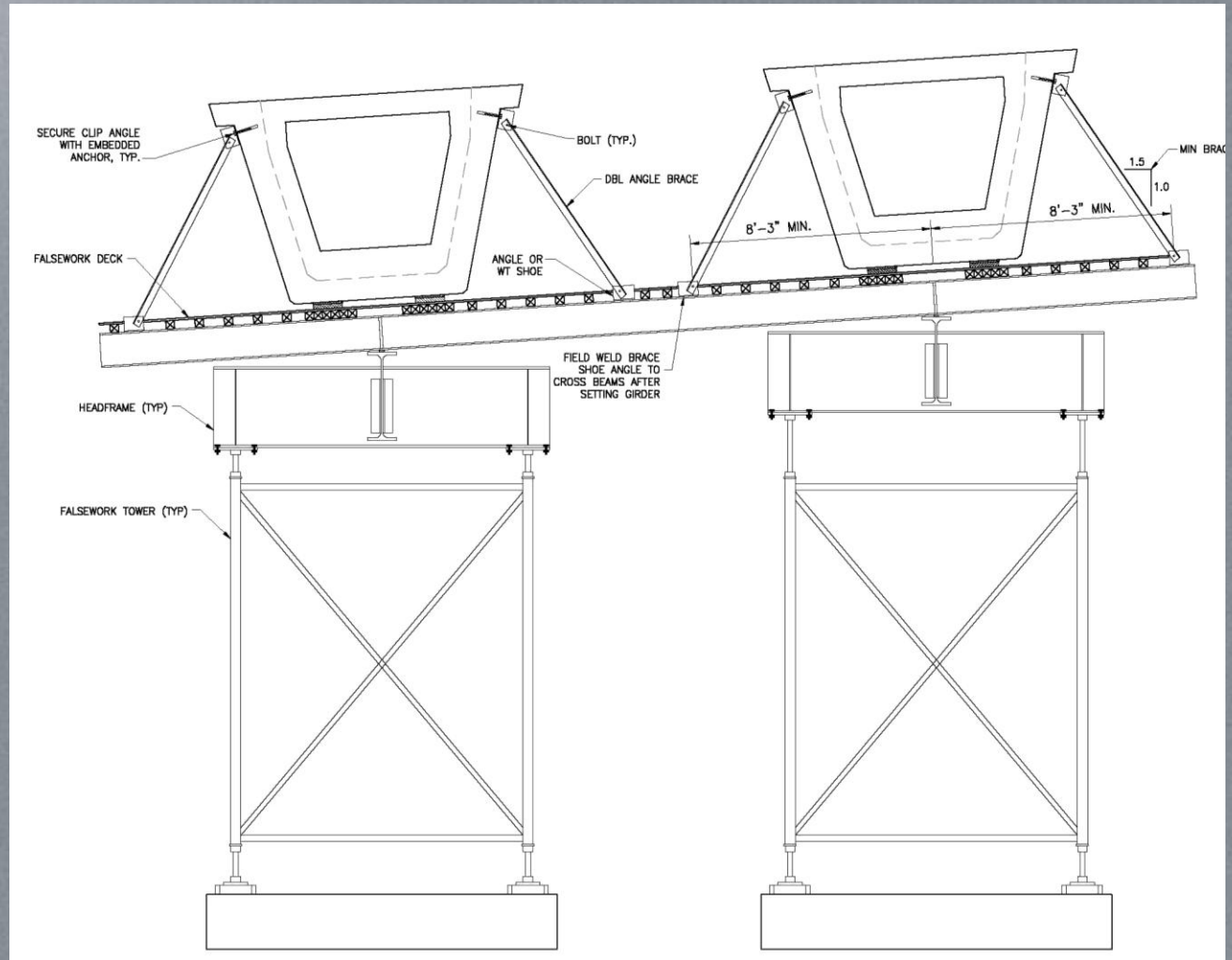
Construction Sequence (U16,17&18)



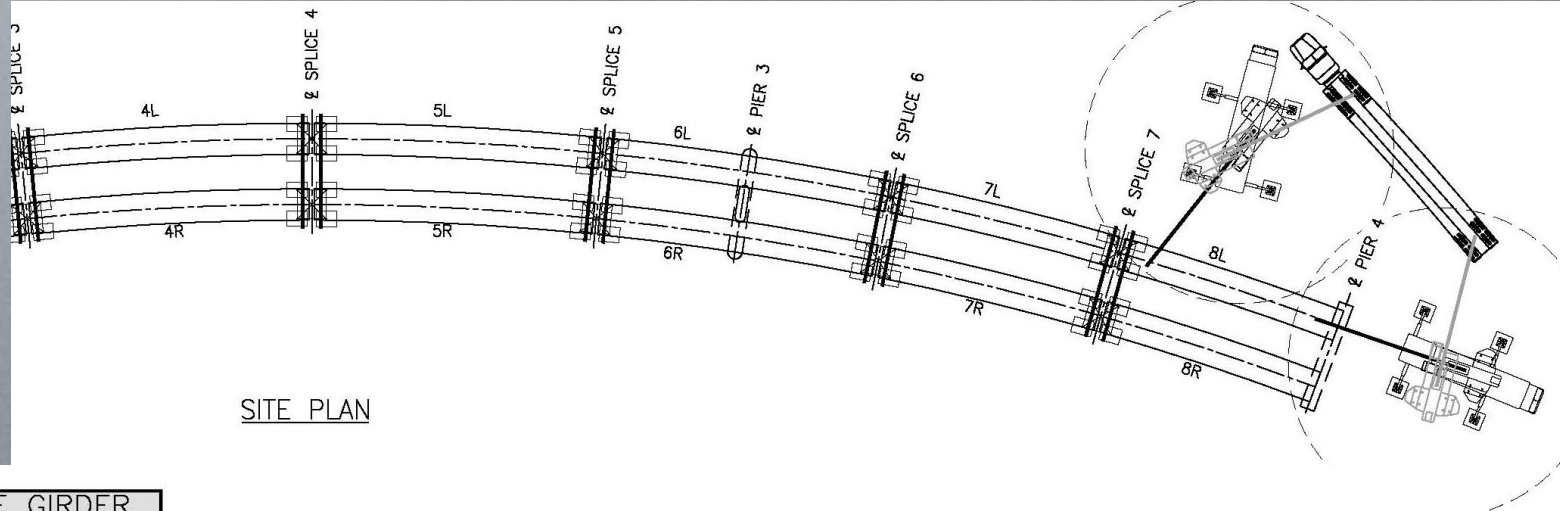
Sheet U-18 Shown



Landing and Bracing (U-19)



Example Erection Plan (U-20)



SITE PLAN

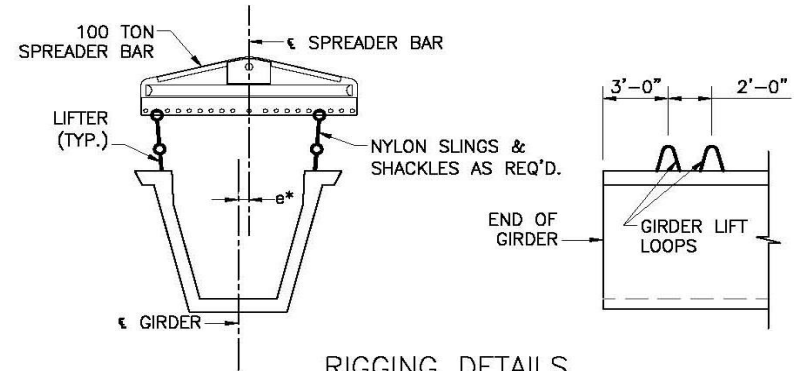
REPRESENTATIVE GIRDER LIFT CHART				
GIRDER NUMBER	MAX GIRDER LENGTH (ft.)	MAX GIRDER WEIGHT (kips)	MAX LIFT WEIGHT 300 TON CRANE (kips) **	e (ft.)
1L&R	78.5	193.5	107.0	1.00
2L&R	78.5	203.0	112.0	1.00
3L&R	98.0	306.0	166.0	1.50
4L&R	98.0	248.0	135.0	1.25
5L&R	98.0	248.0	135.0	1.25
6L&R	98.0	306.0	166.0	1.50
7L&R	78.5	203.0	112.0	1.00
8L&R	78.5	193.5	107.0	1.00

** LIFT WEIGHT INCLUDES 5000 LB BLOCK & RIGGING WEIGHT PLUS 5% IMPACT

ERECTION SEQUENCE

GIRDERS WILL BE ERECTED IN THE FOLLOWING ORDER:

1. 1R 13. 7R
2. 1L 14. 7L
3. 2R 15. 8R
4. 2L 16. 8L
5. 3R
6. 3L
7. 4R
8. 4L
9. 5R
10. 5L
11. 6R
12. 6L



RIGGING DETAILS

* RIGGING OFFSET e IS TOWARD OUTSIDE OF GIRDER CURVE

Summary-Spliced U Girder Bridges

- Pilot Study:
 - Standardized Shape
 - Span Ranges
 - Quantities
 - Variety of Application
 - Working details that are construction tested
 - Variety of Application
 - Demonstrates a working methodology for erection





Details and Reminders

Considerations for Design Concept Approvals

- Prestressed SIP forms with full bedding inspection is not allowed at this time.
- No Crush forming for grouting precast lid slabs. FDOT will need confidence in “slab bedding”
- Bottom Flange Access Hatch
- Currently FDOT Requires Lighting in all post tensioned and Steel boxes





Details and Reminders

Considerations for Design Concept Approvals

- **Spliced I Beams and Pretensioned U Beams do not require “Future PT”. Post Tensioned U beams may be required to have holes in diaphragms?**
- **Any PT box with interior clearance less than 6 feet will require a Variance to FDOT Practice. i.e. Bottom Flange thickening or 72 inch deep section.**
- **Limited use of Light Weight Concrete**





Precast Offers Solutions to Challenges





Thank you!

