

NOTES TO PCI CERTIFIED PRODUCERS, OWNERS AND ENGINEERS FOR THE SPLICED U GIRDERS

PURPOSE AND INTENT OF THIS INFORMATION:

PCI-CERTIFIED PLANTS IN ZONE 6 (SOUTHEAST) HAVE FORMED A TASK FORCE TO DEVELOP AND PROMOTE A SERIES OF CONCEPTS, DRAWINGS AND DETAILS THAT ILLUSTRATE TO OWNERS, ENGINEERS, AND CONTRACTORS THE INFORMATION NECESSARY TO UTILIZE THESE SOLUTIONS THAT HAVE BEEN SUCCESSFULLY IMPLEMENTED ON A NUMBER OF PROJECTS. THE DEVELOPMENT OF THE PRECAST CONCRETE U-BEAM HAS ENABLED THE PCI-CERTIFIED PLANTS TO OFFER AN ECONOMICAL STRUCTURAL DESIGN SOLUTION FOR BOTH LONG SPAN AND CURVED TRANSPORTATION STRUCTURES TO CARRY VEHICULAR AND RAIL TRAFFIC.

BACKGROUND:

THE NEED FOR COMPLEX INTERCHANGES AND LONG-SPAN GRADE SEPARATIONS HAS CREATED THE NEED FOR NEW INNOVATIVE SOLUTIONS. TRADITIONALLY, THESE STRUCTURES WERE BUILT AS CAST-IN-PLACE CONCRETE OR STRUCTURAL STEEL STRUCTURES. THE SUCCESS OF RECENT PROJECTS, WHICH ARE ALL CURRENTLY IN SERVICE, CLEARLY DEMONSTRATES THE ADVANTAGES OF USING COMMERCIAL PRECAST CONCRETE COMPONENTS TO CONSTRUCT COST-EFFECTIVE, COMPLEX, LONG-SPAN STRUCTURES IN HIGH PROFILE APPLICATIONS WHERE AESTHETICS AND URBAN GEOMETRICS ARE SIGNIFICANT DESIGN CONSIDERATIONS.

ADVANCEMENTS IN THE USE OF SPLICED, POST-TENSIONED GIRDERS HAVE EXTENDED THE SPAN RANGE OF PRECAST CONCRETE CONSTRUCTION. THE DEVELOPMENT OF THE U GIRDER INTRODUCED A NEW CROSS SECTION THAT HAD SUFFICIENT STRENGTH AND STABILITY TO MAKE CASTING CURVED SECTIONS FEASIBLE. COMBINING THESE TWO ADVANCEMENTS OPENED UP THE POSSIBILITY OF USING PRECAST CONCRETE FOR LONG SPAN INTERCHANGE PROJECTS.

ENHANCED DURABILITY, AND LOWER LIFE-CYCLE AND CONSTRUCTION COSTS MAKE PRECAST CONCRETE AN ATTRACTIVE DESIGN OPTION. HAVING A STRONG LOCAL MARKET HAS ENHANCED THE ECONOMICS OF USING PRECAST CONCRETE BY REDUCING LEAD TIMES FOR FABRICATION AND SHIPPING COSTS.

SPLICED GIRDER CONSTRUCTION REQUIRES ONLY VERTICAL SHORING WHICH REDUCES INTERFERENCE WITH EXISTING ROADWAYS. CONVENTIONAL CONSTRUCTION METHODS AND EQUIPMENT ARE USED TO ERECT THE GIRDERS ELIMINATING THE NEED TO INVEST IN SPECIALIZED EQUIPMENT. PCI-CERTIFIED PLANTS OFFER SHORTER LEAD TIMES FOR FABRICATION AND DELIVERY OF GIRDERS, WHICH GREATLY ENHANCES THE COST EFFECTIVENESS OF THIS TYPE OF CONSTRUCTION.

THE USE OF PRECAST CONCRETE U-GIRDERS ENABLES A PROJECT TO UNIFY THE APPEARANCE OF A PROJECT FOR ALL SPANS OF THE STRUCTURE. GIRDERS WITH SLOPED WEBS CREATE AN ATTRACTIVE STRUCTURE THAT HAS BEEN WELL RECEIVED IN HIGH VISIBILITY LOCATIONS AS A CONTEXT-SENSITIVE DESIGN.

CONSTRUCTION CHALLENGES AND SOLUTIONS:

CONSTRUCTION OF THESE BRIDGES INVOLVES HANDLING AND ERECTING LARGE, HEAVY, CURVED GIRDERS IN CHALLENGING SITE CONDITIONS THAT REQUIRED TEMPORARY SUPPORT AND STABILIZATION.

SUMMARY:

THE DEVELOPMENT OF THE U-GIRDERS HAS CREATED AN OPPORTUNITY TO USE PRECAST CONCRETE IN NEW APPLICATIONS FOR BRIDGE CONSTRUCTION.

THE DETAILS DESCRIBED IN THIS DRAWING PACKAGE WERE DEVELOPED BASED ON CONSTRUCTED PROJECTS WITH CHALLENGING SITE CONDITIONS WHERE MAINTENANCE OF EXISTING TRAFFIC WAS ESSENTIAL. FURTHER REFINEMENT OF DESIGN DETAILS AND CONSTRUCTION METHODS ON FUTURE PROJECTS WILL CONTINUE TO ENHANCE THE ECONOMY AND EASE OF CONSTRUCTION OF THIS CONCEPT AND MAKE IT EVEN MORE ATTRACTIVE TO ENGINEERS, OWNERS AND BUILDERS. THE USE OF THESE STANDARDIZE PCI ZONE 6 SECTIONS, PREFABRICATED UNDER A STRICT, WELL-ESTABLISHED PCI CERTIFICATION QUALITY ASSURANCE SYSTEM, WILL ALLOW THESE SPLICED GIRDERS TO BE ASSEMBLED RAPIDLY AT THE JOBSITE. THE SUCCESS OF THESE PROJECTS CLEARLY DEMONSTRATES THAT THE POTENTIAL FOR APPLICATION OF PRECAST CONCRETE FOR USE IN LONG-SPAN BRIDGES IS ONLY BOUND BY THE ENGINEER AND CONTRACTOR'S CREATIVITY AND IMAGINATION. THESE BEAM SECTIONS WILL PROTECT THE PCI-CERTIFIED PLANTS FROM HAVING AN INFINITE SET OF PERMUTATIONS IN A REGION. COMPETITION IN THE BRIDGE INDUSTRY IS A GOOD DEAL FOR THE TAXPAYERS.

GENERAL NOTES

1. MINIMUM 3 TENDONS TO CROSS EACH SPLICE.
2. WEB THICKNESS FOR 3"Ø & 4"Ø PLASTIC DUCTS DETERMINED PER FDOT QPL FOR BONDED TENDON CRITERIA.
3. USE AASHTO AND STATE SPECIFIC CRITERIA TO PROPERLY DETAIL POST-TENSIONING.
4. PRESSURE TEST ALL DUCTS PRIOR TO GROUTING.
5. GRADE 60 REINFORCING STEEL IS REQUIRED.

DESIGN DATA

1. AASHTO, 4TH EDITION LRFD
2. DESIGN METHOD: LOAD AND RESISTANCE FACTOR DESIGN
3. DEAD LOAD ASSUMPTIONS:
DESIGN CURVED GIRDERS FOR GIRDER LENGTHS ALONG OUTSIDE OF CURVE.
CONCRETE UNIT WEIGHT = 155 PCF
8" STRUCTURAL + ½" SACRIFICIAL CAST-IN-PLACE DECK.
FWS ALLOWANCE 3" ASPHALT OVERLAY MAXIMUM.
417 LBS PER LIN. FT. FOR BARRIER RAIL.
10 LBS PER SQ. FT. SUPERIMPOSED DEAD LOAD APPLIED TO COMPOSITE SECTION FOR CONSTRUCTION INCIDENTALS.
4. LIVE LOADS: HL-93
5. PRECAST PRESTRESSED CONCRETE ASSUMPTIONS:
f'c = 8,500 PSI (28 DAY FIELD COMPRESSIVE STRENGTH)
fs = 270,000 PSI
LOW-LAX 0.6"Ø STRAND
STRESS STRAND TO 75% ULTIMATE
K=0.0002, μ=0.18
ANCHOR SET OF ¾" AT JACKING ENDS
ELASTIC SHORTENING AND PROVISIONS FOR AN ADDITIONAL LONG TERM LOSS IN STRESS PER AASHTO GUIDELINES

NOTES TO DESIGNER

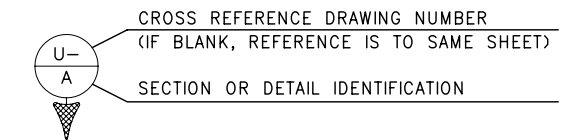
1. THE CONCEPTS PRESENTED IN THIS SET OF DRAWINGS ARE CONCEPTUAL ONLY. ALL DESIGNS PREPARED USING THE CONCEPTS PRESENTED MUST BE PREPARED BY A RESPONSIBLE CHARGE OF A REGISTERED ENGINEER AND MUST CONFORM TO AASHTO AND ALL STATE AND LOCAL DESIGN REQUIREMENTS.
2. ALL DESIGNS MUST SATISFY SERVICE LOAD STRESS LIMITATIONS FOR ALL PRESTRESSED CONCRETE MEMBERS.
3. ALL ULTIMATE LOAD COMBINATIONS MUST BE CHECKED FOR THE COMPOSITE SECTION.
4. SERVICE AND ULTIMATE LOAD CONDITIONS MUST BE CHECKED AND CONFORM TO AASHTO AND LOCAL GUIDELINES FOR FLEXURE, SHEAR, TORSION, CRACK CONTROL AND SERVICABILITY DURING ALL STAGES OF CASTING AND CONSTRUCTION.
5. THE DESIGNER SHALL VERIFY THAT CURVED, OPEN U GIRDERS ARE CLOSED PRIOR TO CASTING THE DECK SLAB OR APPLYING SIGNIFICANT CONSTRUCTION LOADINGS TO PREVENT TORSIONAL CRACKING DURING CONSTRUCTION.
6. DECK SLAB REINFORCING SHALL BE PROPORTIONED TO CONTROL CRACKING IN NEGATIVE MOMENT REGIONS UNDER SERVICE LOAD CONDITIONS.
7. WEB THICKNESSES SHALL BE PROPORTIONED TO CONFORM TO AASHTO GUIDELINES FOR DUCT TO WEB THICKNESS RATIOS.
8. PRINCIPAL TENSILE STRESSES IN GIRDER WEBS UNDER SERVICE LOADINGS WILL BE LIMITED TO CONFORM TO AASHTO GUIDELINES.

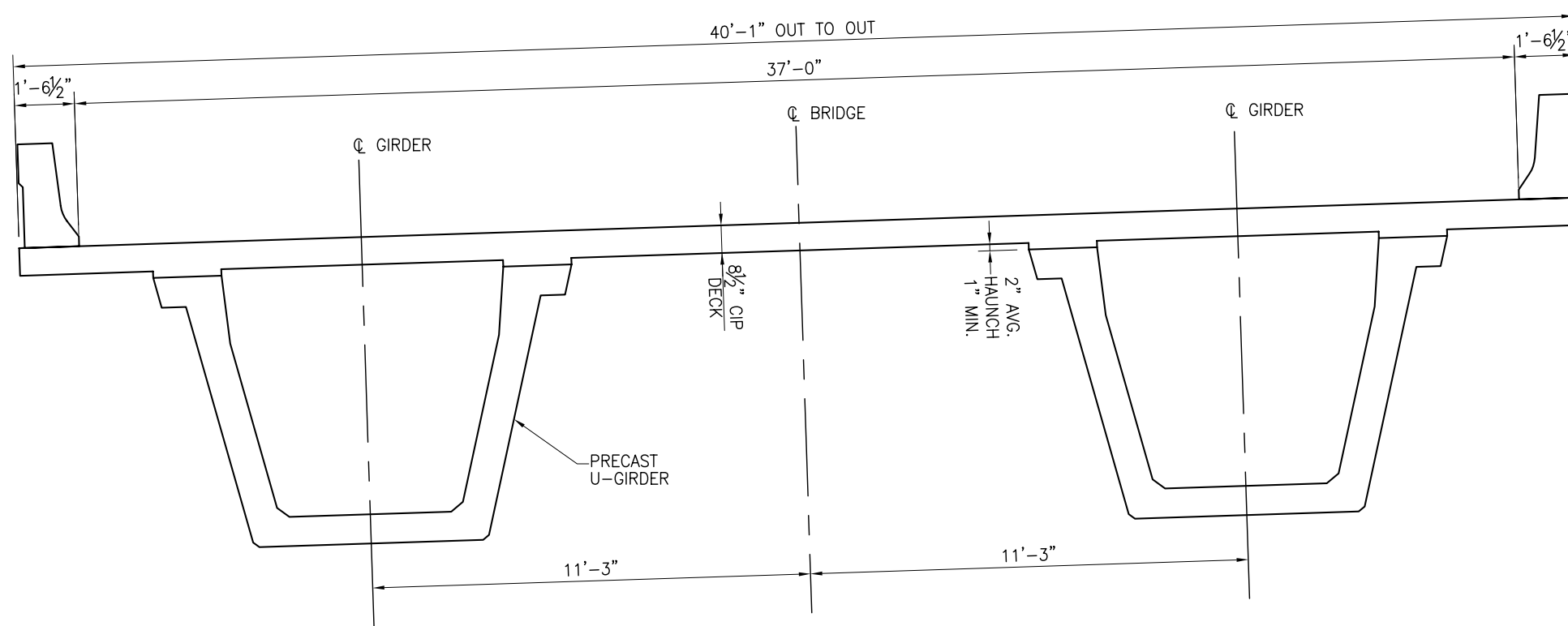
CURVED GIRDERS

1. GIRDERS SHALL BE ERECTED AND ALIGNED IN A MANNER TO PRODUCE A SMOOTH PROFILE IN CONTINUITY WEB TENDONS TO AVOID KINKS AND UNDESIRABLE ANGLE BREAKS.
2. CONFINEMENT REINFORCING SHALL BE DESIGNED AROUND WEB TENDONS IN CURVED GIRDERS TO RESIST ALL LATERAL FORCES DUE TO CURVATURE AND INCIDENTAL MISALIGNMENTS.
3. CURVED GIRDERS MAY BE ERECTED IN AN OPEN CONDITION IF TORSIONAL STRESSES ARE VERIFIED AND CONTROLLED AND STRENGTH REQUIREMENTS ARE MET DURING ALL STAGES OF CONSTRUCTION.
4. SERVICE STRESSES IN ALL GIRDERS SHALL BE WITHIN ALLOWABLE LIMITS AND STRENGTH REQUIREMENTS MET FOR ALL STAGES OF CASTING, ERECTION AND CONSTRUCTION.

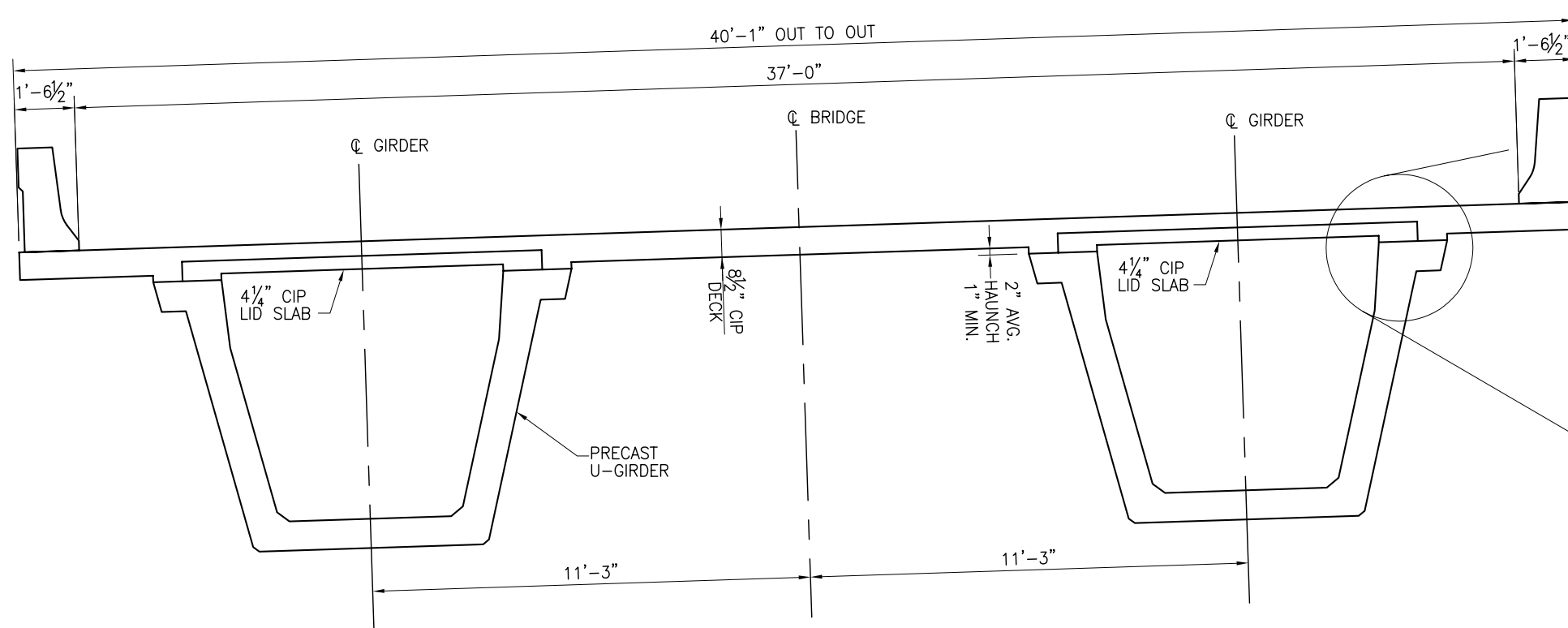
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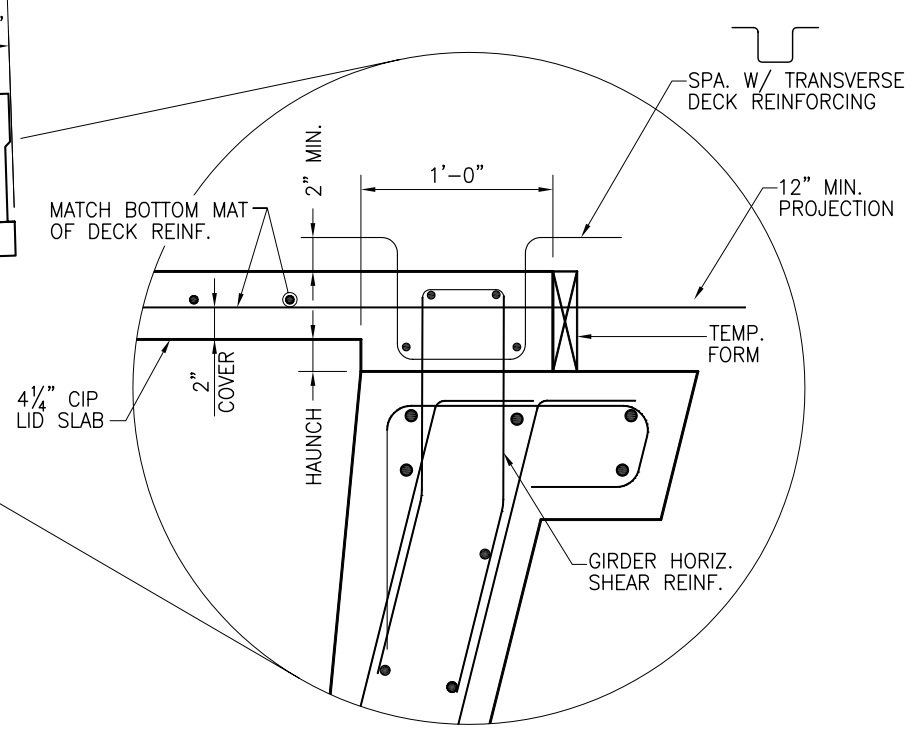




CROSS SECTION WITH CONVENTIONAL DECK
 (STRAIGHT GIRDERS ONLY)

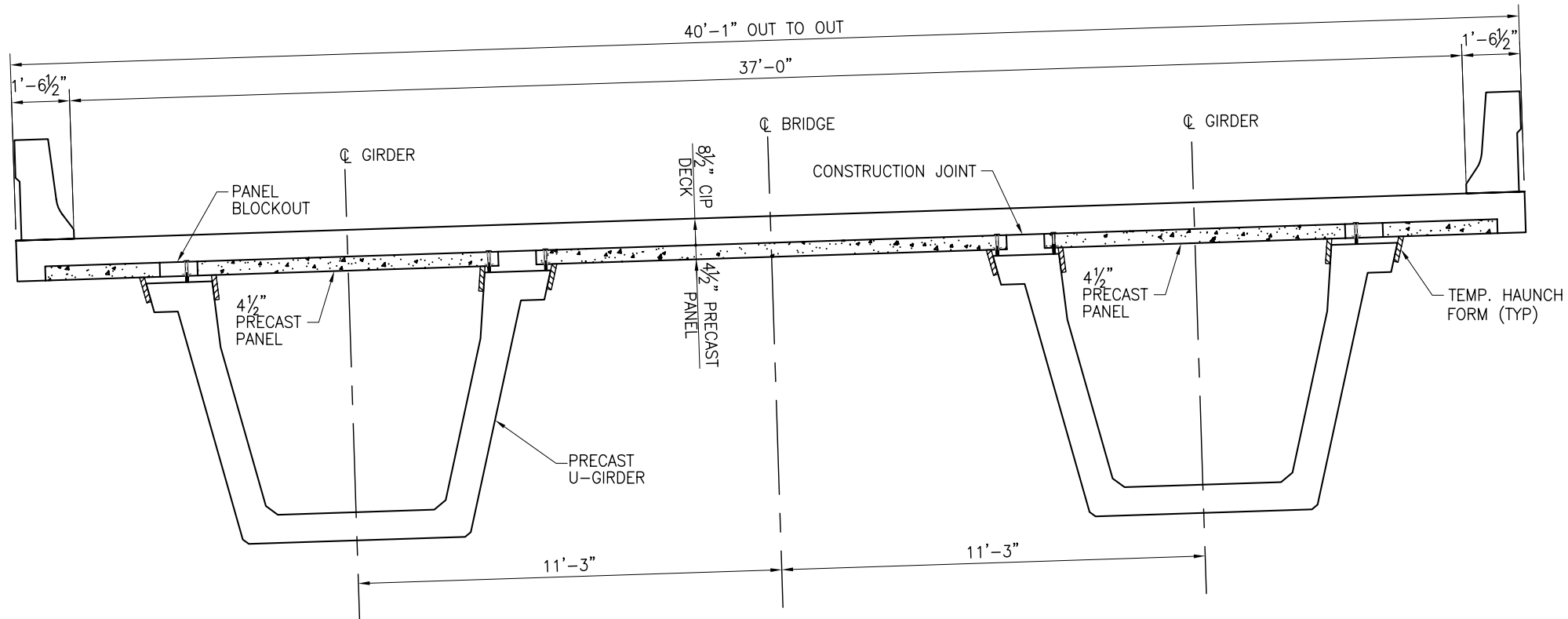


CROSS SECTION WITH CONVENTIONAL DECK
PLACED OVER GIRDER LID SLABS



NOTES

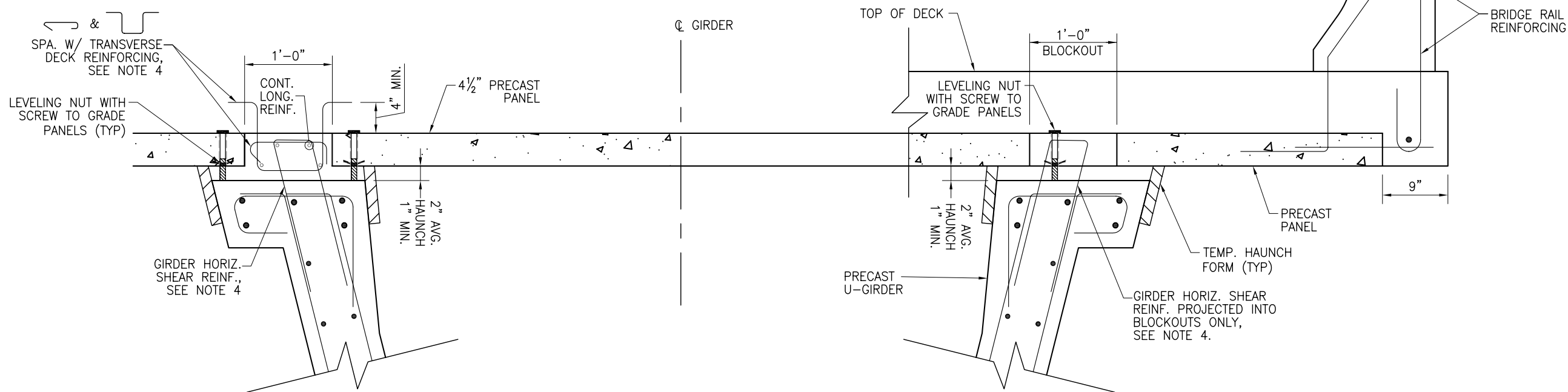
1. INFORMATION SHOWN ON THIS DRAWING IS INTENDED TO ILLUSTRATE A WORKING CONCEPT FOR SPliced U-GIRDERS.
2. ALL CONCRETE DIMENSIONS AND REINFORCEMENT SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY.



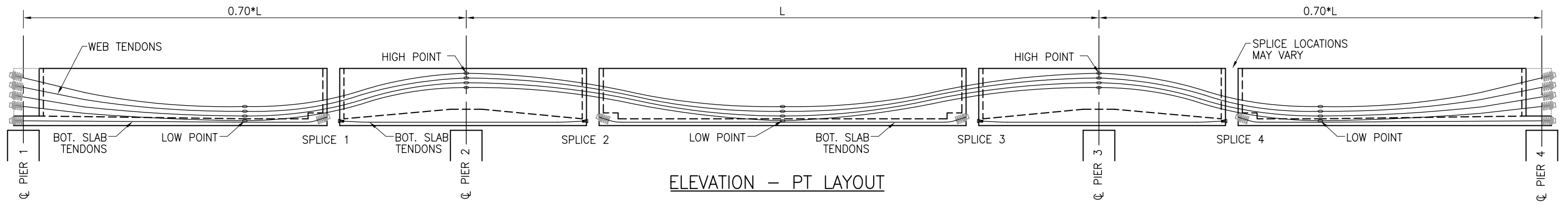
**CROSS SECTION WITH CONVENTIONAL DECK
PLACED OVER PRECAST PANELS**

NOTES

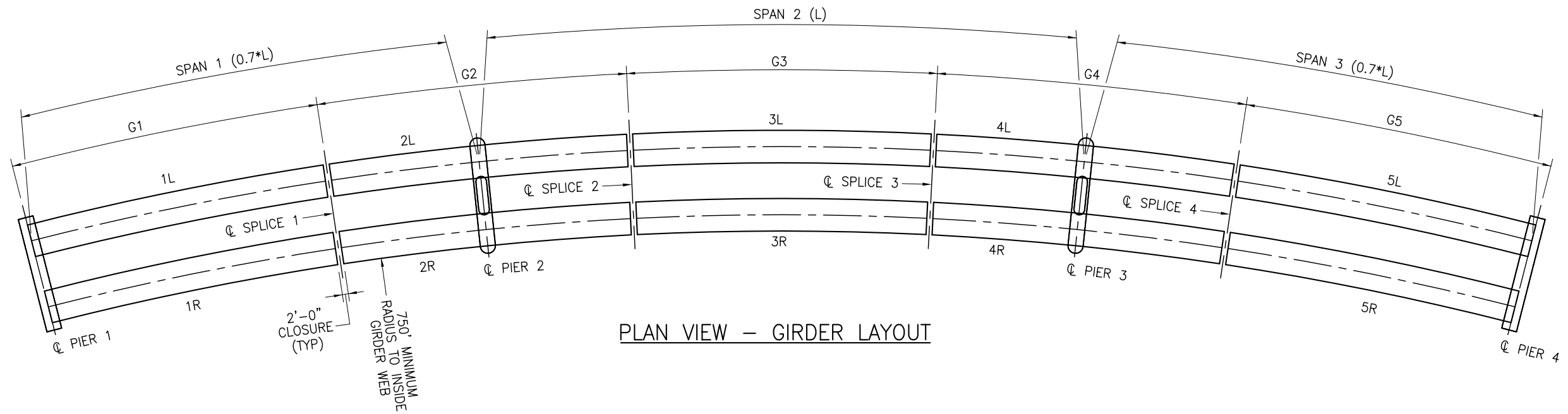
1. INFORMATION SHOWN ON THIS DRAWING IS INTENDED TO ILLUSTRATE A WORKING CONCEPT FOR SPLICED U-GIRDERS.
2. ALL CONCRETE DIMENSIONS AND REINFORCEMENT SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY.
3. FOR PRECAST PANEL DETAILS, SEE SHEET A-14.
4. REINFORCING IN PANEL POCKETS TO BE DESIGNED TO DEVELOP HORIZONTAL SHEAR TRANSFER BETWEEN THE GIRDER AND DECK.
5. CLOSURE CONCRETE BETWEEN U GIRDERS AND PRECAST PANELS SHALL BE CAST AND CURED PRIOR TO PLACING DECK CONCRETE.



**PANEL CONNECTION AND
OVERHANG DETAIL**



ELEVATION - PT LAYOUT



PLAN VIEW - GIRDER LAYOUT

U72					
BOTTOM SLAB	PRECAST PANELS	CIP LID SLAB	CONCRETE	TENDONS (PER WEB)	L _{MAX}
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"

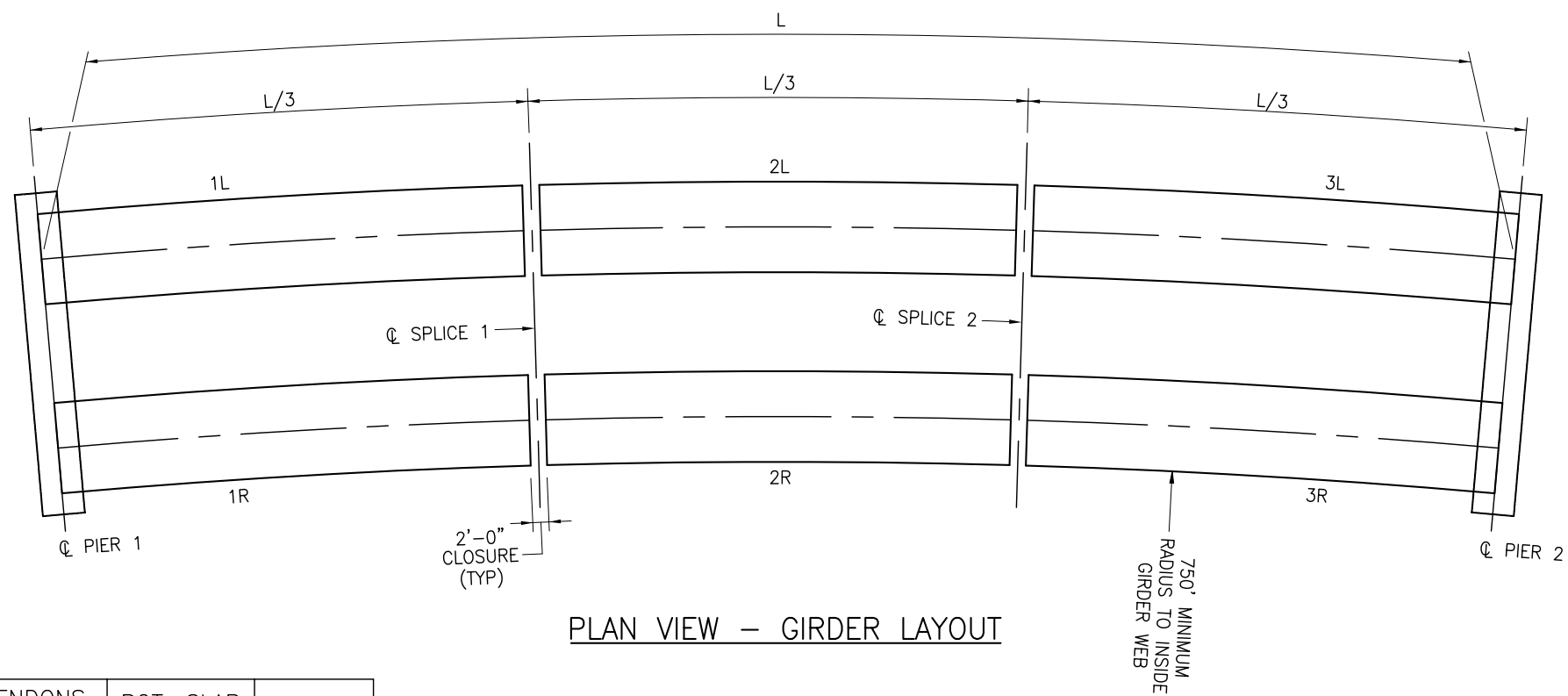
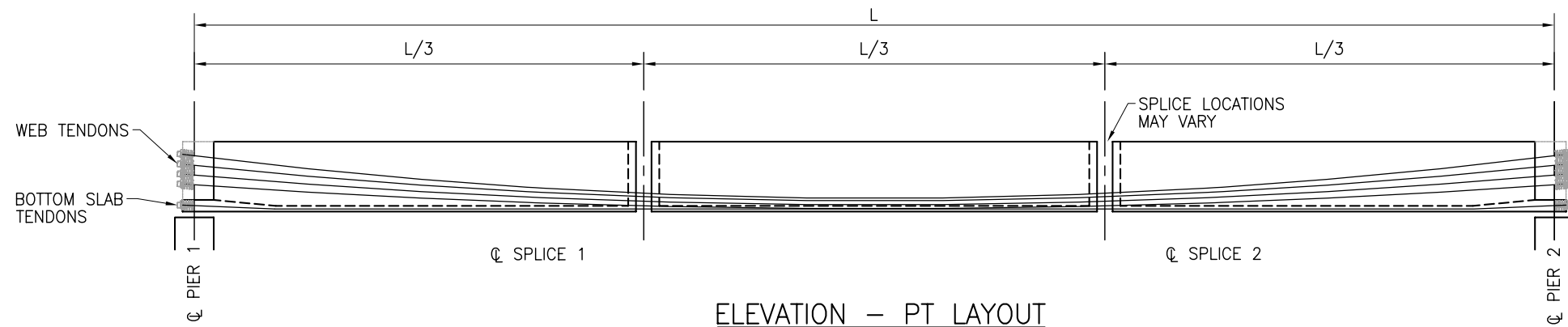
U84					
BOTTOM SLAB	PRECAST PANELS	CIP LID SLAB	CONCRETE	TENDONS (PER WEB)	L _{MAX}
CONSTANT	NO	NO	NORMAL	3 x 12-0.6"φ	195'-0"
VARIABLE	YES	NO	NORMAL	4 x 12-0.6"φ	205'-0"
VARIABLE	NO	NO	NORMAL	4 x 12-0.6"φ	220'-0"
VARIABLE	NO	YES	NORMAL	4 x 12-0.6"φ	225'-0"
VARIABLE	NO	YES	LIGHTWEIGHT	4 x 12-0.6"φ	235'-0"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

U96					
BOTTOM SLAB	PRECAST PANELS	CIP LID SLAB	CONCRETE	TENDONS (PER WEB)	L _{MAX}
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"

ASSUMPTIONS:
 -3"φ PLASTIC DUCTS - 12 STRAND TENDONS - 9" WEBS
 -4"φ PLASTIC DUCTS - 19 STRAND TENDONS - 10" WEBS
 -4 1/2" FROM EXTREME FIBER TO C OF TOP & BOTTOM DUCTS
 -SPLICE LOCATIONS LOCATED AT 1/4" POINTS OF SPANS

NOTES

- GIRDER LENGTHS MEASURE ALONG C OUTSIDE GIRDER USED FOR DESIGN.
- PIERS ASSUMED PERPENDICULAR TO C GIRDERS ALONG CURVE.
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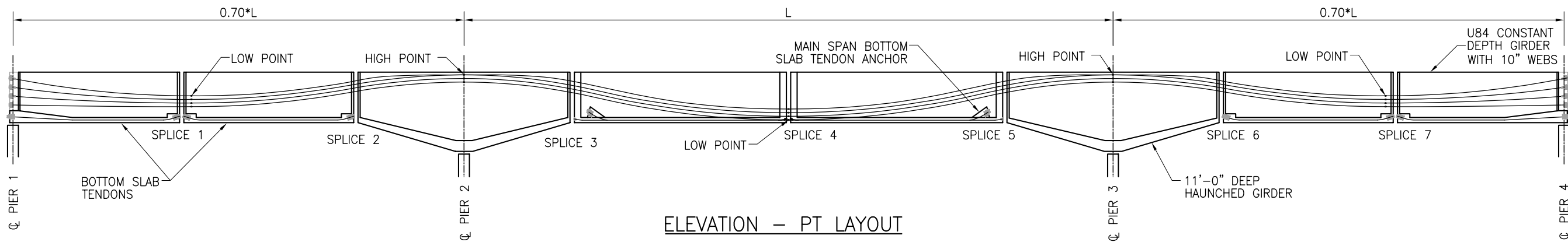


GIRDER TYPE	PRECAST PANELS	CIP LID SLAB	CONCRETE	TENDONS (PER WEB)	BOT. SLAB TENDONS	L _{MAX}
U72	NO	NO	NORMAL	4 x 12-0.6"∅	4 x 12-0.6"∅	175'-0"
	NO	NO	NORMAL	4 x 19-0.6"∅	4 x 12-0.6"∅	180'-0"
U84	NO	NO	NORMAL	4 x 12-0.6"∅	4 x 12-0.6"∅	190'-0"
	NO	NO	NORMAL	4 x 19-0.6"∅	4 x 12-0.6"∅	200'-0"
U96	NO	NO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

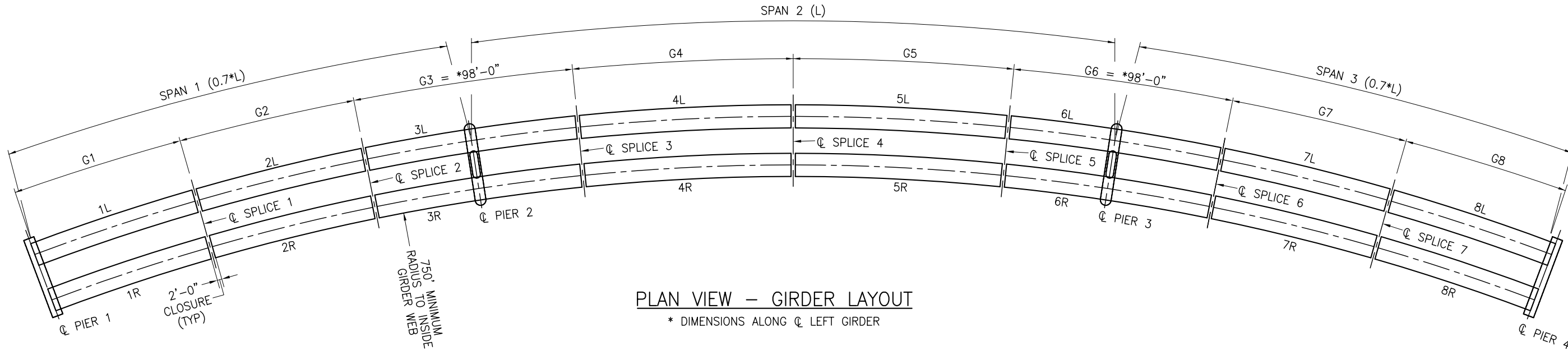
ASSUMPTIONS:
 -3"∅ PLASTIC DUCTS - 12 STRAND TENDONS - 9" WEBS
 -4"∅ PLASTIC DUCTS - 19 STRAND TENDONS - 10" WEBS
 -4 1/2" FROM EXTREME FIBER TO ∅ OF TOP & BOTTOM DUCTS

NOTES

1. GIRDER LENGTHS MEASURE ALONG ∅ OUTSIDE GIRDER USED FOR DESIGN.
2. ALL SPAN RANGES DESIGNED ASSUMING DECK SLAB IS CAST USING SHORED CONSTRUCTION.
3. INFORMATION SHOWN ON THIS DRAWING IS INTENDED TO ILLUSTRATE A WORKING CONCEPT FOR SPLICED U-GIRDERS.
4. ALL CONCRETE DIMENSIONS AND REINFORCEMENT SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY.



ELEVATION - PT LAYOUT



PLAN VIEW - GIRDER LAYOUT

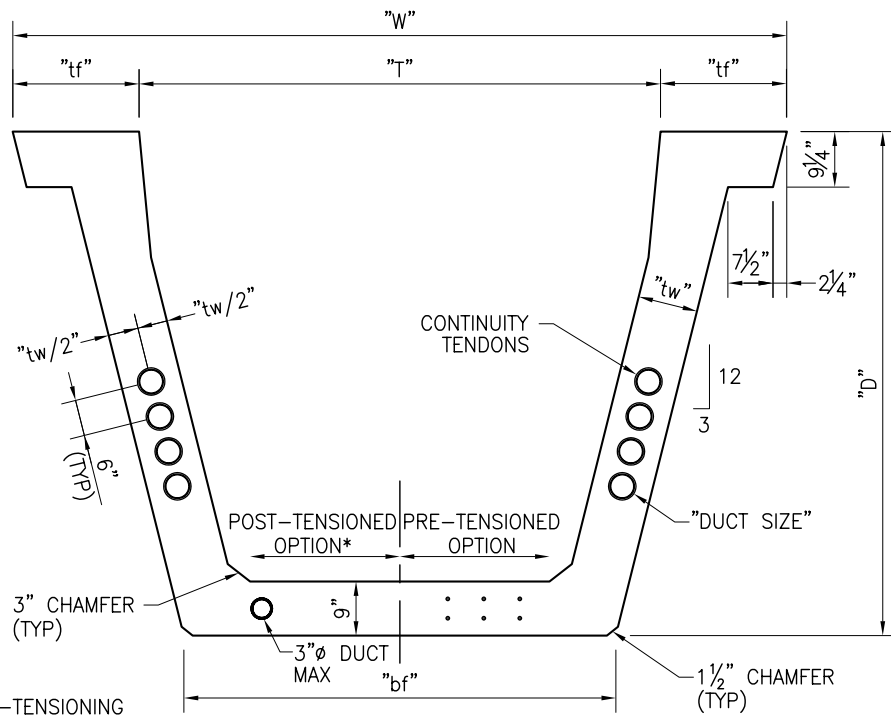
* DIMENSIONS ALONG C LEFT GIRDER

GIRDER TYPE	TENDONS (PER WEB)	BOT. SLAB MAIN SPAN TENDON	L _{MAX}
U84/U132 HAUNCH	4 x 19-0.6"φ	3 x 12-0.6"φ	300'-0"

ASSUMPTIONS:
 -4"φ PLASTIC DUCTS - 19 STRAND TENDONS - 10" WEBS
 -4 1/2" FROM EXTREME FIBER TO C OF TOP & BOTTOM DUCTS

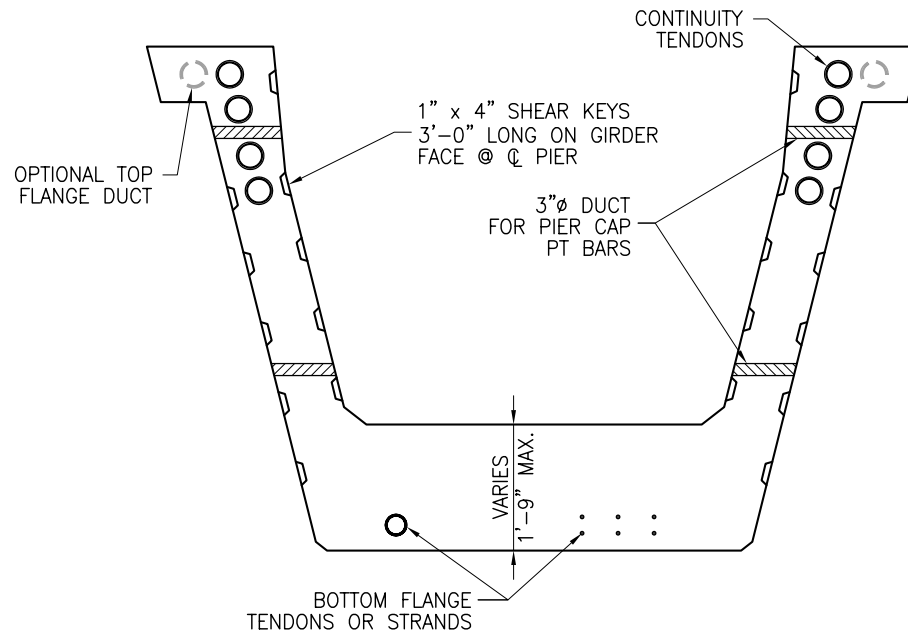
NOTES

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TYPICAL GIRDER GEOMETRY

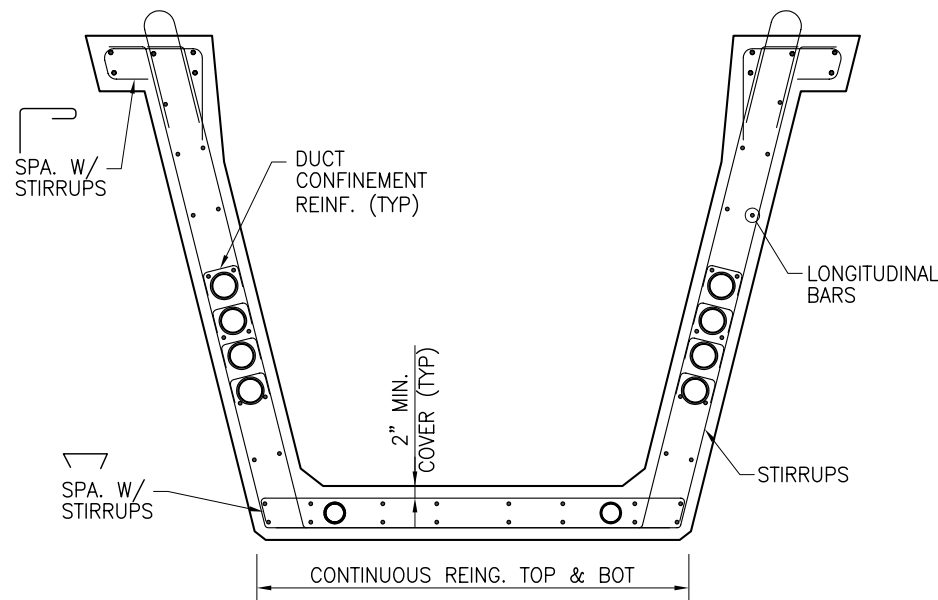
*POST-TENSIONING SHALL BE FOR ALL CURVED GIRDERS



GIRDER GEOMETRY OVER PIER

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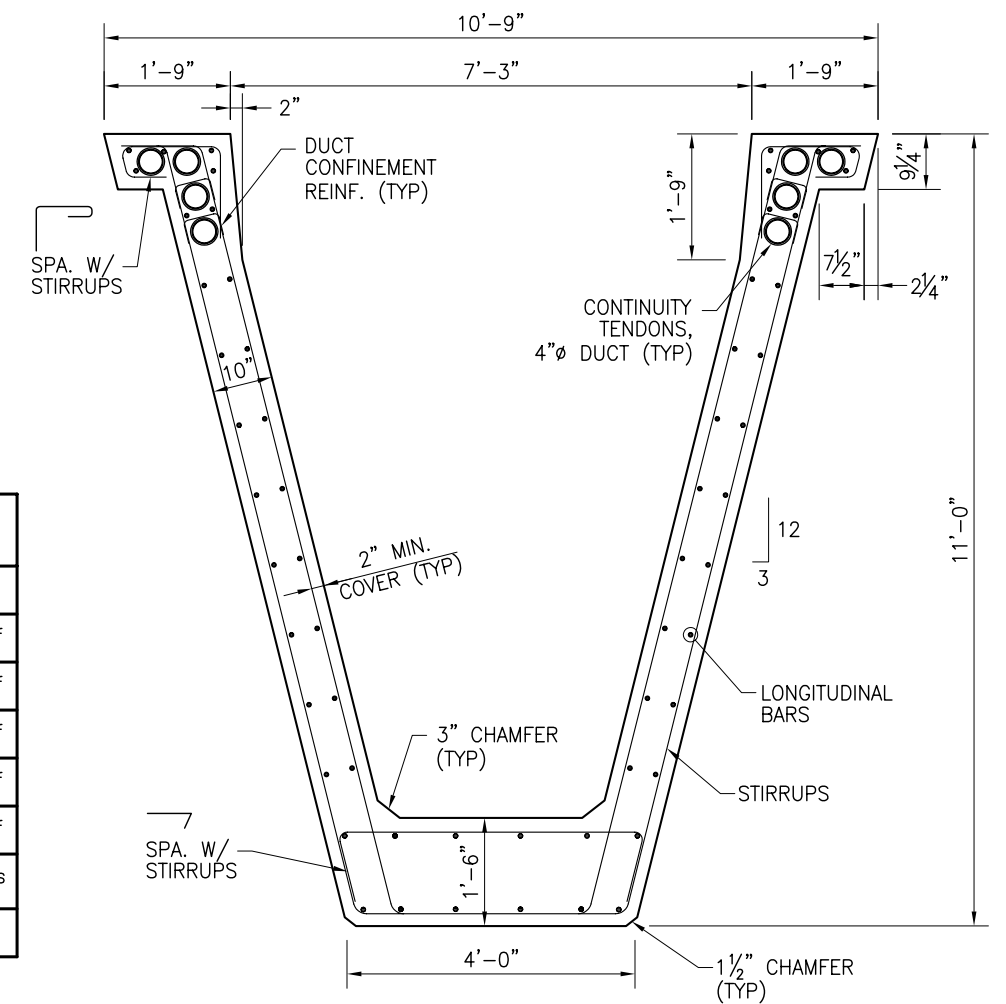


TYPICAL GIRDER REINFORCING

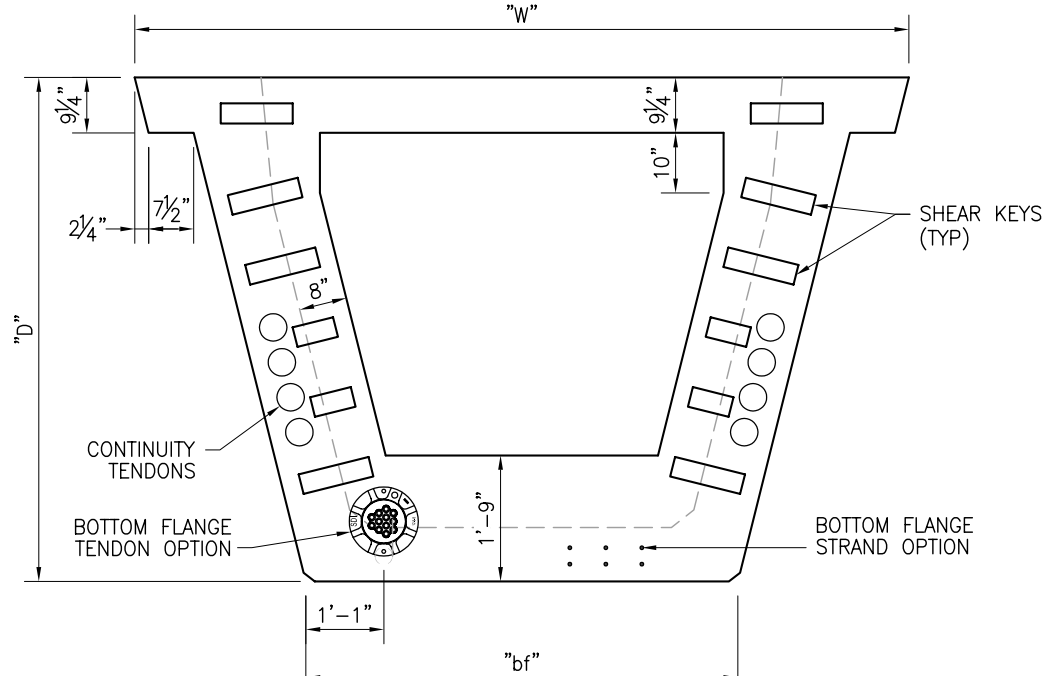
GIRDER GEOMETRY								
GIRDER	D	DUCT SIZE	tw	W	T	tf	bf	WEIGHT
U72-3	6'-0"	3"φ	9"	10'-1"	6'-9"	1'-8"	5'-10"	2,117 plf
U84-3	7'-0"	3"φ	9"	10'-7"	7'-3"	1'-8"	5'-10"	2,349 plf
U96-3	8'-0"	3"φ	9"	11'-1"	7'-9"	1'-8"	5'-10"	2,581 plf
U72-4	6'-0"	4"φ	10"	10'-3"	6'-9"	1'-9"	6'-0"	2,271 plf
U84-4	7'-0"	4"φ	10"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

ASSUMPTIONS:
 -GIRDER UNIT WEIGHT = 150 pcf
 -GROSS GIRDER SECTION USED (DUCT VOID VOLUME NOT DEDUCTED)

* TOTAL WEIGHT OF 98' LONG HAUNCHED PIER GIRDER

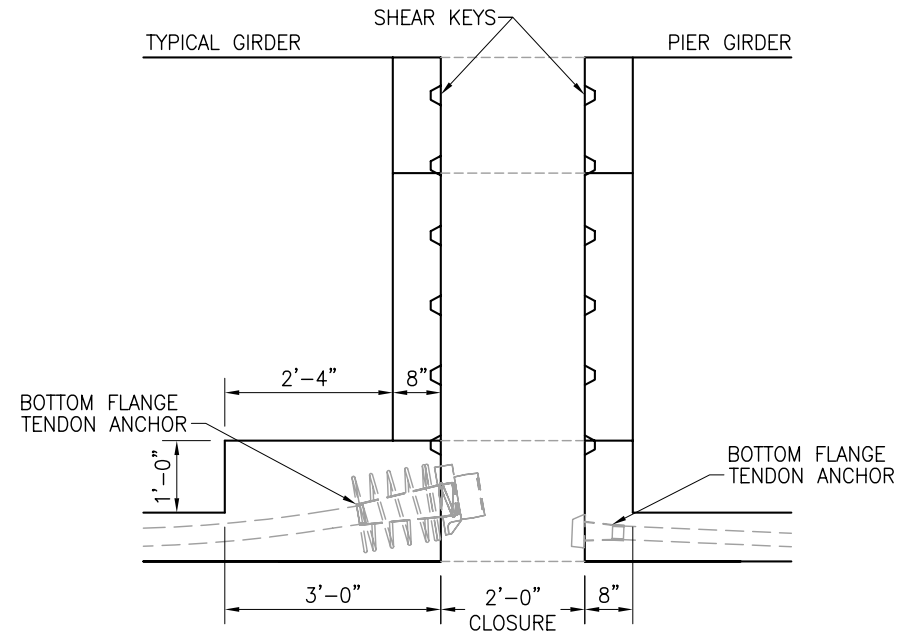


HAUNCHED GIRDER GEOMETRY & REINFORCING



TYPICAL GIRDER END VIEW

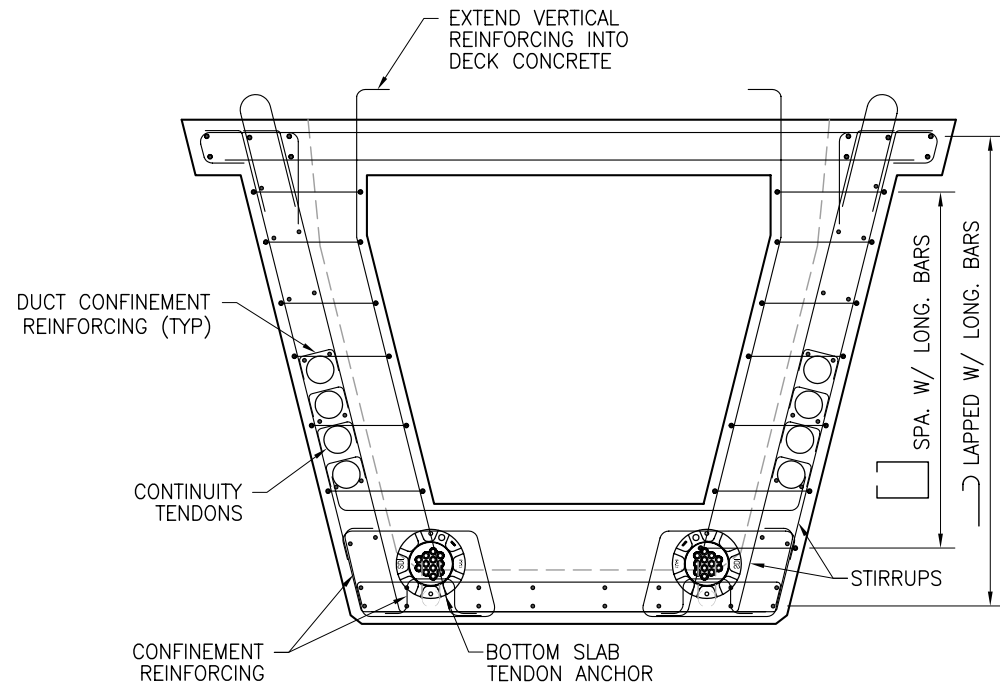
(SEE GIRDER GEOMETRY TABLE ON SHEET A-7 FOR VARIABLE DIMENSIONS)



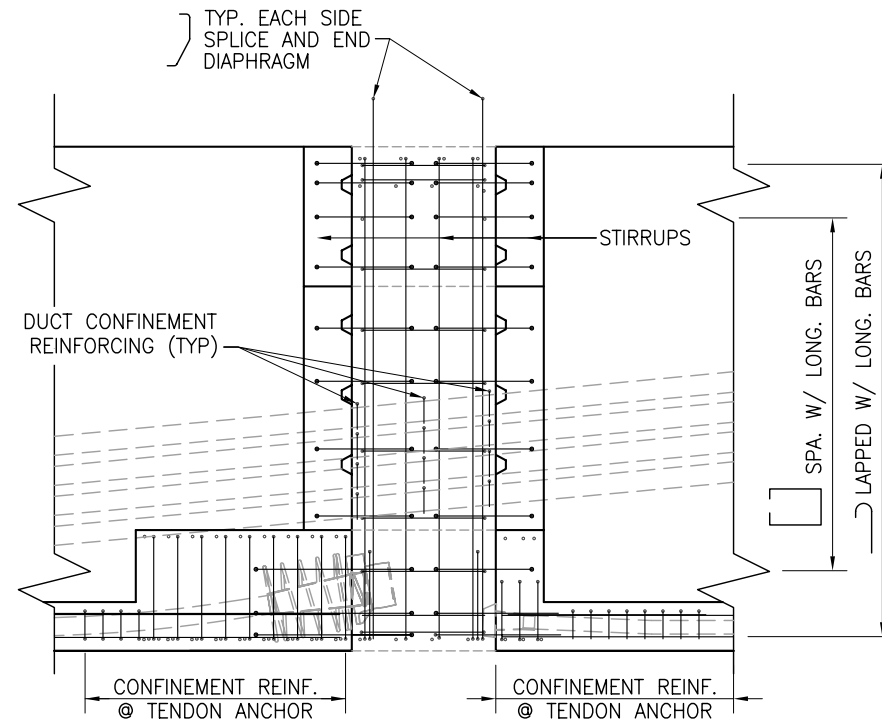
SECTION AT SPLICE

NOTES

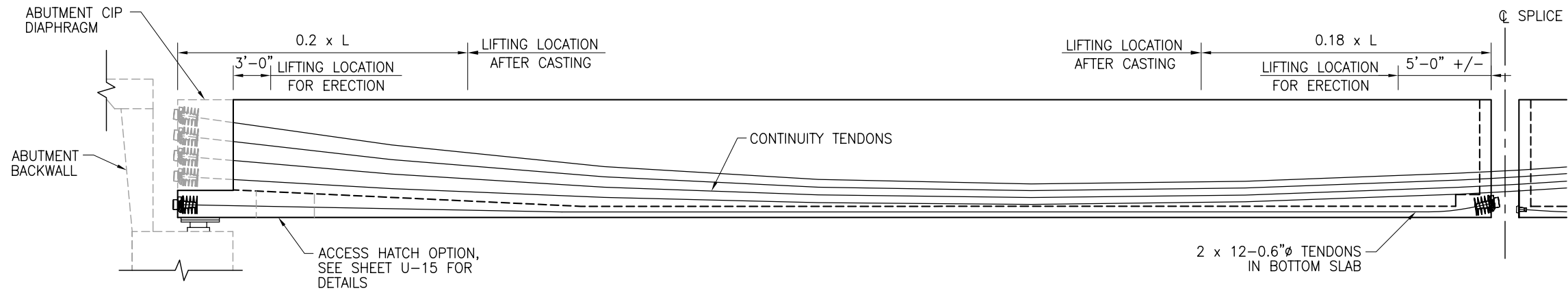
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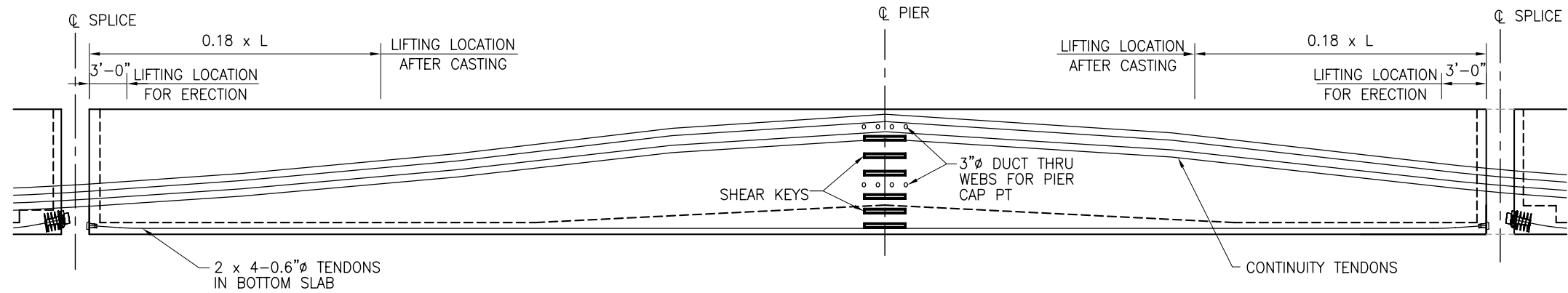
TYPICAL SPLICE REINFORCING



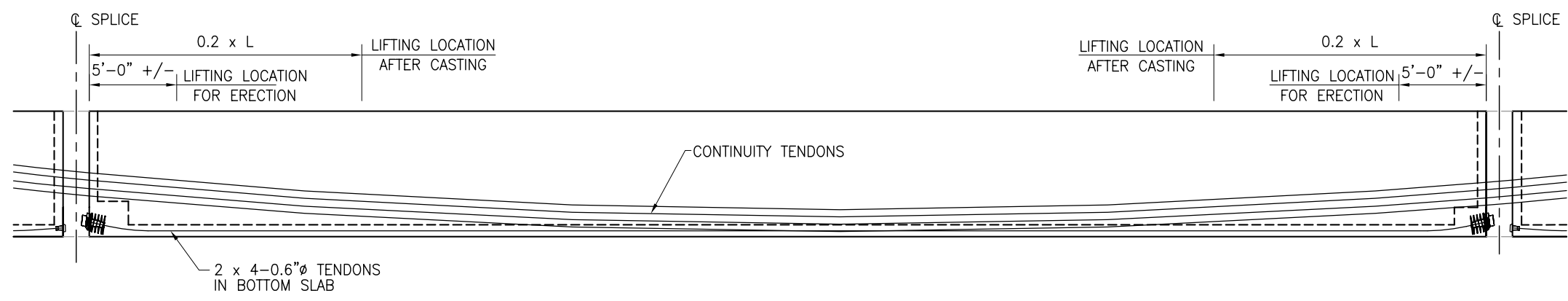
SPLICE REINFORCING SECTION



ELEVATION
TYPICAL END GIRDER



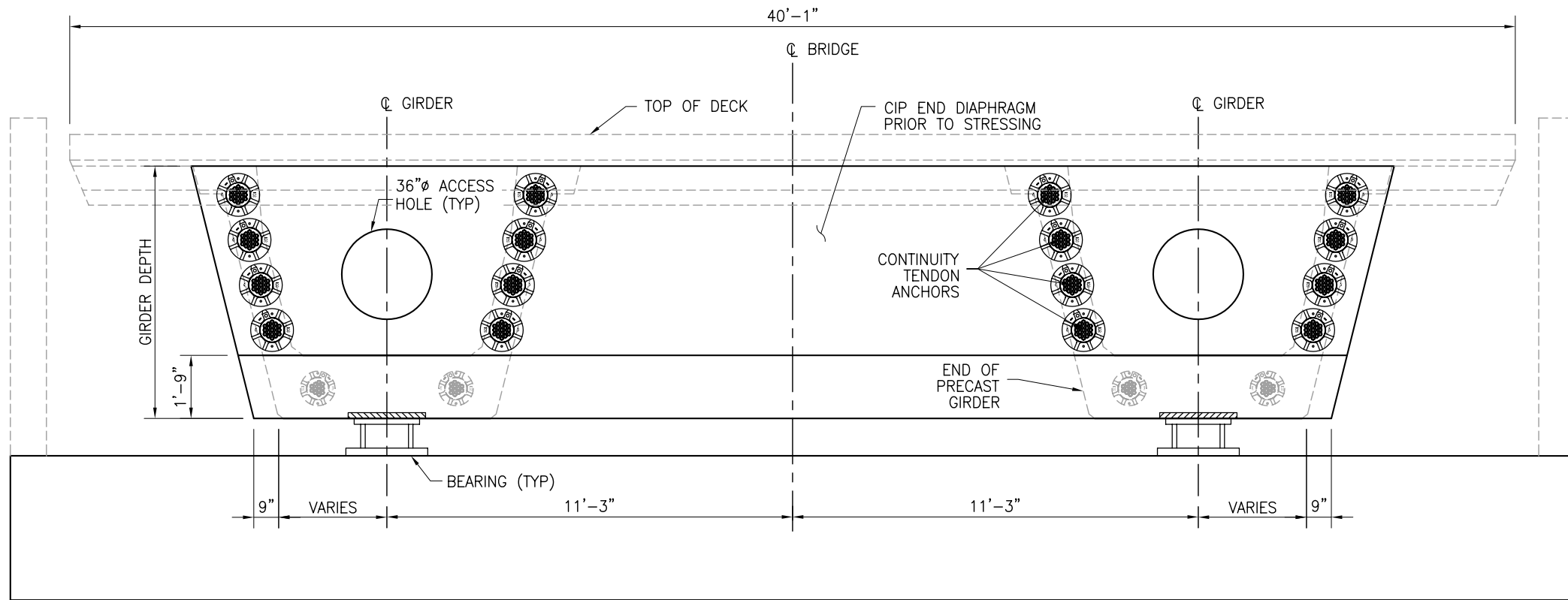
ELEVATION
TYPICAL PIER GIRDER



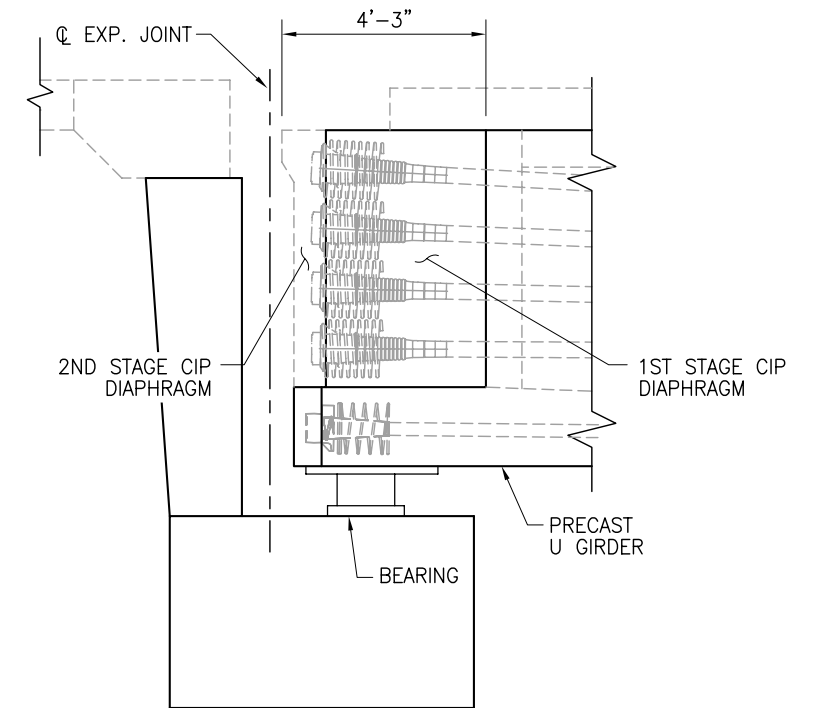
ELEVATION
TYPICAL MID-SPAN GIRDER

NOTES

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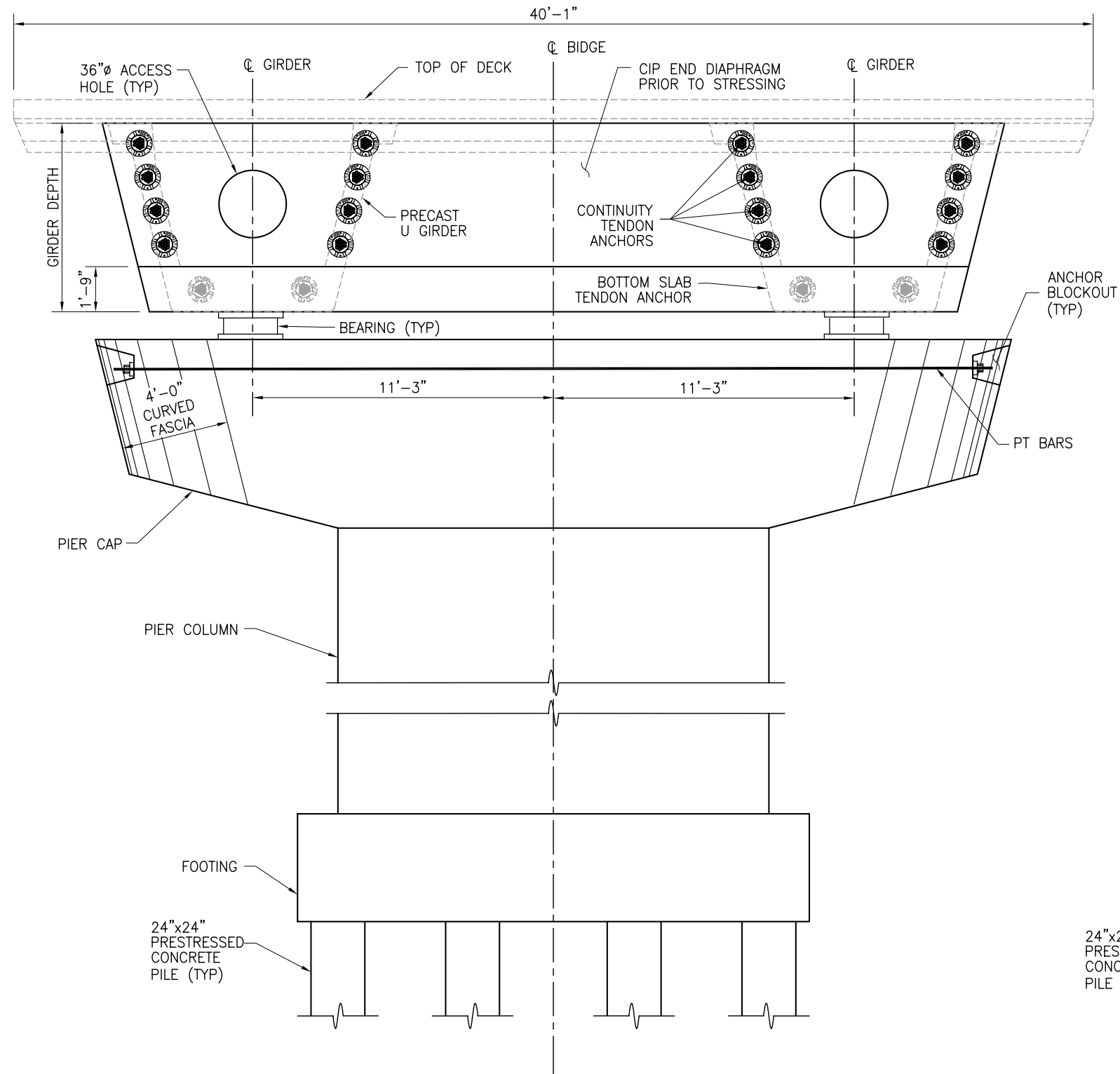
ELEVATION AT ABUTMENT



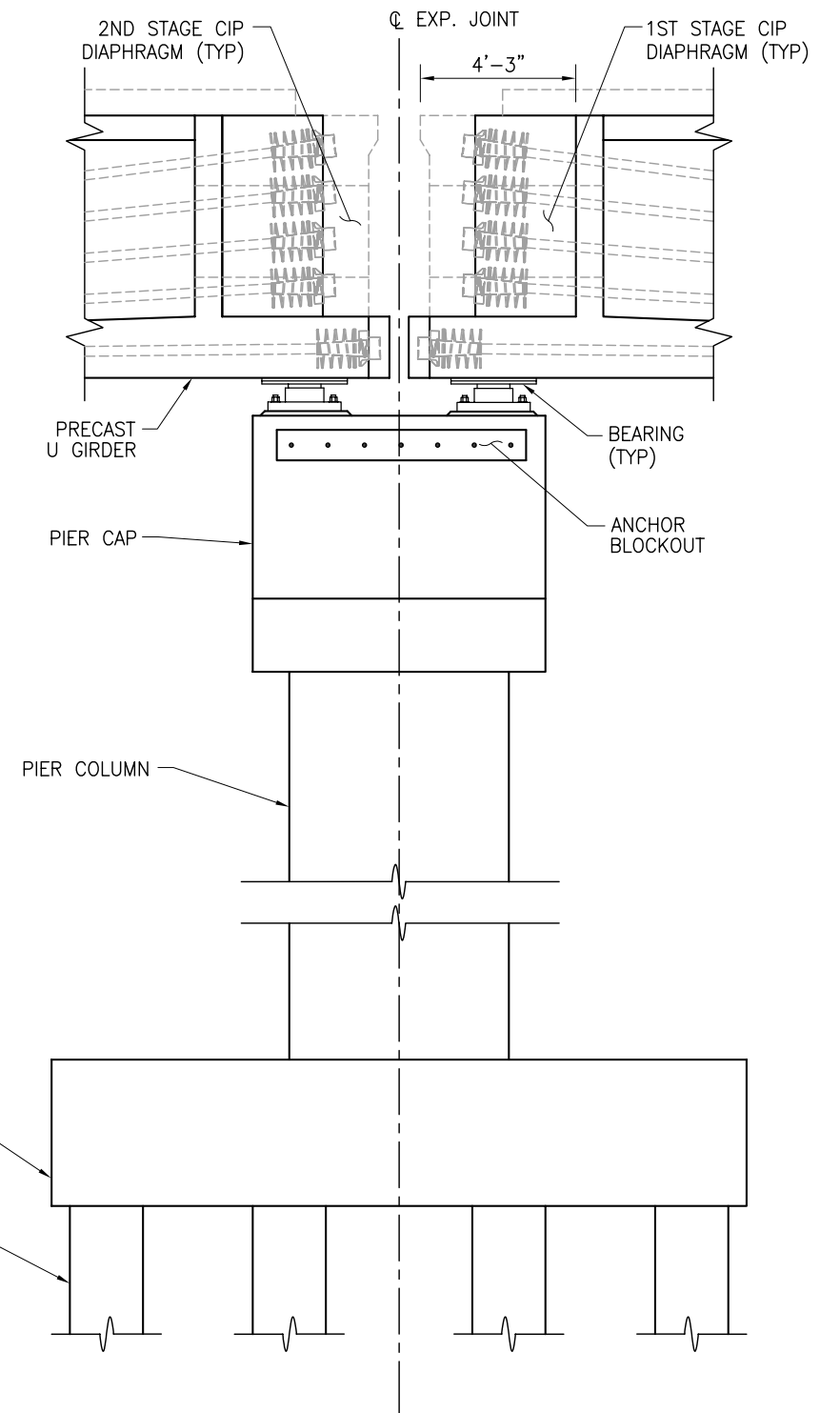
SECTION AT ABUTMENT

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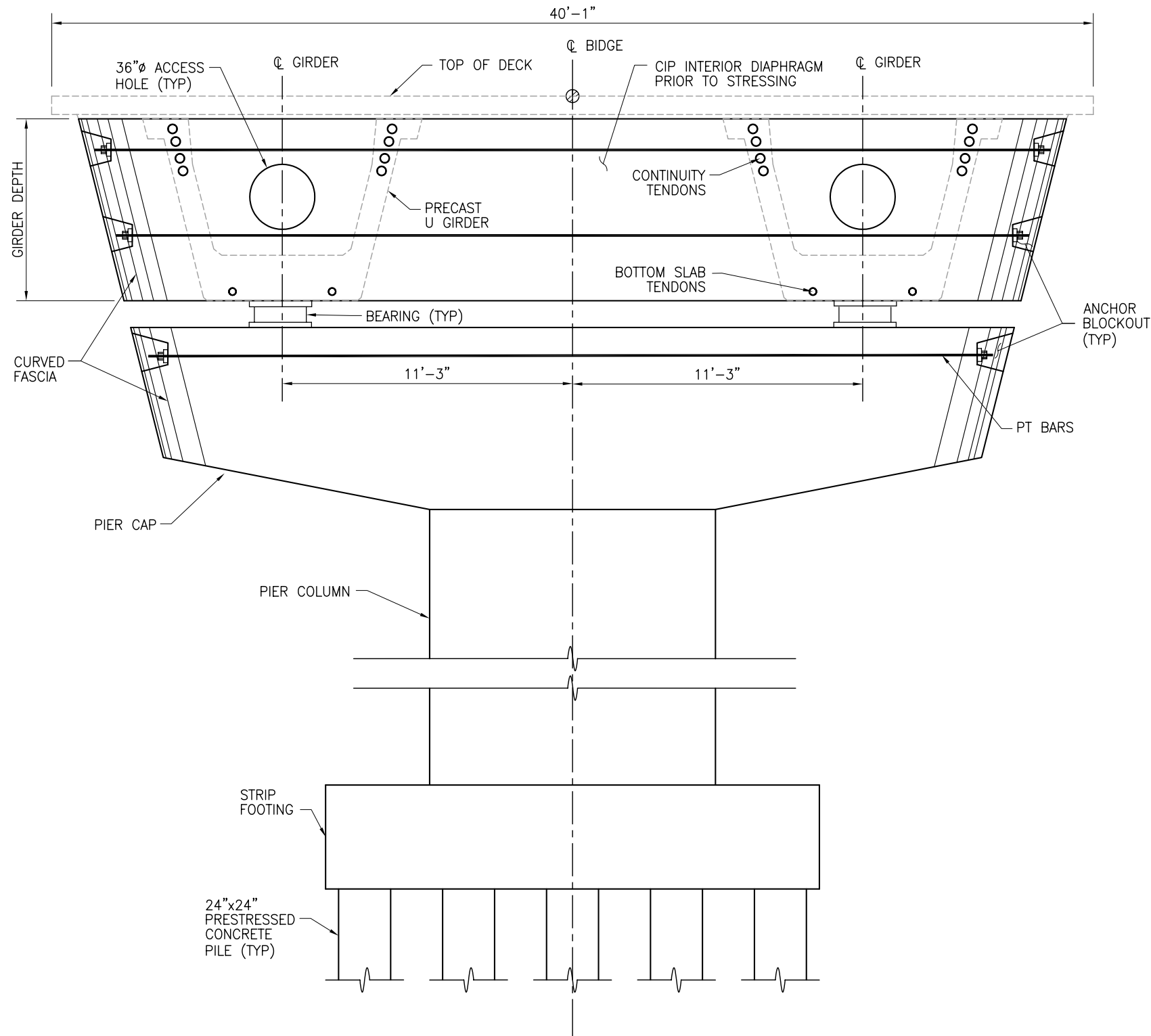
ELEVATION



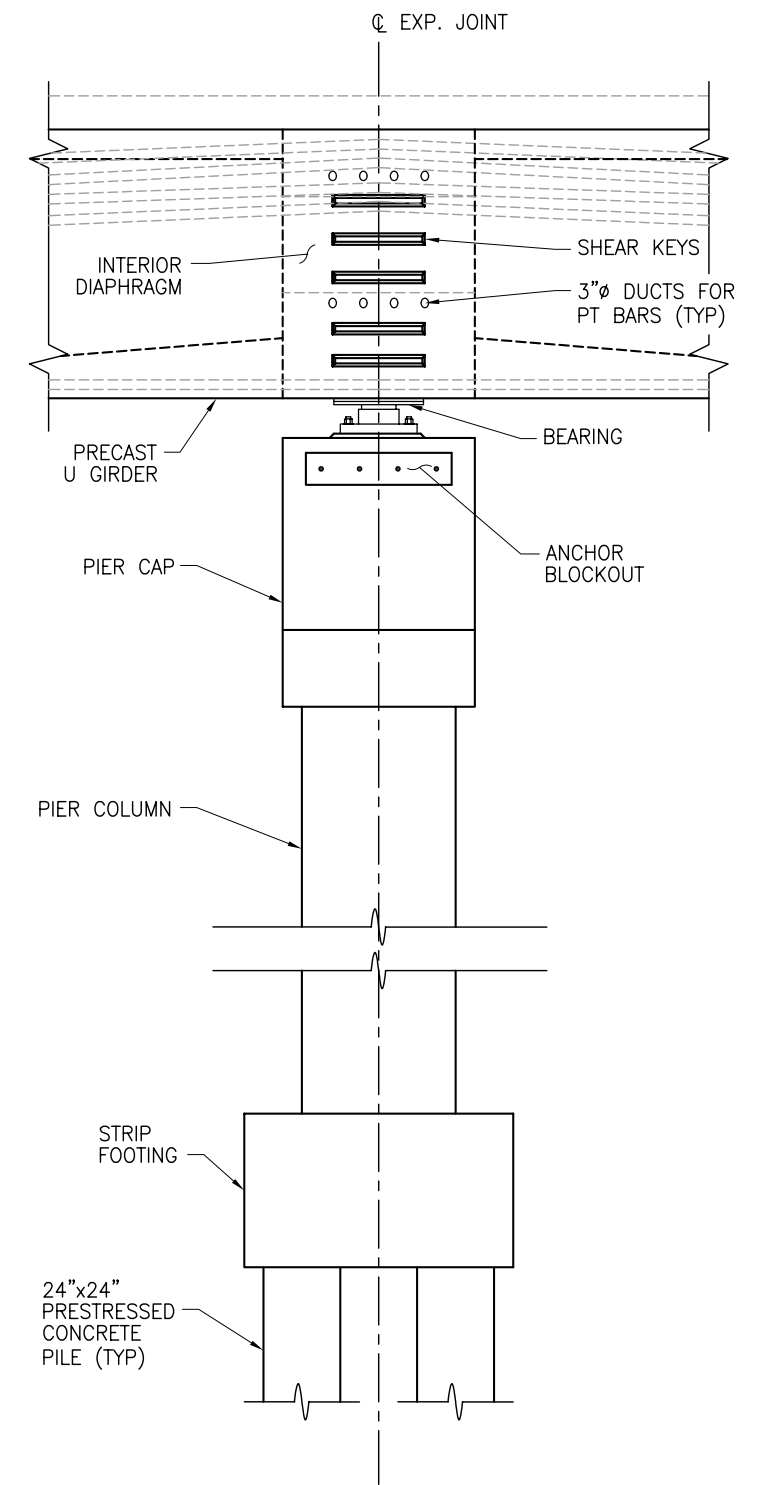
SIDE VIEW

NOTES

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2. ALL CONCRETE DIMENSIONS AND REINFORCEMENT SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY.



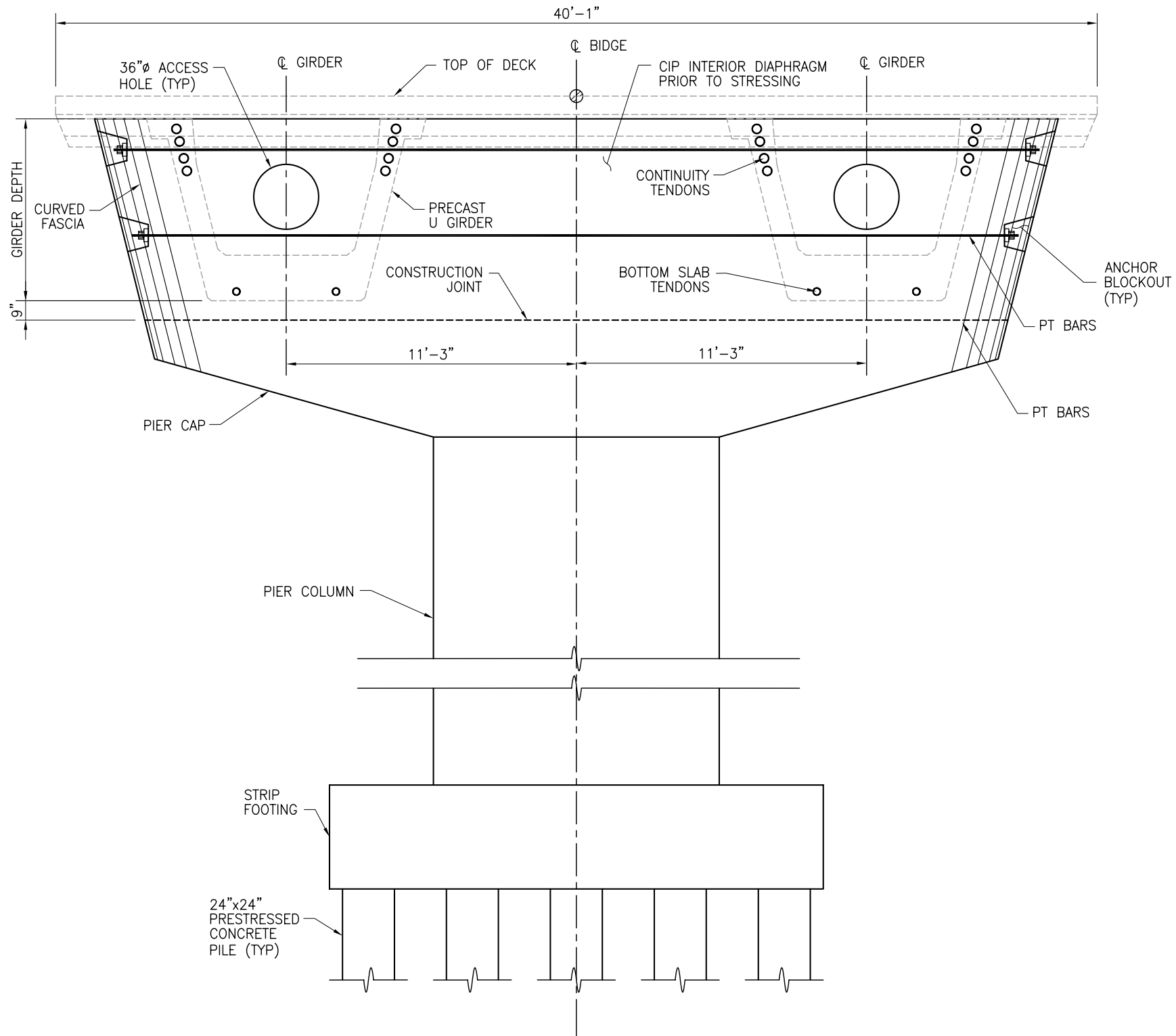
ELEVATION



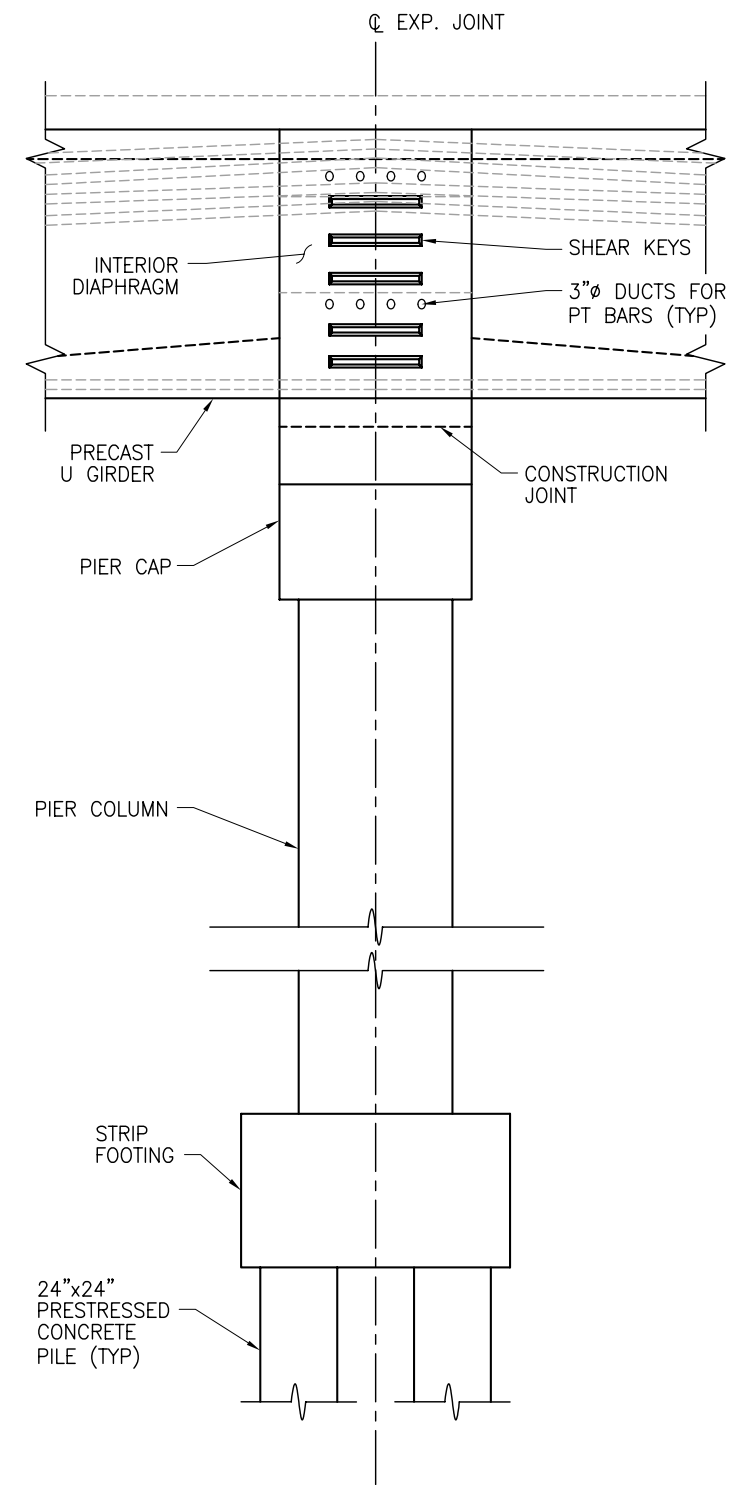
SIDE VIEW

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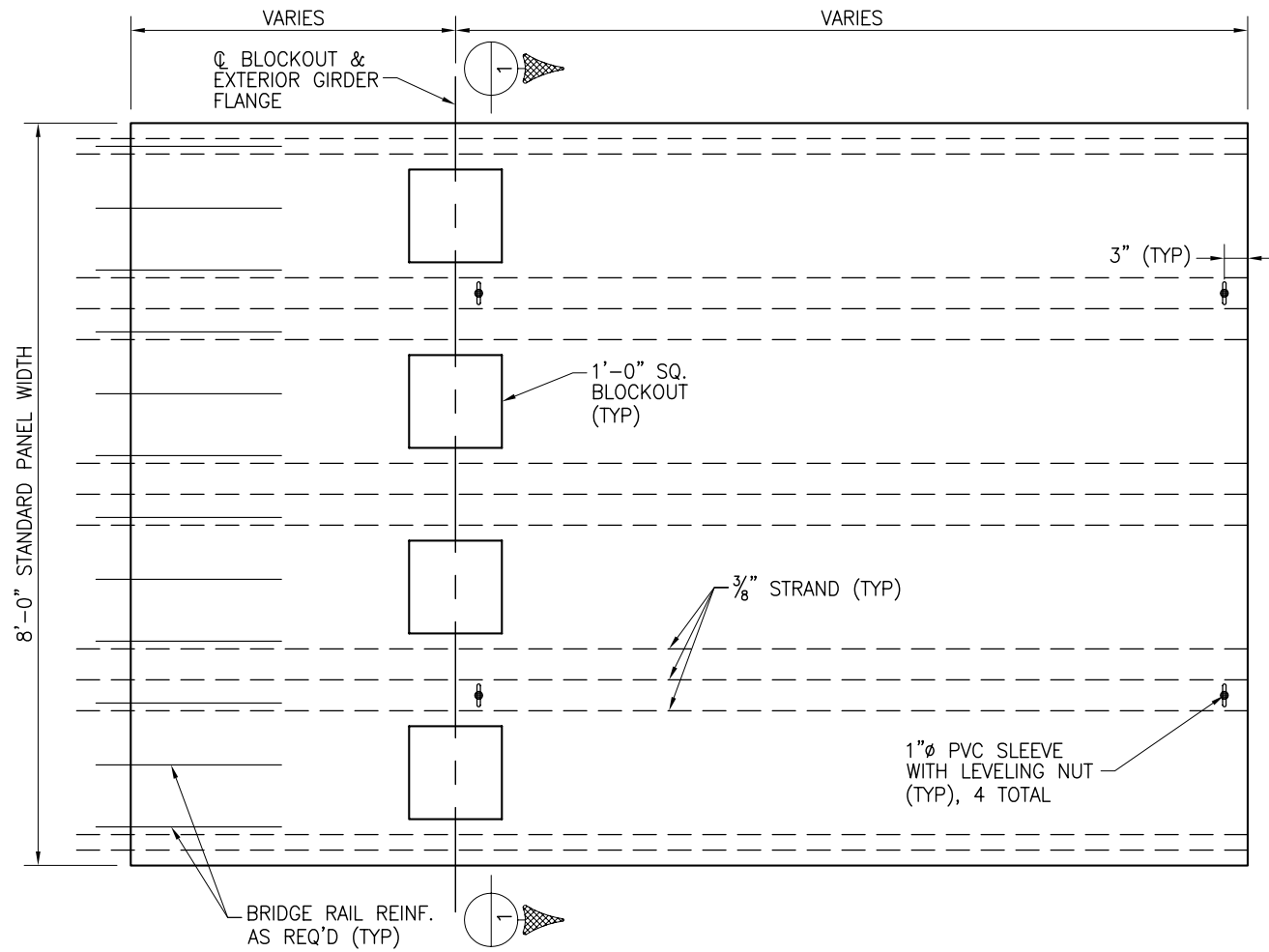
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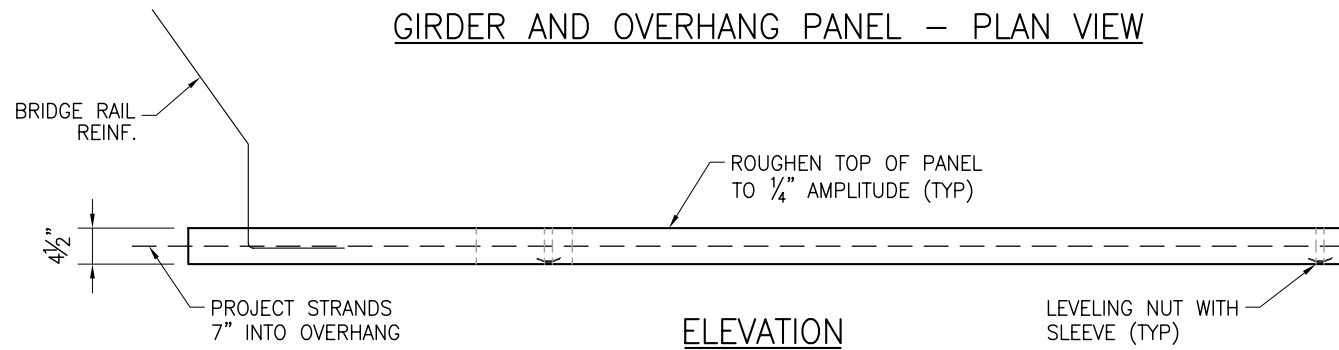
SIDE VIEW

NOTES

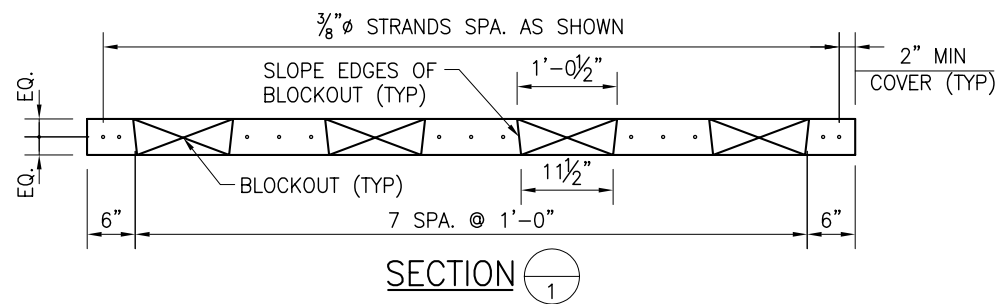
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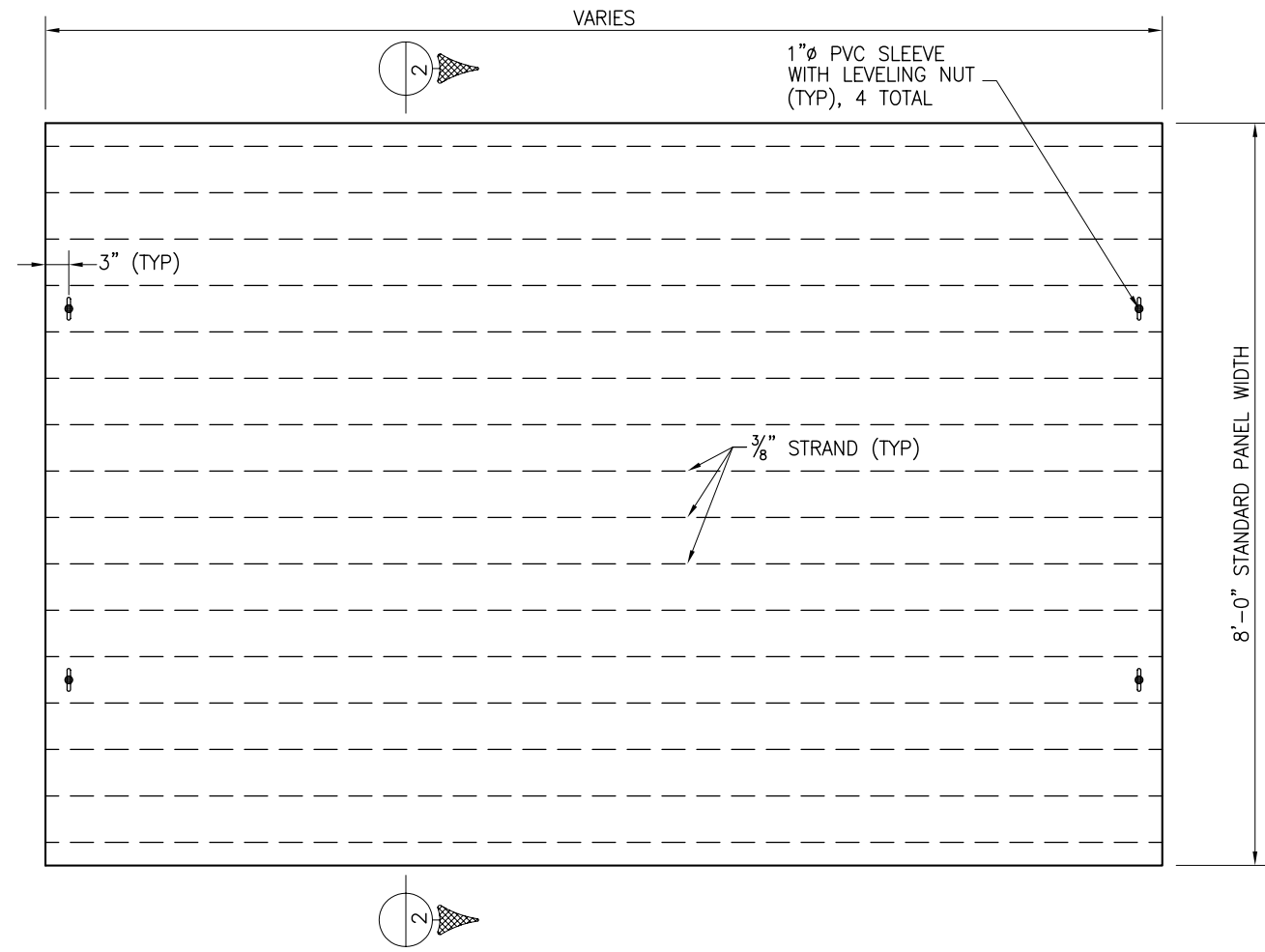
GIRDER AND OVERHANG PANEL - PLAN VIEW



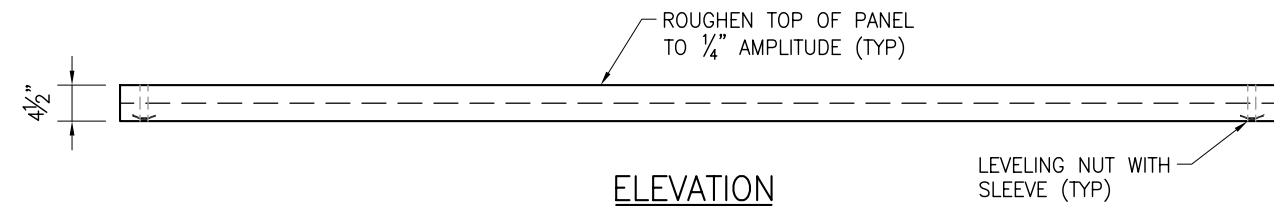
ELEVATION



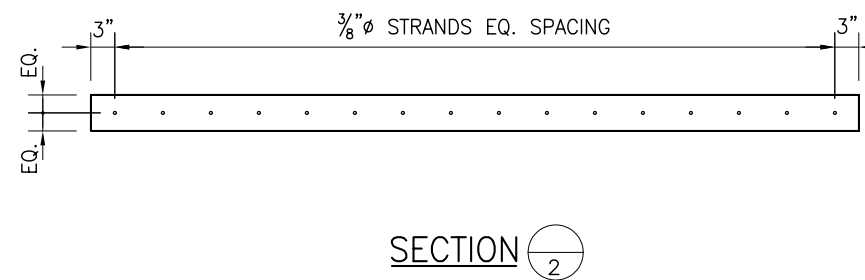
SECTION 1



MID-SPAN PANEL - PLAN VIEW



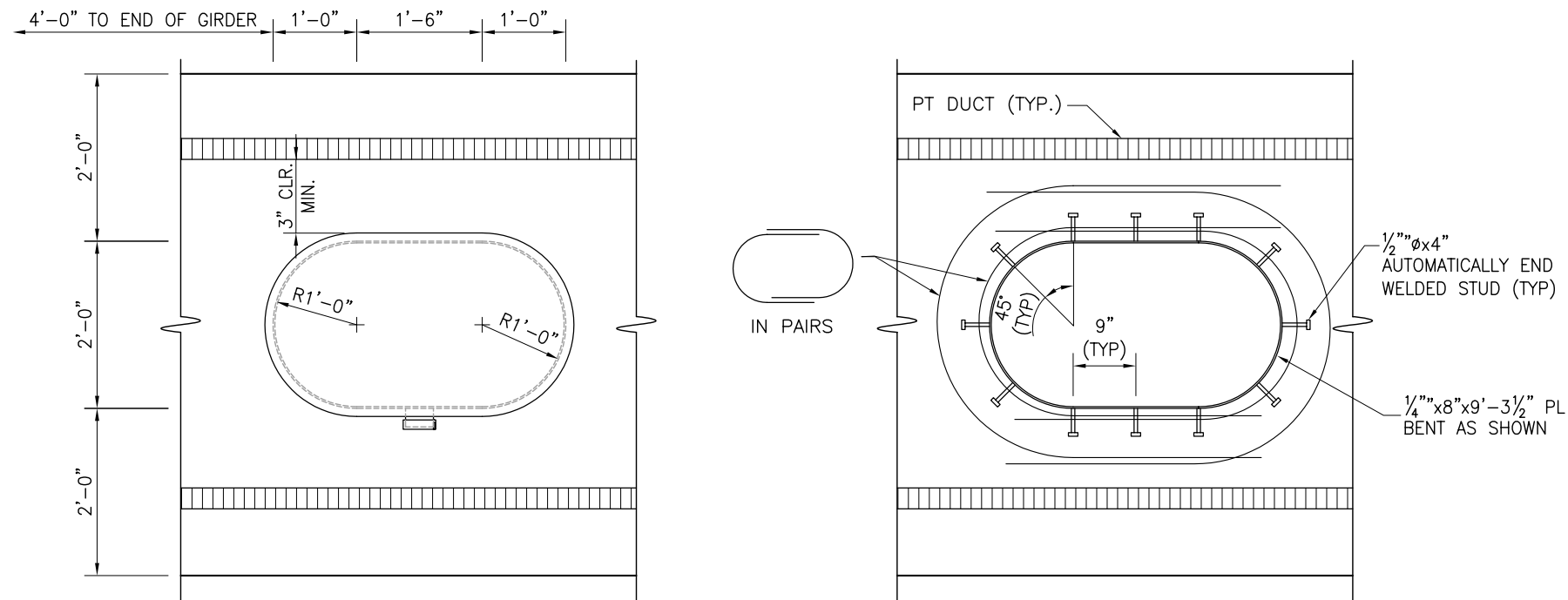
ELEVATION



SECTION 2

NOTES

1. INFORMATION SHOWN ON THIS DRAWING IS INTENDED TO ILLUSTRATE A WORKING CONCEPT FOR SPLICED U-GIRDERS.
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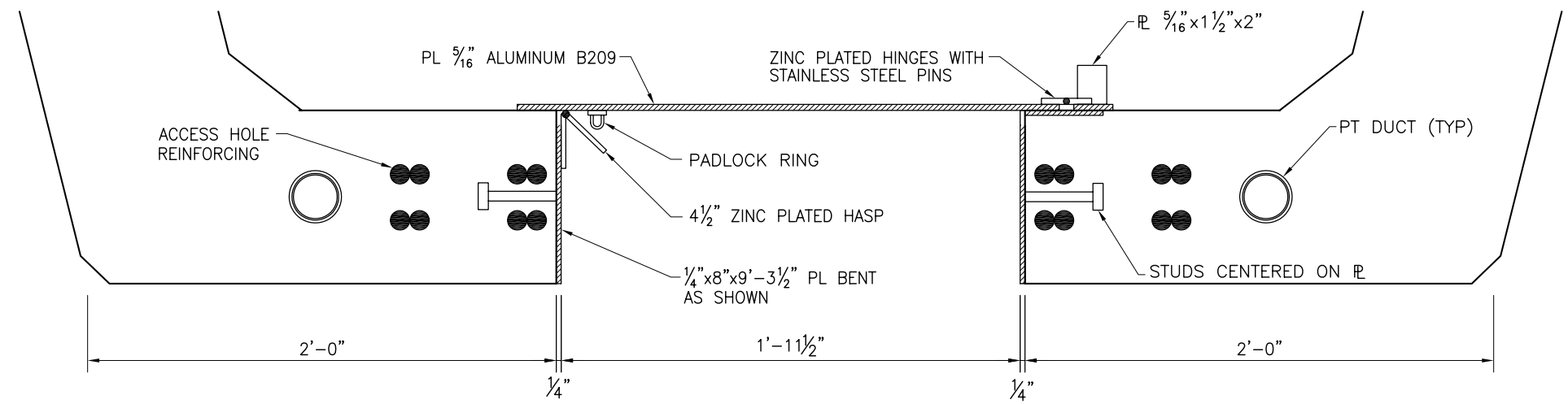


CONCRETE OPENING

REINFORCING PLAN

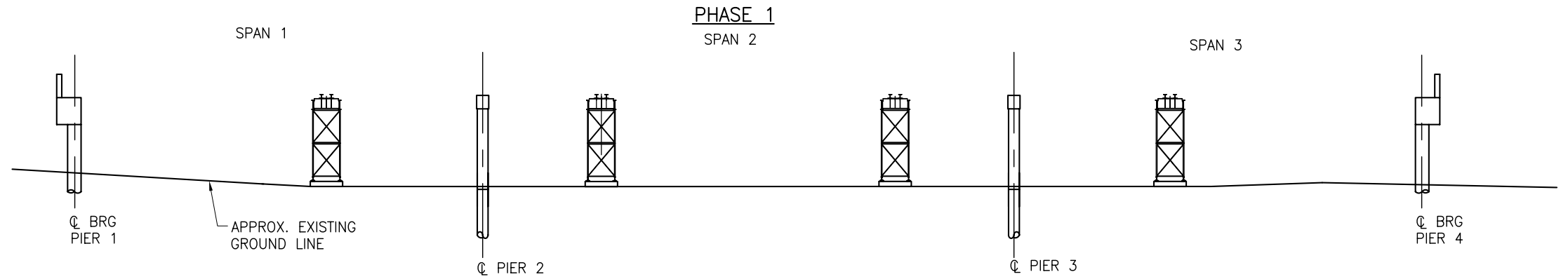
NOTES

- GRIND GALVANIZING FROM FRAME, WHERE HASP OR HINGE ATTACHES, PRIOR TO WELDING. AFTER WELDING PAINT THE SURROUNDING AREAS WITH ZINC RICH PAINT MEETING MILITARY SPECIFICATION DOD-P-210035A.
- ATTACH DOOR WITH (4) 1/4" Ø ZINC PLATED BOLTS COUNTERSUNK HEADS. USE DOUBLE NUTS, BURRING THREADS AFTER TIGHTENING. ATTACH HASP STAPLE IN A SIMILAR MANNER.
- LEAVE DOOR IN THE OPEN POSITION WHILE POURING THE BOTTOM SLAB. PAINT DOOR WITH ZINC RICH PAINT AFTER WELDING.
- INFORMATION SHOWN ON THIS DRAWING IS INTENDED TO ILLUSTRATE A WORKING CONCEPT FOR SPLICED U-GIRDERS.
- ALL CONCRETE DIMENSIONS AND REINFORCEMENT SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY.

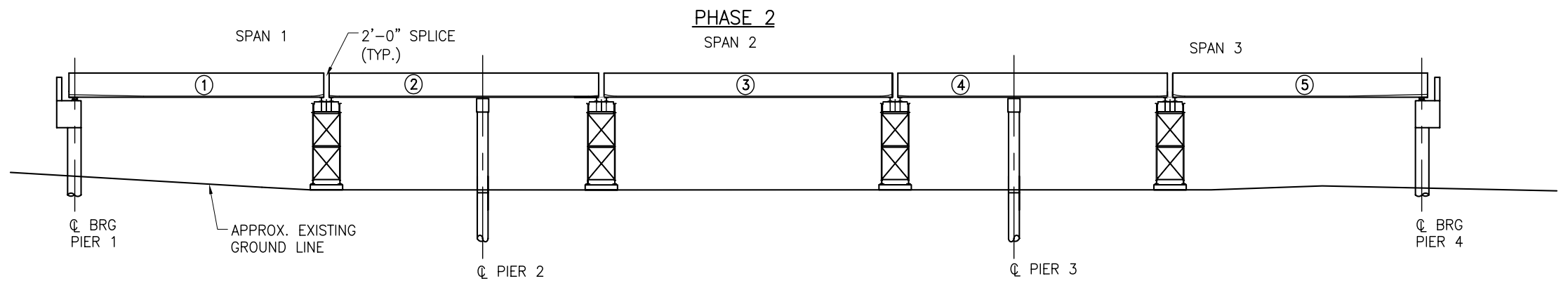


HATCH SECTION

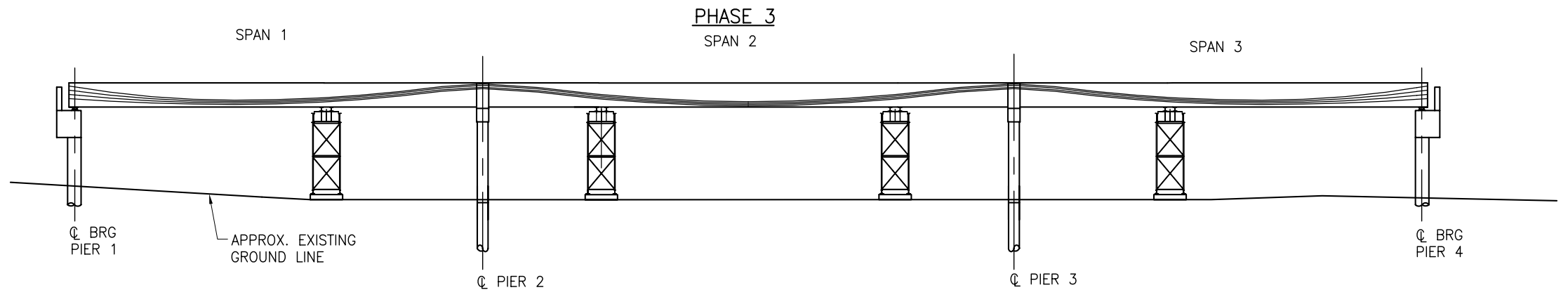
1. CONSTRUCT FOUNDATIONS, ABUTMENTS, AND PIERS.
2. STRESS AND GROUT PIER CAPS.
3. PRECAST GIRDERS, STRESS AND GROUT BOTTOM FLANGE PT.
4. ERECT SHORING TOWERS.



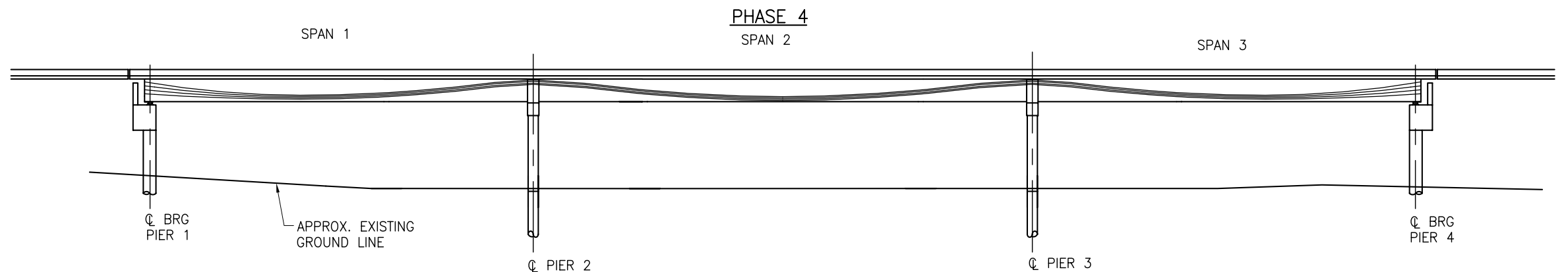
1. ERECT GIRDER SEGMENTS (PIER GIRDERS ARE NOT SET ON INTERIOR PIERS.)
2. BRACE CURVED SEGMENTS.
3. CAST ALL CLOSURES.
4. CAST DIAPHRAGMS OVER INTERIOR PIERS.
5. CAST DIAPHRAGMS AT EXPANSION PIERS.
6. FORM & CAST LID SLABS OVER GIRDERS OR PLACE AND GROUT RECAST CONCRETE PANELS.
7. STRESS AND GROUT TRANSVERSE PT AT INTEGRAL BENTS.



1. STRESS CONTINUITY TENDONS.
2. GROUT ALL TENDONS.



1. REMOVE ALL SHORING TOWERS.
2. CAST DECK SLAB.
3. CAST APPROACH SLABS AND BRIDGE RAIL.
4. INSTALL EXPANSION JOINTS.

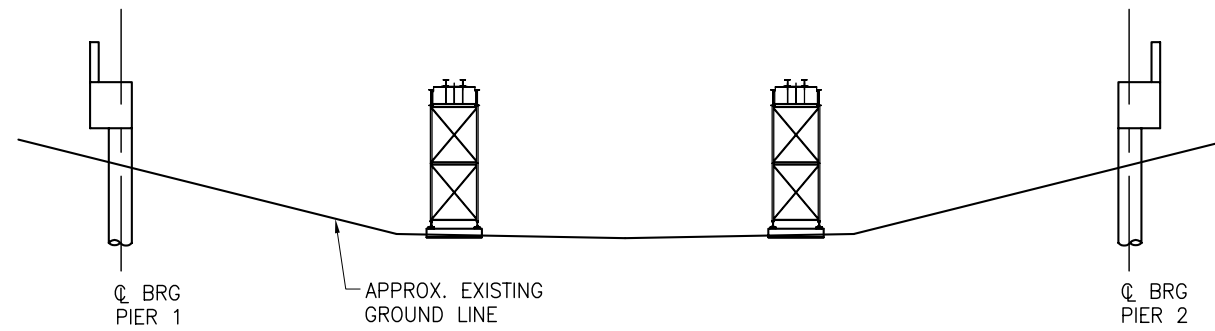


NOTES

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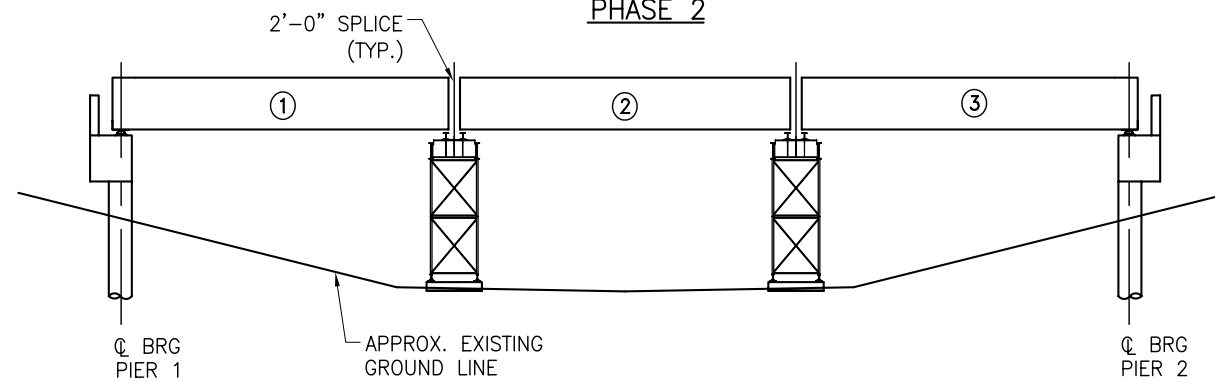
1. CONSTRUCT FOUNDATIONS, ABUTMENTS, AND PIERS.
2. PRECAST GIRDERS, STRESS AND GROUT BOTTOM FLANGE PT.
3. ERECT SHORING TOWERS.

PHASE 1



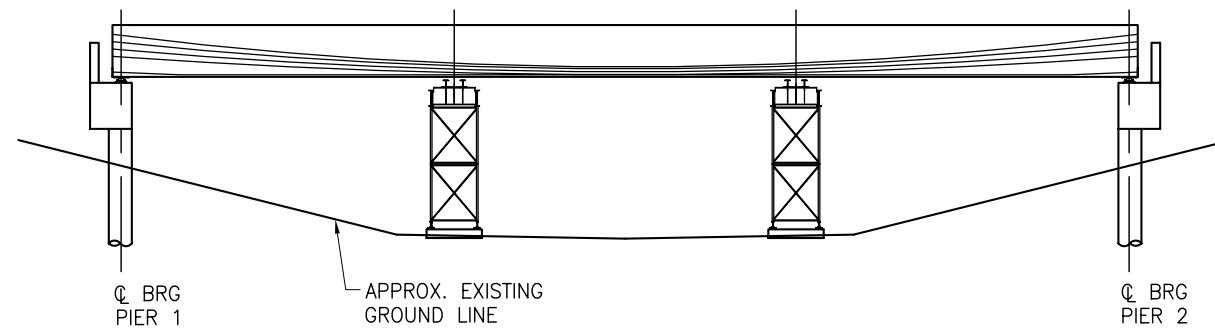
1. ERECT GIRDER SEGMENTS.
2. BRACE CURVED SEGMENTS.
3. CAST ALL CLOSURES.
4. FORM & CAST LID SLABS OVER GIRDERS OR PLACE AND GROUT PRECAST CONCRETE PANELS.

PHASE 2



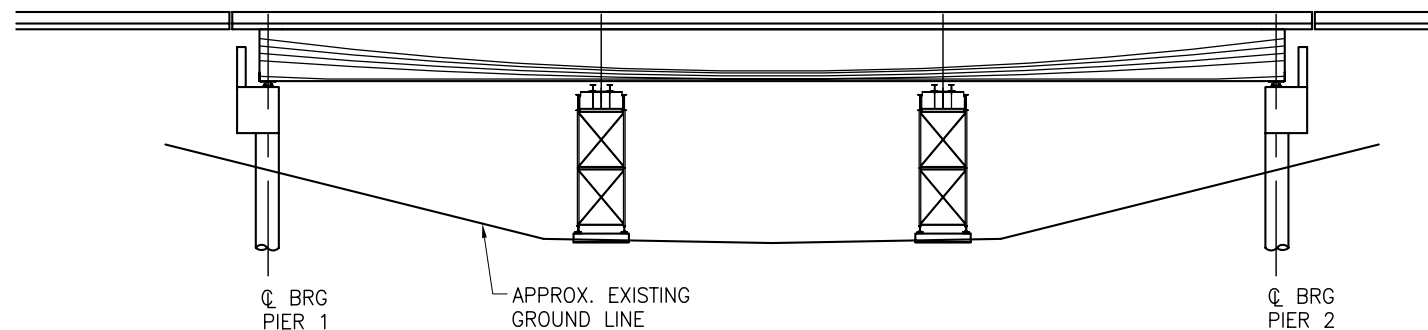
1. STRESS CONTINUITY TENDONS.
2. GROUT ALL TENDONS.

PHASE 3



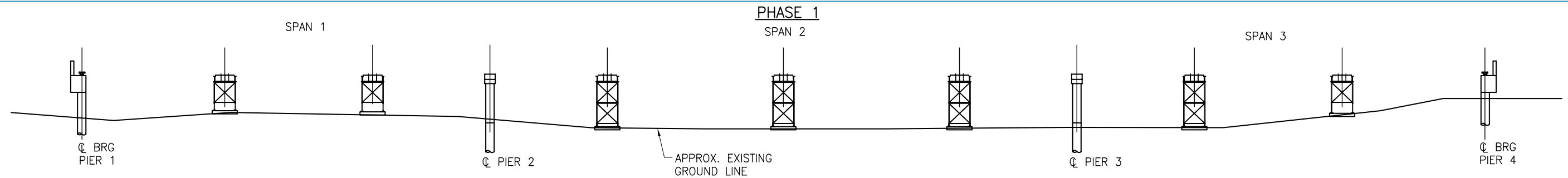
1. RE-SHORE GIRDERS AT SPLICE LOCATIONS.
2. CAST DECK SLAB.
3. CAST APPROACH SLABS AND BRIDGE RAIL.
4. INSTALL EXPANSION JOINTS.
5. REMOVE SHORING TOWERS.

PHASE 4

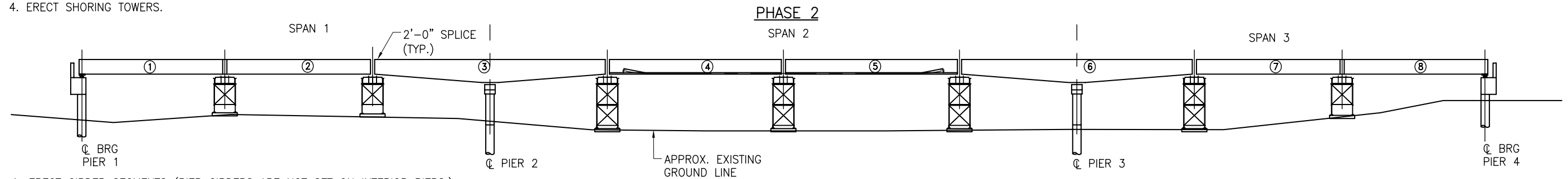


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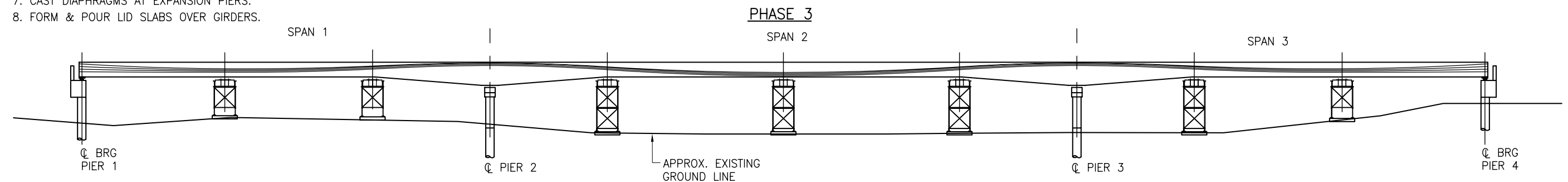
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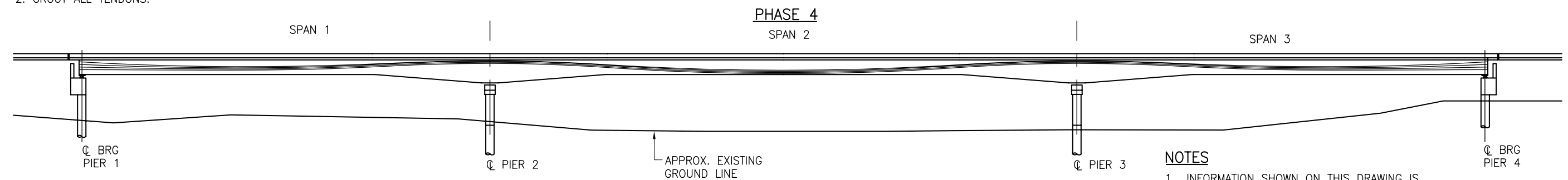
1. CONSTRUCT FOUNDATIONS, ABUTMENTS, AND PIERS.
2. STRESS AND GROUT PIER CAPS.
3. PRECAST GIRDERS, STRESS AND GROUT BOTTOM FLANGE PT.
4. ERECT SHORING TOWERS.



1. ERECT GIRDER SEGMENTS (PIER GIRDERS ARE NOT SET ON INTERIOR PIERS.)
2. BRACE CURVED SEGMENTS.
3. CAST CLOSURE BETWEEN GIRDERS 4 & 5.
4. STRESS BOTTOM FLANGE TENDON TO CONNECT GIRDER 4 & 5.
5. CAST ALL OTHER CLOSURES.
6. CAST DIAPHRAGMS OVER INTERIOR PIERS.
7. CAST DIAPHRAGMS AT EXPANSION PIERS.
8. FORM & POUR LID SLABS OVER GIRDERS.



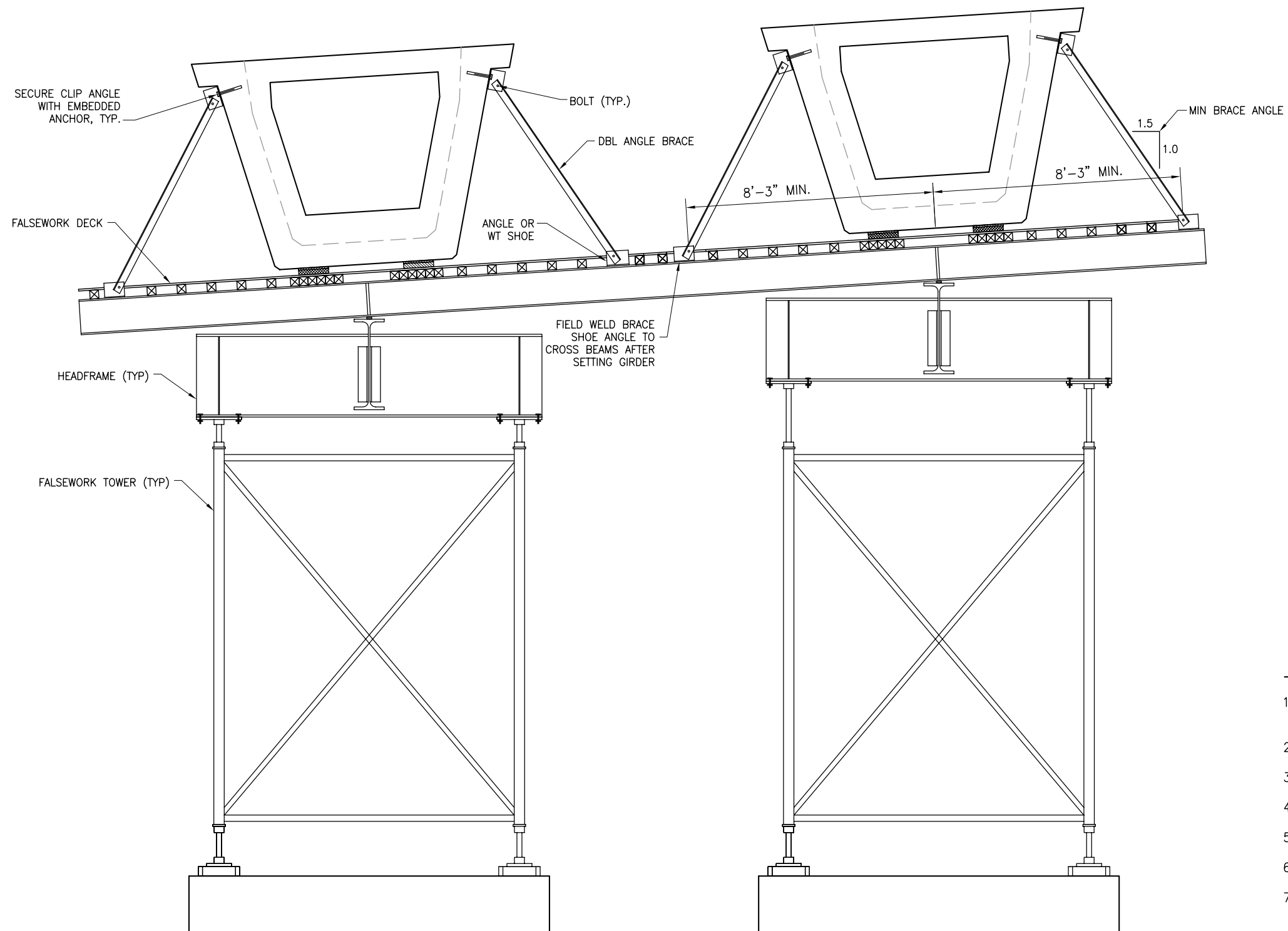
1. STRESS CONTINUITY TENDONS.
2. GROUT ALL TENDONS.



1. REMOVE ALL SHORING TOWERS.
2. CAST DECK SLAB.
3. CAST APPROACH SLABS AND BRIDGE RAIL.
4. INSTALL EXPANSION JOINTS.

NOTES

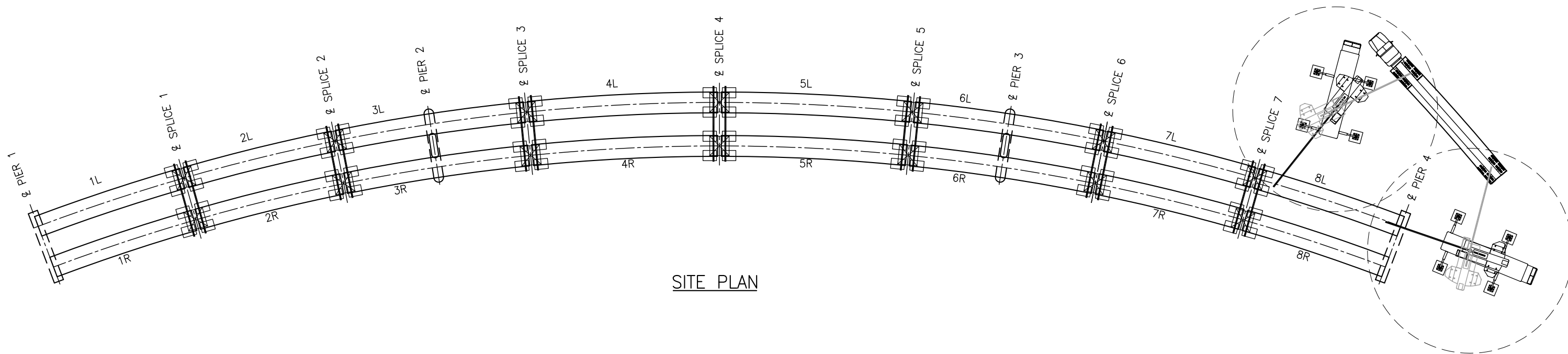
1. INFORMATION SHOWN ON THIS DRAWING IS INTENDED TO ILLUSTRATE A WORKING CONCEPT FOR SPLICED U-GIRDERS.
2. ALL CONCRETE DIMENSIONS AND REINFORCEMENT SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY.



NOTES:

1. THIS DRAWING IS INTENDED TO REPRESENT SUGGESTED METHODS FOR BRACING THE PRECAST GIRDERS DURING ERECTION TO RESIST ROLLING, PROVIDE STABILITY AND LIMIT TORSIONAL STRESSES AND DEFLECTIONS.
2. GIRDERS SHALL BE SUPPORTED AND TORSIONALLY BRACED ON FALSEWORK AT EACH END AT EACH SPLICE DURING ERECTION.
3. ALL GIRDERS SHALL BE BRACED AT EACH END PRIOR TO RELEASING ANY SIGNIFICANT LOAD FROM ERECTION EQUIPMENT TO PREVENT ROLLING.
4. BRACES AND ALL ASSOCIATED CONNECTIONS SHALL BE DESIGNED BY FALSEWORK ENGINEER.
5. SUPPORTING FALSEWORK SHALL BE DESIGNED TO PROVIDE ADEQUATE STIFFNESS UNDER BRACE LOADS TO PREVENT SIGNIFICANT DEFLECTIONS WHEN RELEASING GIRDERS.
6. INFORMATION SHOWN ON THIS DRAWING IS INTENDED TO ILLUSTRATE A WORKING CONCEPT FOR SPLICED U-GIRDERS.
7. ALL CONCRETE DIMENSIONS, AND SPACING & SIZES OF REINFORCEMENT, SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY.

ERECTION BRACING AT ENDS OF PRECAST GIRDERS



SITE PLAN

GENERAL NOTES

1. INFORMATION SHOWN ON THIS DRAWING IS INTENDED TO ILLUSTRATE A WORKING CONCEPT FOR SPLICED U-GIRDERS.
2. ALL CONCRETE DIMENSIONS AND REINFORCEMENT SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY.
3. SOIL FOR ANY CRANE PAD SHALL BE COMPACTED BY THE CONTRACTOR AND SHALL BE ACCEPTED BY THE CRANE OPERATOR PRIOR TO COMMENCING WITH ERECTION.
4. RIGGING SHALL BE PROVIDED BY THE ERECTOR WITH A MINIMUM SAFE WORKING LOAD OF THE CHARTED MAXIMUM LIFT WEIGHT. FURTHER DETAILS REGARDING RIGGING SHALL BE PROVIDED BY THE ERECTION SUBCONTRACTOR.
5. THE CONTRACTOR SHALL VERIFY THAT CRANE MOVEMENT DOES NOT INTERFERE WITH EXISTING FACILITIES, UTILITIES, OR TERRAIN PRIOR TO PROCEEDING WITH GIRDER ERECTION.
6. GIRDER ERECTION SHALL NOT PROCEED DURING INCLEMENT WEATHER OR WIND SPEEDS IN EXCESS OF 25 MPH.
7. GIRDERS SHALL CONFORM TO PCI TOLERANCES PER FDOT SPECIFICATION. BEAMS ACCEPTED BY THE OWNER ARE ASSUMED TO MEET THE PCI SPECIFICATIONS.
8. ACTUAL GIRDER ERECTION SCHEDULE AND DETAILED SCHEDULE REGARDING WORKING HOUR RESTRICTIONS SHALL BE PROVIDED BY CONTRACTOR.
9. GIRDER LAUNCHERS AND TROLLEYS WILL NOT BE USED.
10. REFER TO FALSEWORK DRAWINGS FOR FALSEWORK AND CONNECTION DETAILS AT SPLICES.
11. ALL GIRDERS SHALL BE LIFTED BY END LIFT LOOPS PER SHOP DRAWINGS.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR SAFETY ISSUES RELATING TO TRAFFIC IN AREAS ADJACENT TO ERECTION OPERATIONS.

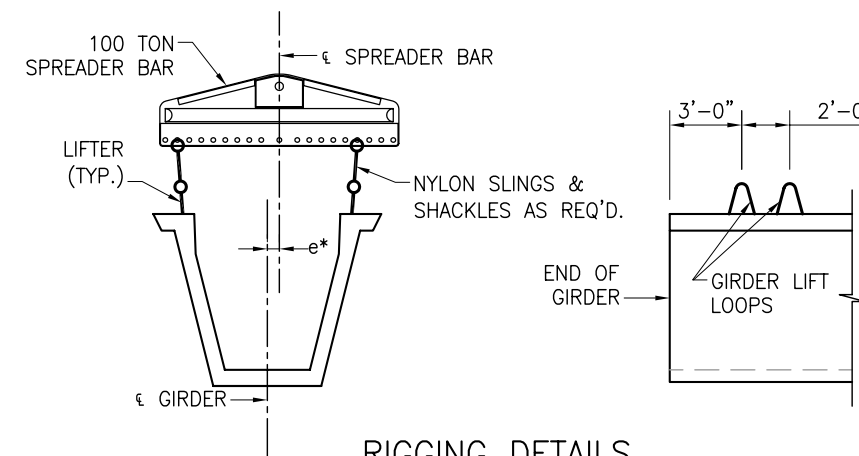
REPRESENTATIVE GIRDER LIFT CHART				
GIRDER NUMBER	MAX GIRDER LENGTH (ft.)	MAX GIRDER WEIGHT (kips)	MAX LIFT WEIGHT 300 TON CRANE (kips) **	e (ft.)
1L&R	78.5	193.5	107.0	1.00
2L&R	78.5	203.0	112.0	1.00
3L&R	98.0	306.0	166.0	1.50
4L&R	98.0	248.0	135.0	1.25
5L&R	98.0	248.0	135.0	1.25
6L&R	98.0	306.0	166.0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

GIRDER ERECTION PLAN