



PCI™ Precast/Prestressed Concrete Institute

BRIDGE DESIGN MANUAL

3rd Edition, First Release, November 2011

Version Compressed for ePub

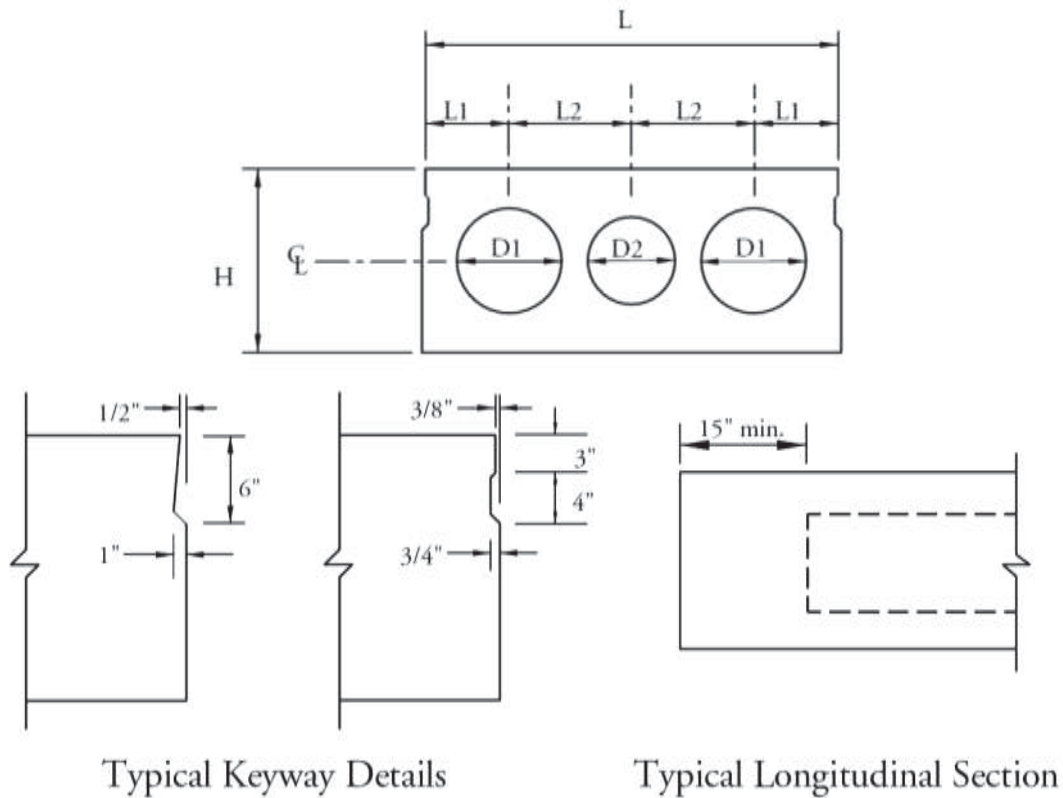
MNL-133-11

1st Edition, First Printing, 1997

2nd Edition, First Printing, 2003

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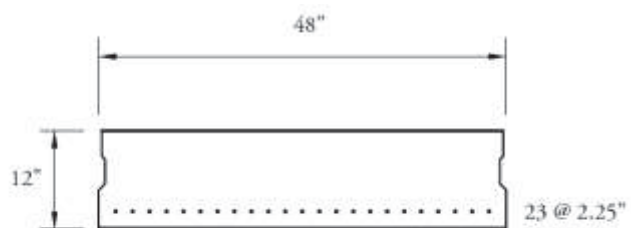
AASHTO Solid and Voided Slab Beams**Dimension (inches)**

Type	L	H	L1	L2	No. of Voids	D1	D2
SI-36	36	12	-	-	0	-	-
SII-36	36	15	10.5	7.5	2	8	-
SIII-36	36	18	10.5	7.5	2	10	-
SIV-36	36	21	10	8	2	12	-
SI-48	48	12	-	-	0	-	-
SII-48	48	15	10	14	3	8	8
SIII-48	48	18	9.5	14.5	3	10	10
SIV-48	48	21	10	14	3	12	10

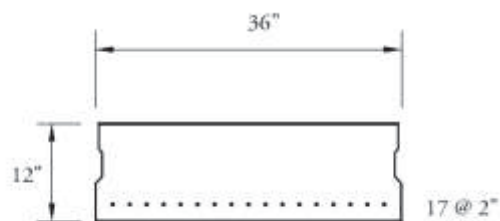
Properties

Type	Area in. ²	y _{bottom} in.	Inertia in. ⁴	Weight kip/ft
SI-36	432	6	5,184	0.45
SII-36	439	7.5	9,725	0.457
SIII-36	491	9	16,514	0.511
SIV-36	530	10.5	25,747	0.552
SI-48	576	6	6,912	0.6
SII-48	569	7.5	12,897	0.593
SIII-48	628	9	21,855	0.654
SIV-48	703	10.5	34,517	0.732

AASHTO Solid and Voided Slab Beams



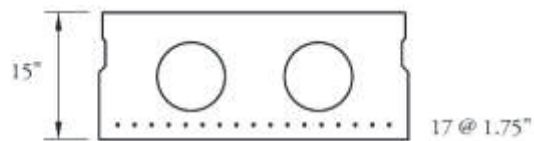
Type SI-48



Type SI-36



Type SII-48



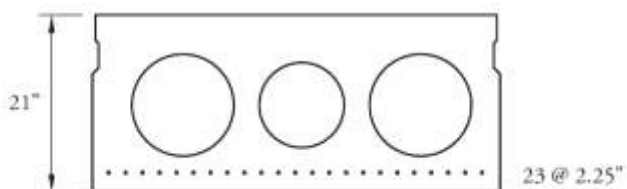
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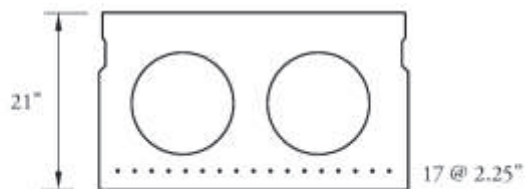
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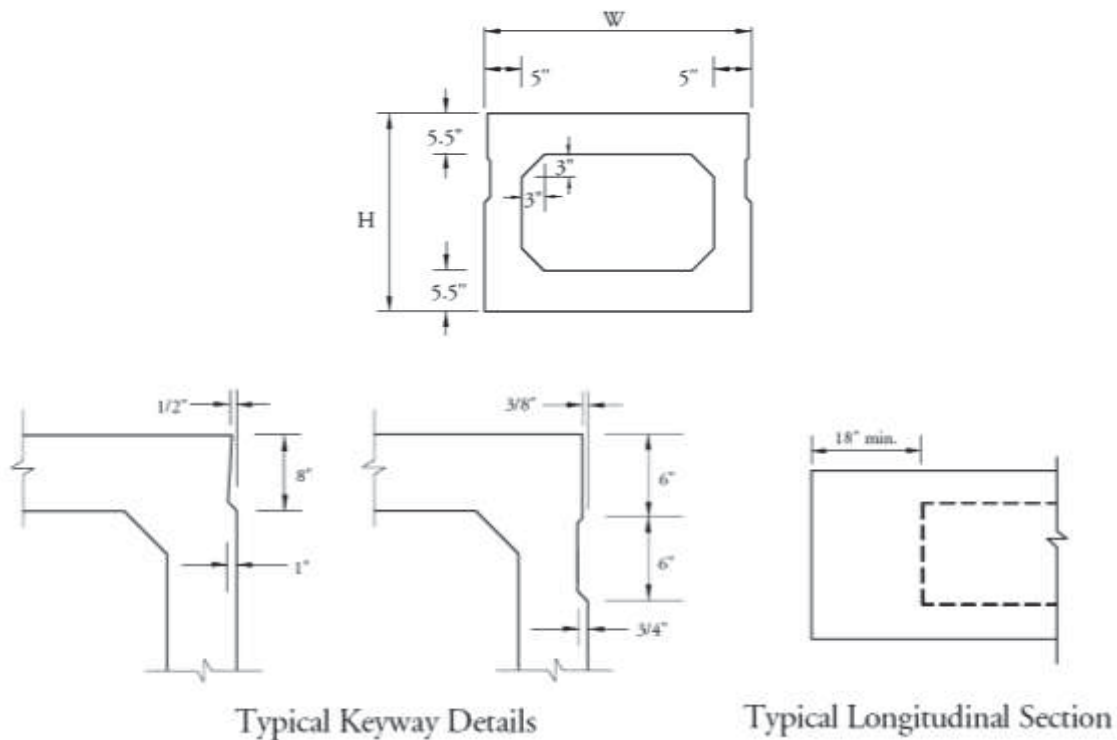
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Type IV-48



Type IV-36

AASHTO Box Beams

Typical Keyway Details

Typical Longitudinal Section

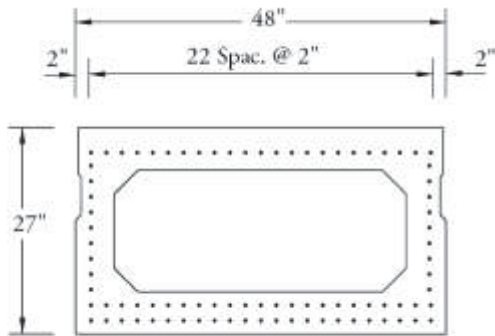
Dimensions:

Type	W	H
BI-36	36	27
BI-48	48	27
BII-36	36	33
BII-48	48	33
BIII-36	36	39
BIII-48	48	39
BIV-36	36	42
BIV-48	48	42

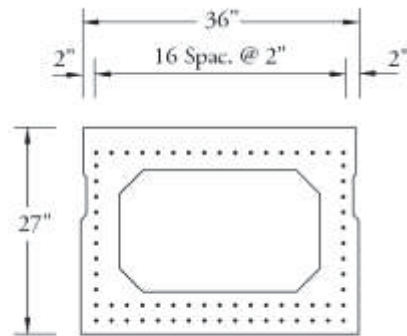
Properties:

Type	Area in. ²	y_{bottom} in.	Inertia in. ⁴	Weight kip/ft
BI-36	560.5	13.35	50,334	0.584
BI-48	692.5	13.37	65,941	0.721
BII-36	620.5	16.29	85,153	0.646
BII-48	752.5	16.33	110,499	0.784
BIII-36	680.5	19.25	131,145	0.709
BIII-48	812.5	19.29	168,367	0.846
BIV-36	710.5	20.73	158,644	0.74
BIV-48	842.5	20.78	203,088	0.878

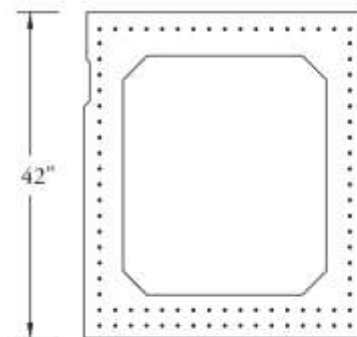
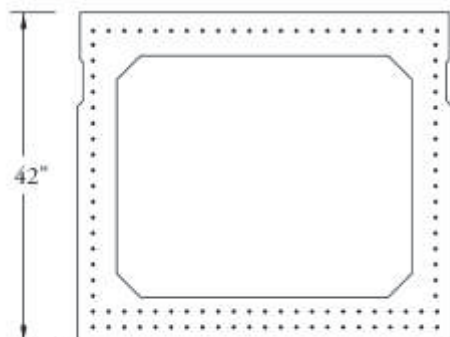
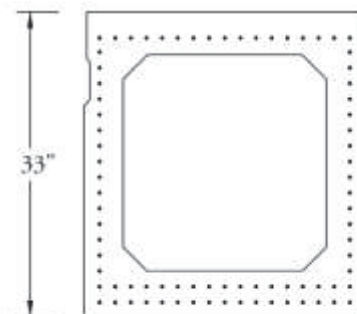
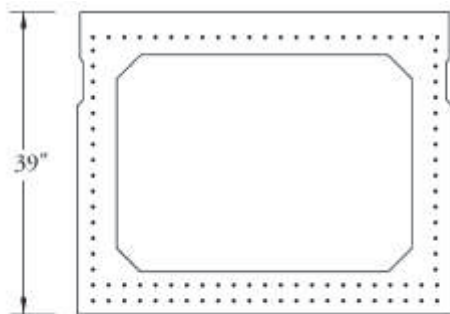
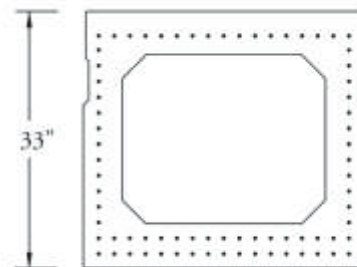
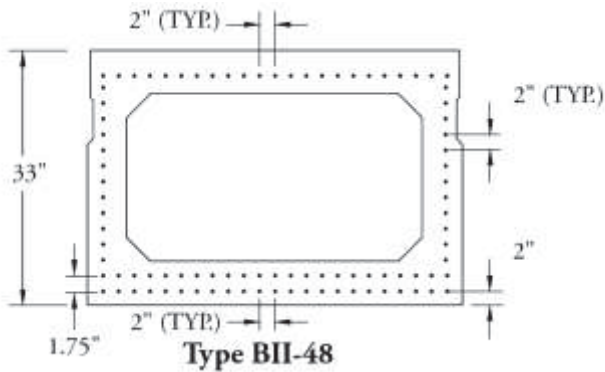
AASHTO Box Beams

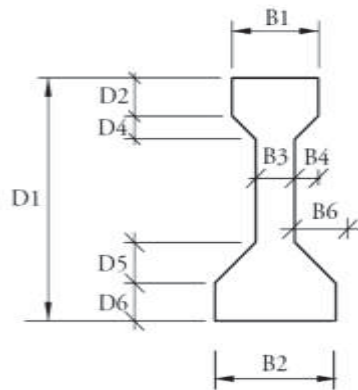


Type BI-48

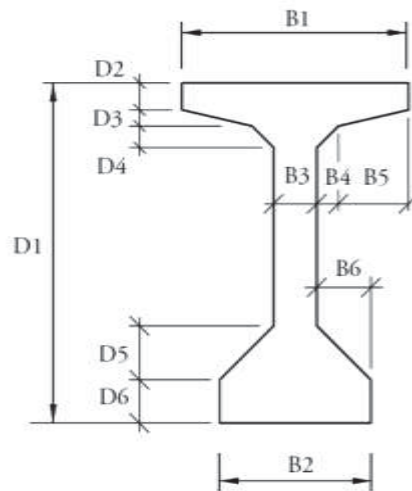


Type BI-36



AASHTO I-Beams

Type I-IV



Type V-VI

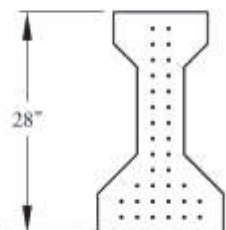
Dimensions (inches)

Type	D1	D2	D3	D4	D5	D6	B1	B2	B3	B4	B5	B6
I	28	4	0	3	5	5	12	16	6	3	0	5
II	36	6	0	3	6	6	12	18	6	3	0	6
III	45	7	0	4.5	7.5	7	16	22	7	4.5	0	7.5
IV	54	8	0	6	9	8	20	26	8	6	0	9
V	63	5	3	4	10	8	42	28	8	4	13	10
VI	72	5	3	4	10	8	42	28	8	4	13	10

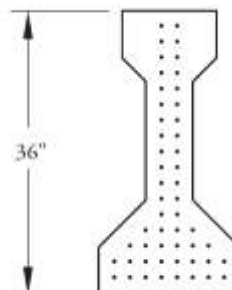
Properties:

Type	Area in. ²	y _{bottom} in.	Inertia in. ⁴	Weight kip/ft
I	276	12.59	22,750	0.287
II	369	15.83	50,980	0.384
III	560	20.27	125,390	0.583
IV	789	24.73	260,730	0.822
V	1,013	31.96	521,180	1.055
VI	1,085	36.38	733,320	1.13

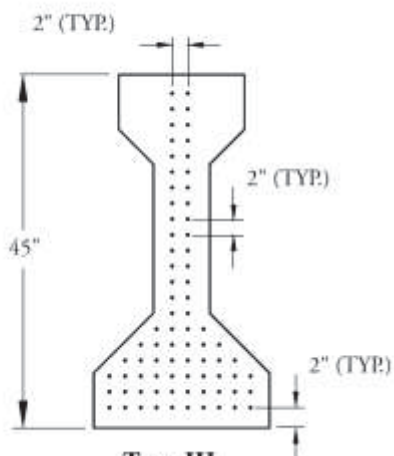
AASHTO I-Beams



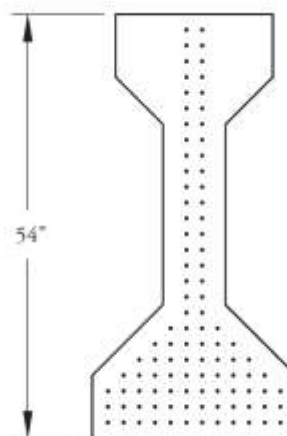
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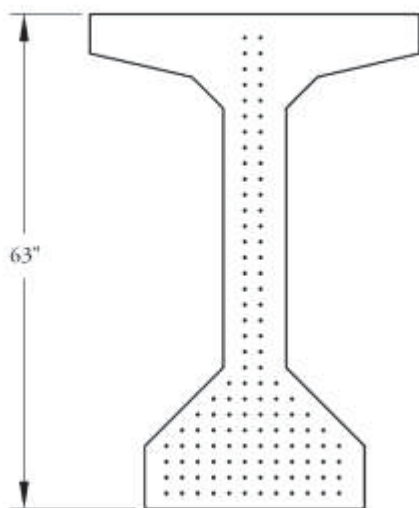
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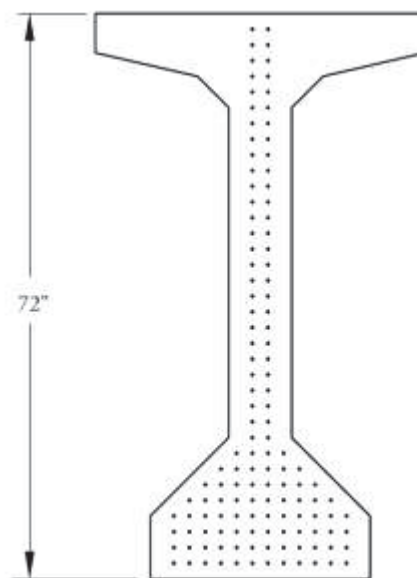
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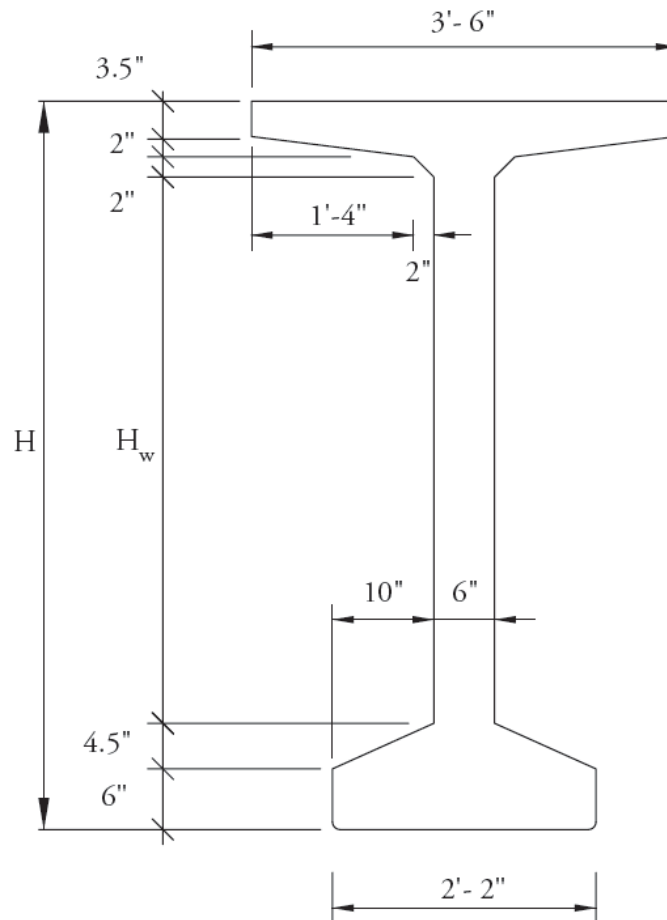
Type IV



Type V

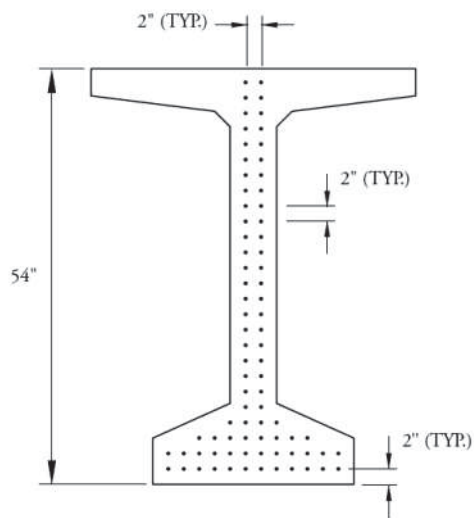


Type VI

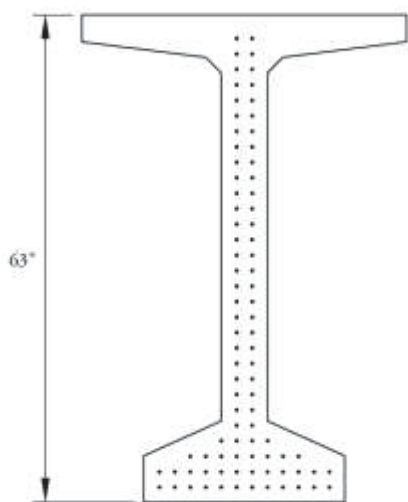
AASHTO-PCI Bulb-Tees**Properties**

Type	H in.	H _w in.	Area in. ²	Inertia in. ⁴	y _{bottom} in.	Weight kip/ft
BT-54	54	36	659	268,077	27.63	0.686
BT-63	63	45	713	392,638	32.12	0.743
BT-72	72	54	767	545,894	36.6	0.799

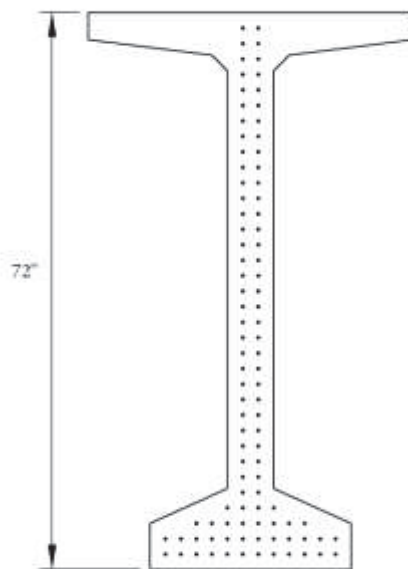
AASHTO-PCI Bulb-Tees



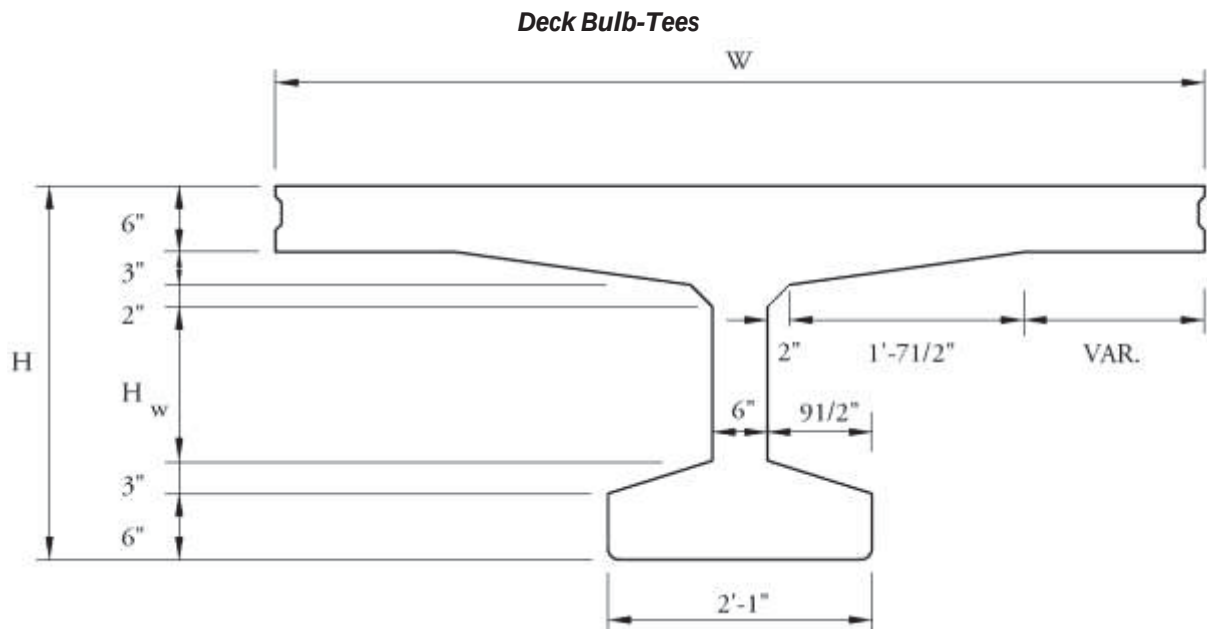
BT-54



BT-63

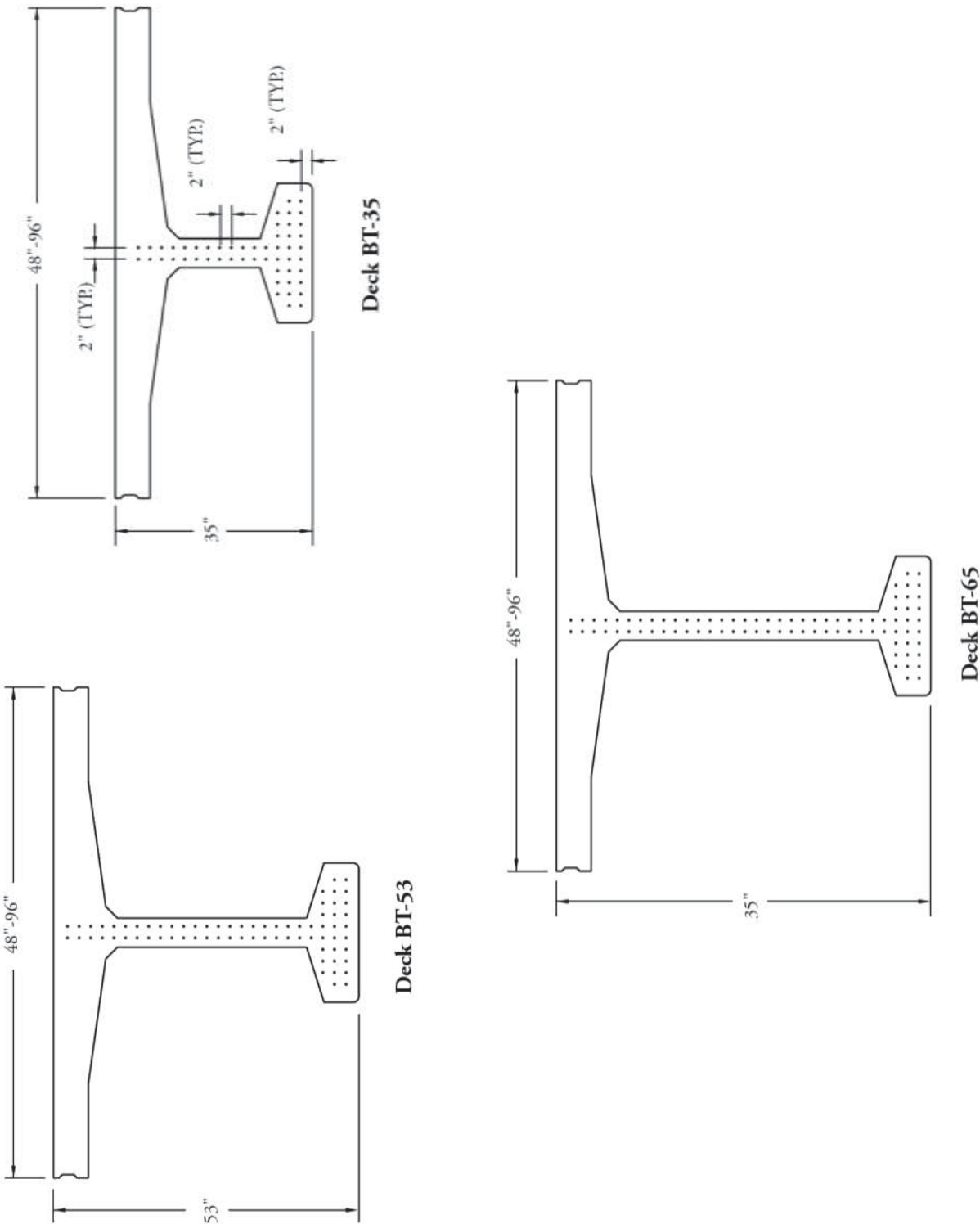


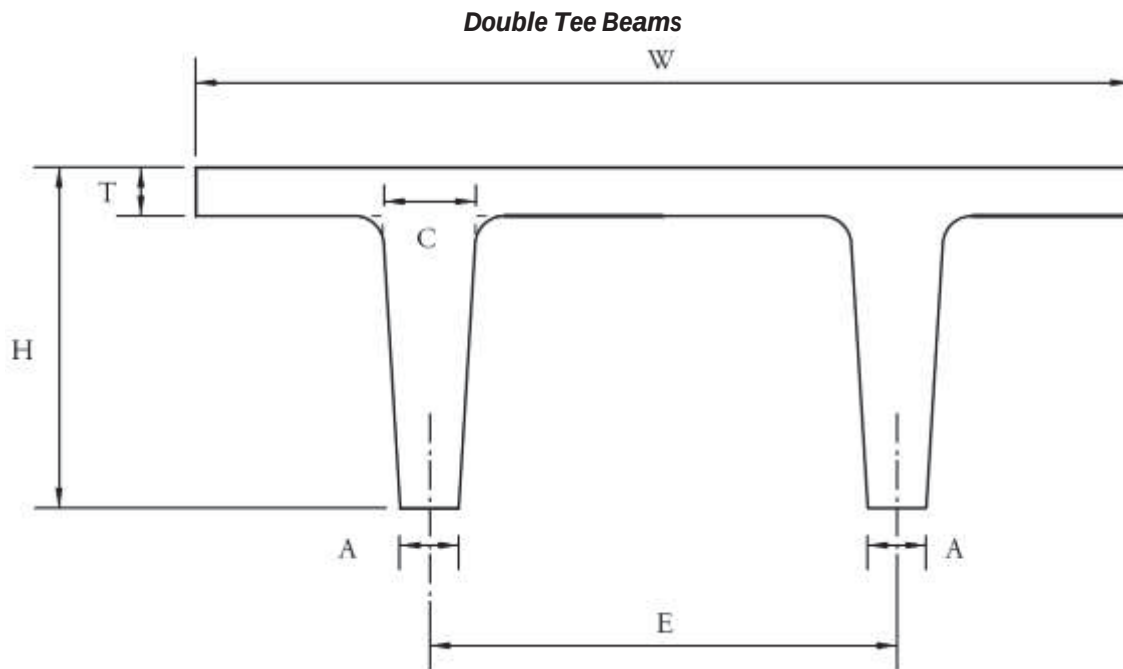
BT-72

**Dimensions and Properties**

H in.	H _w in.	W in.	Area in. ²	Inertia in. ⁴	y _{bottom} in.	Weight kip/ft
35	15	48	677	101,540	21.12	0.75
		72	823	116,071	23.04	0.91
		96	967	126,353	24.37	1.07
53	33	48	785	294,350	31.71	0.87
		72	931	335,679	34.56	1.03
		96	1,075	365,827	36.63	1.19
65	45	48	857	490,755	38.55	0.95
		72	1,003	559,367	41.95	1.11
		96	1,147	610,435	44.46	1.27

Deck Bulb-Tees



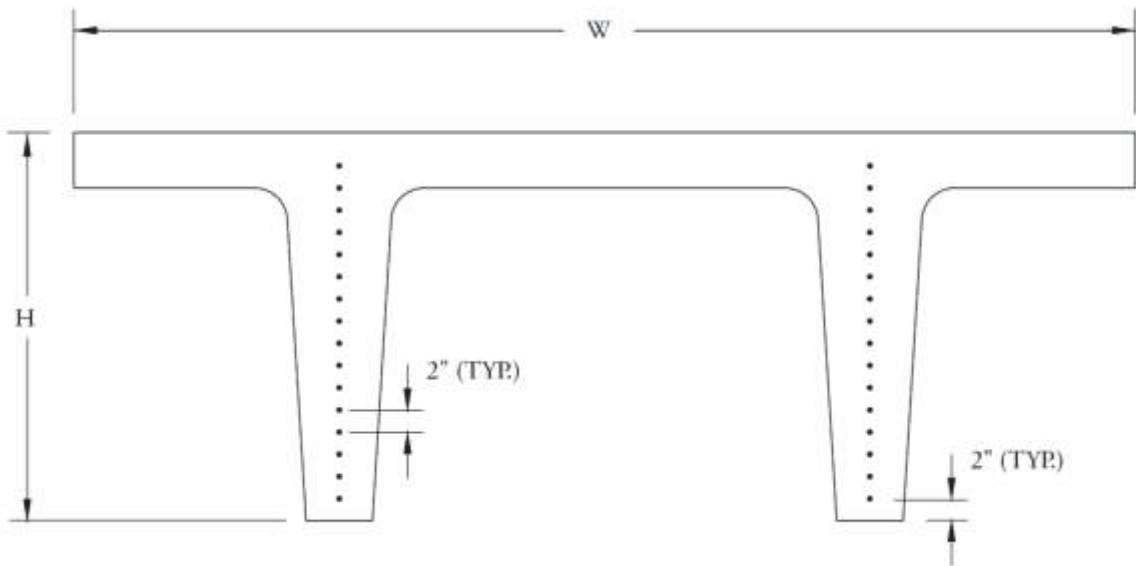
**Light Sections**

W ft	H in.	T in.	A in.	C in.	E in.	Area in. ²	Inertia in. ⁴	y _{bottom} in.	Weight kip/ft
5	27	5	4.5	8	36	575	33,740	18.6	0.599
6	23	5	4.5	6.5	36	558	21,366	16.61	0.582
6	27	5	4.5	8	36	635	35,758	19.15	0.662
8	27	5	3.75	5.75	48	689	32,888	20.64	0.718
8	35	5	3.75	6.5	48	787	72,421	26.2	0.82

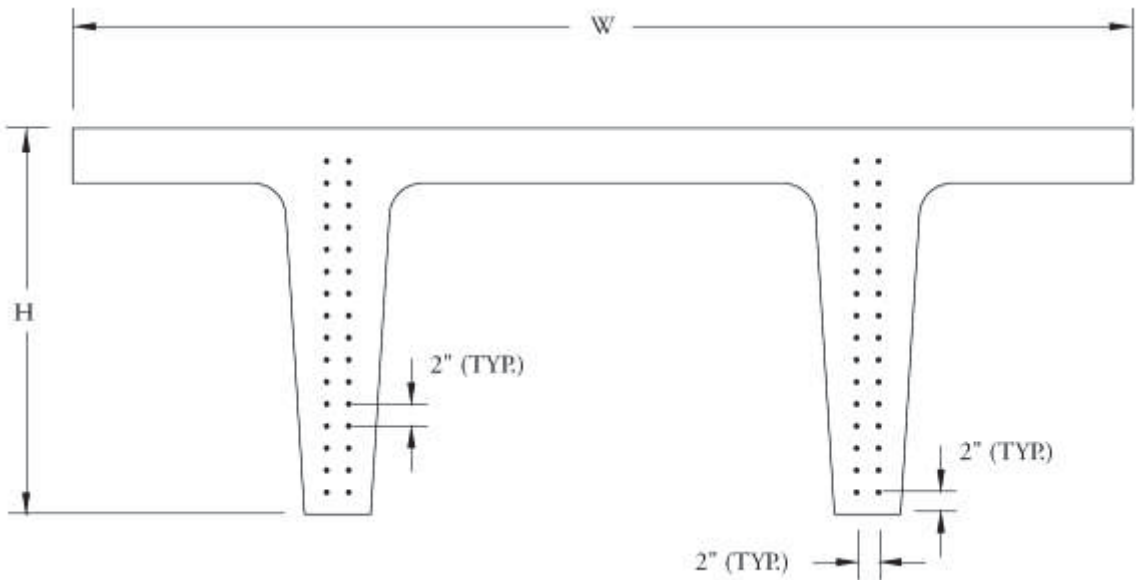
Heavy Sections

W ft	H in.	T in.	A in.	C in.	E in.	Area in. ²	Inertia in. ⁴	y _{bottom} in.	Weight kip/ft
5	36	6	6	8	30	780	90,286	23.69	0.812
6	35	5	6	9.75	48	840	90,164	23.3	0.876
7	35	5	6	9.75	48	900	95,028	23.91	0.938
8	35	5	6	9.75	48	960	99,299	24.45	1.001
6	27	5	7	9.75	48	731	45,084	18.09	0.761
7	27	5	7	9.75	48	791	47,486	18.58	0.824
8	27	5	7	9.75	48	851	49,566	19	0.886
6	21	5	7.75	9.75	48	644	22,720	14.11	0.671
7	21	5	7.75	9.75	48	704	23,903	14.48	0.733
8	21	5	7.75	9.75	48	764	24,920	14.8	0.796

Double Tee Beams

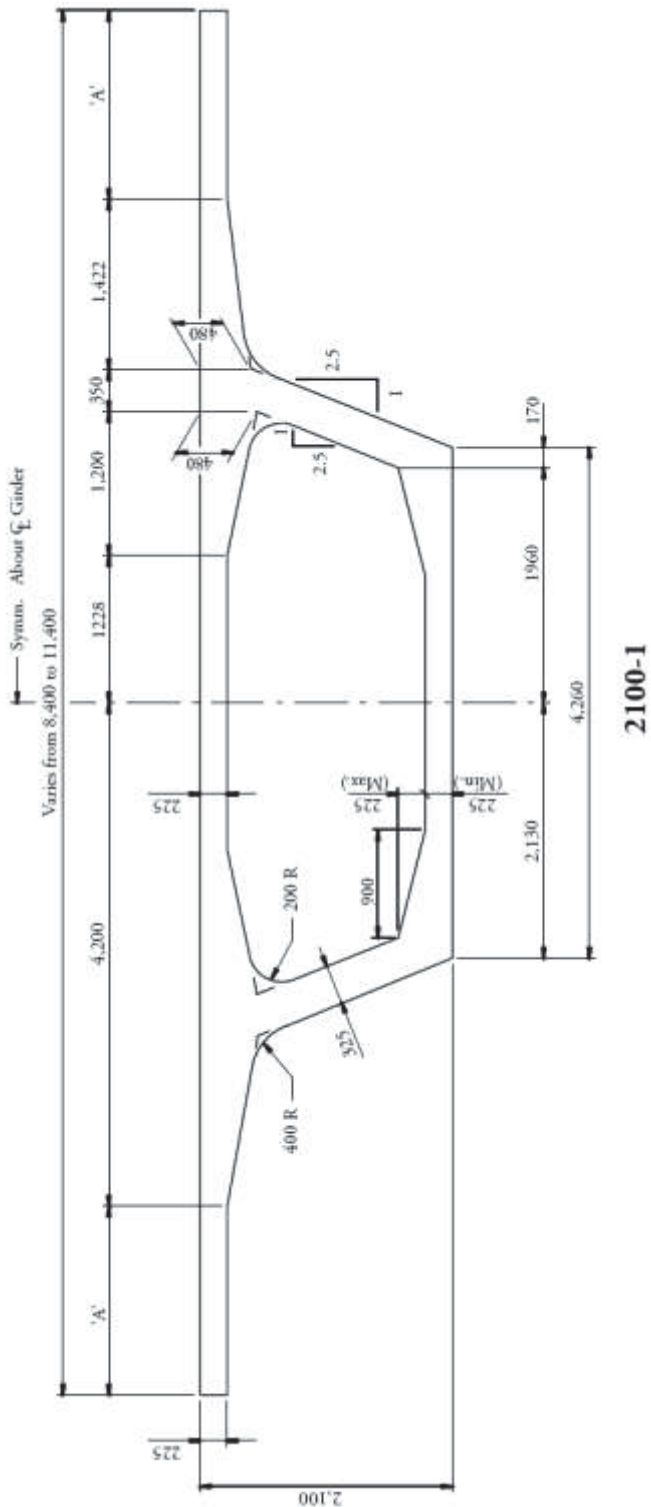


Light Sections



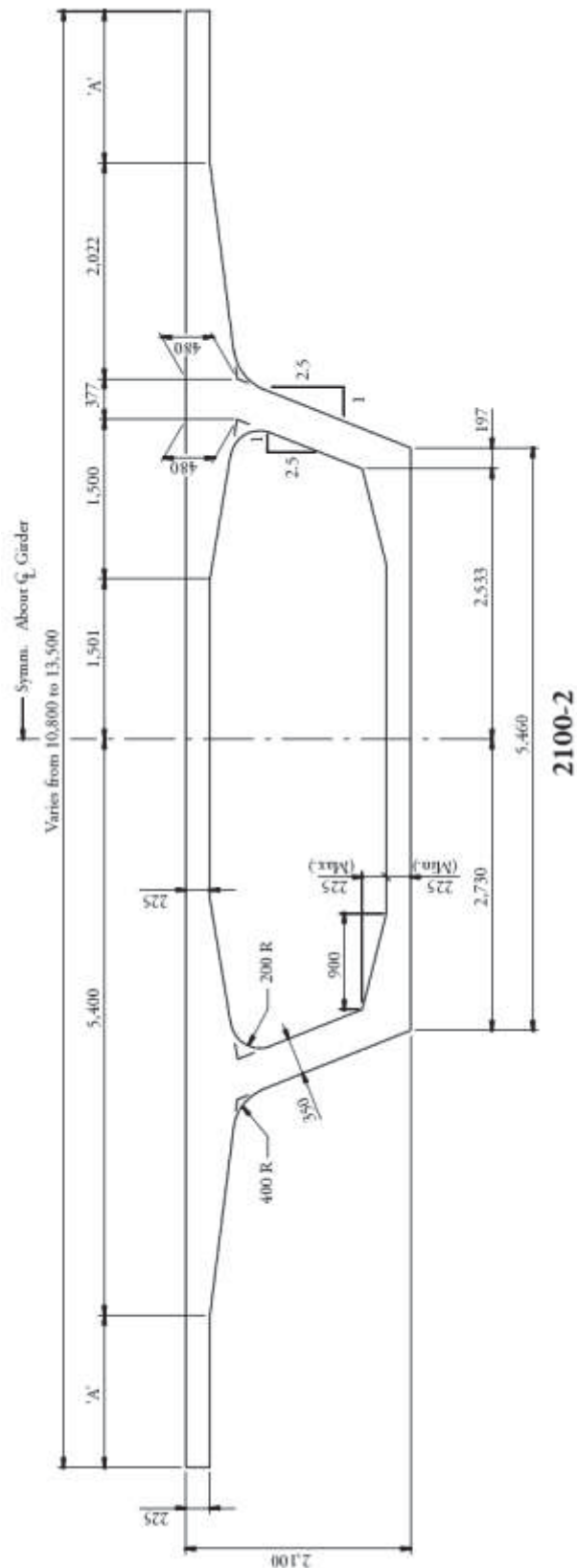
Heavy Sections

AASHTO-PCI-ASBI Standard Segment For Span-By-Span Construction



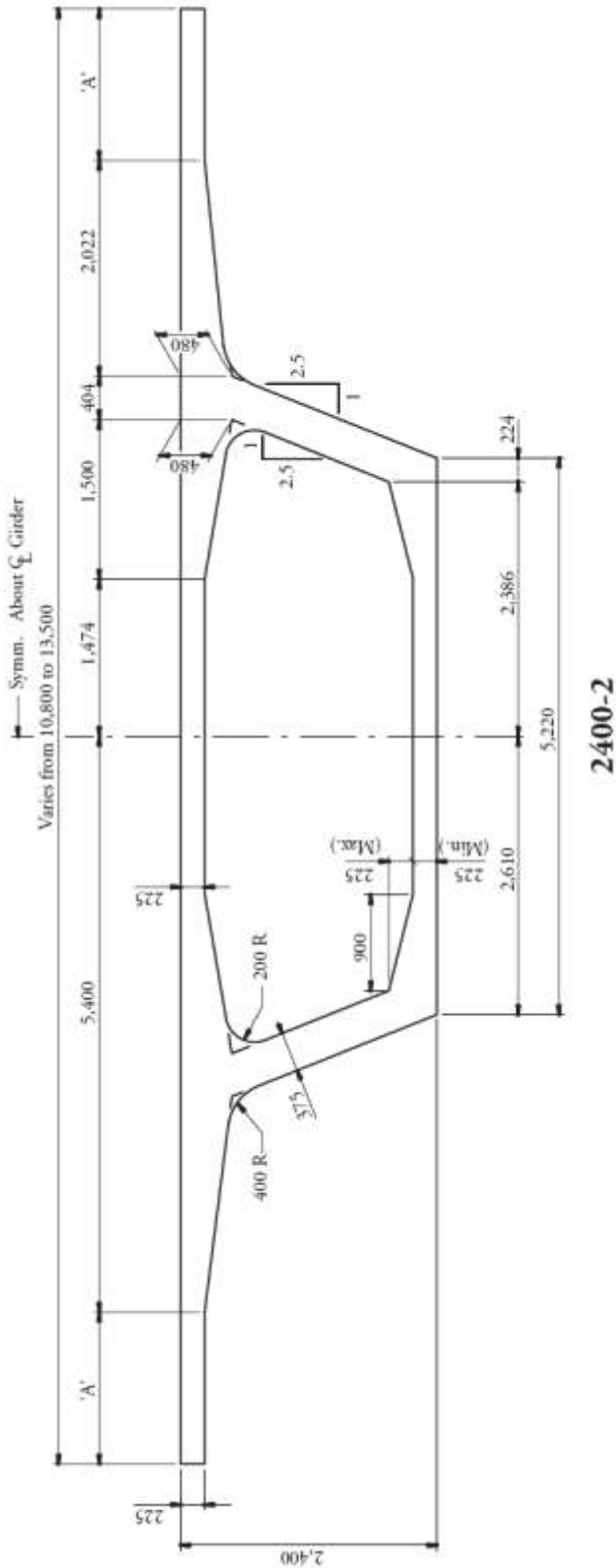
Deck Width mm	'A' mm	Area mm ²	W _t /3,000 mm kN	I _x m ⁴	Y _t mm
8,400	0	4,916,000	360	2,967	799
8,700	150	4,984,000	365	2,999	790
9,000	300	5,051,000	370	3,030	781
9,300	450	5,119,000	375	3,060	772
9,600	600	5,186,000	380	3,089	763
9,900	750	5,254,000	385	3,118	755
10,200	900	5,321,000	390	3,145	747
10,500	1,050	5,389,000	394	3,172	739
10,800	1,200	5,456,000	399	3,199	731
11,000	1,350	5,524,000	404	3,225	723
11,400	1,500	5,591,000	409	3,250	716

AASHTO-PCI-ASBI Standard Segment For Span-By-Span Construction



Deck Width mm	'A' mm	Area mm ²	W _t /3,000 mm kN	I _x m ⁴	Y _t mm
11,800	0	6,050,000	443	3.685	776
11,100	150	6,117,000	448	3.715	769
11,400	300	6,185,000	453	3.744	762
11,700	450	6,252,000	458	3.772	755
12,000	600	6,320,000	463	3.800	748
12,300	750	6,387,000	468	3.827	741
12,600	900	6,455,000	472	3.854	734
12,900	1,050	6,522,000	477	3.880	728
13,200	1,200	6,590,000	482	3.906	722
13,500	1,350	6,657,000	487	3.931	715

AASHTO-PCI-ASBI Standard Segment For Balanced Cantilever Construction



Deck Width mm	'A' mm	Area mm ²	W _t /3,000 mm kN	I _x m ⁴	Y _t mm
8,400	0	5,177,000	379	4.064	908
8,700	150	5,245,000	384	4.107	898
9,000	300	5,312,000	389	4.148	888
9,300	450	5,380,000	394	4.188	878
9,600	600	5,447,000	399	4.228	869
9,900	750	5,515,000	404	4.266	859
10,200	900	5,582,000	409	4.304	850
10,500	1,050	5,650,000	404	4.340	841
10,800	1,200	5,717,000	419	4.376	833
11,000	1,350	5,785,000	423	4.411	824
11,400	1,500	5,852,000	428	4.445	816

Technical drawing of the cross-section of a 2400-2 girder. The drawing shows a symmetrical I-beam profile with dimensions in millimeters. Key dimensions include: total height 2,400; flange width 2,400; web thickness 2.5; flange thickness 1; and various radii (R) and fillets (F) for smooth transitions. The drawing is labeled "2400-2" and "Symm. About C_x Girder".

Deck Width mm	'A' mm	Area mm ²	W _t /3,000 mm kN	I _x m ⁴	Y _t mm
10,800	0	6,327,000	463	5.045	882
11,100	150	6,395,000	468	5.085	874
11,400	300	6,462,000	473	5.124	866
11,700	450	6,530,000	478	5.162	858
12,000	600	6,597,000	483	5.199	851
12,300	750	6,665,000	488	5.236	843
12,600	900	6,732,000	493	5.272	836
12,900	1,050	6,800,000	498	5.307	829
13,200	1,200	6,867,000	503	5.342	821
13,500	1,350	6,935,000	508	5.376	815

PCI BRIDGE DESIGN MANUAL

APPENDIX C

PCI REGIONAL PRODUCTS

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NEXT D BEAMS

Appendix C - 3

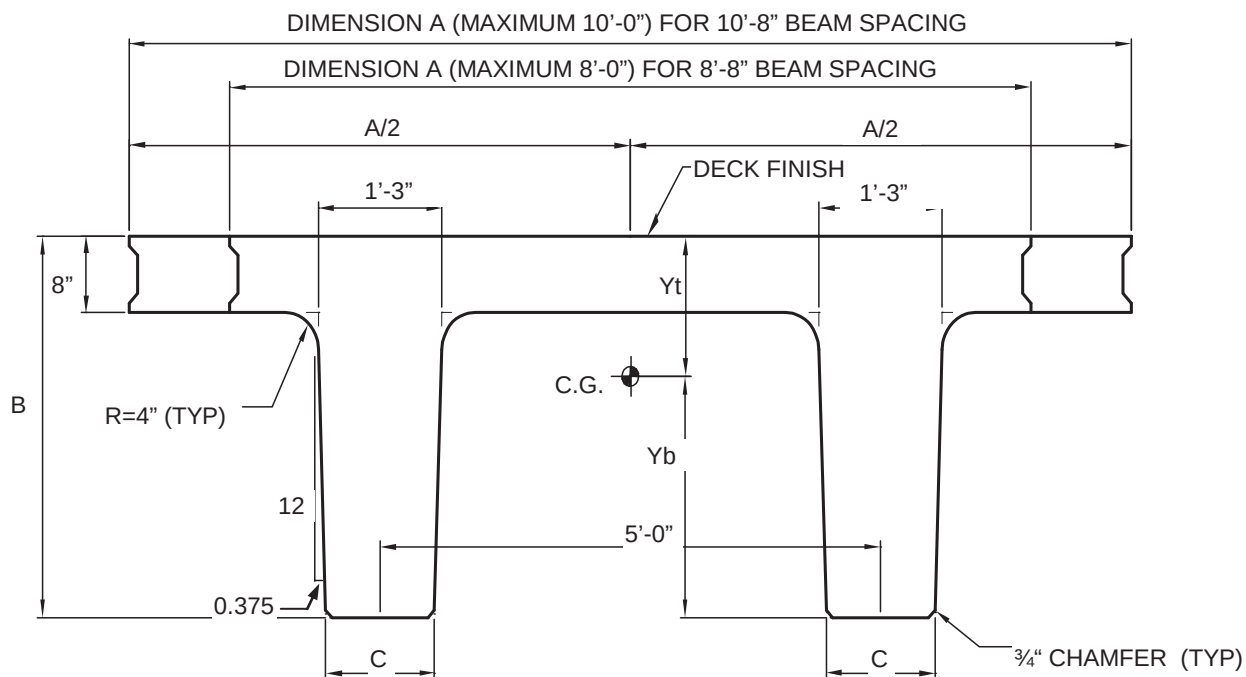
NEXT F BEAMS

Appendix C - 4

PCI Zone 6 (SE Region) Spliced U-Girders

Appendix C - 5

NEXT D BEAMS

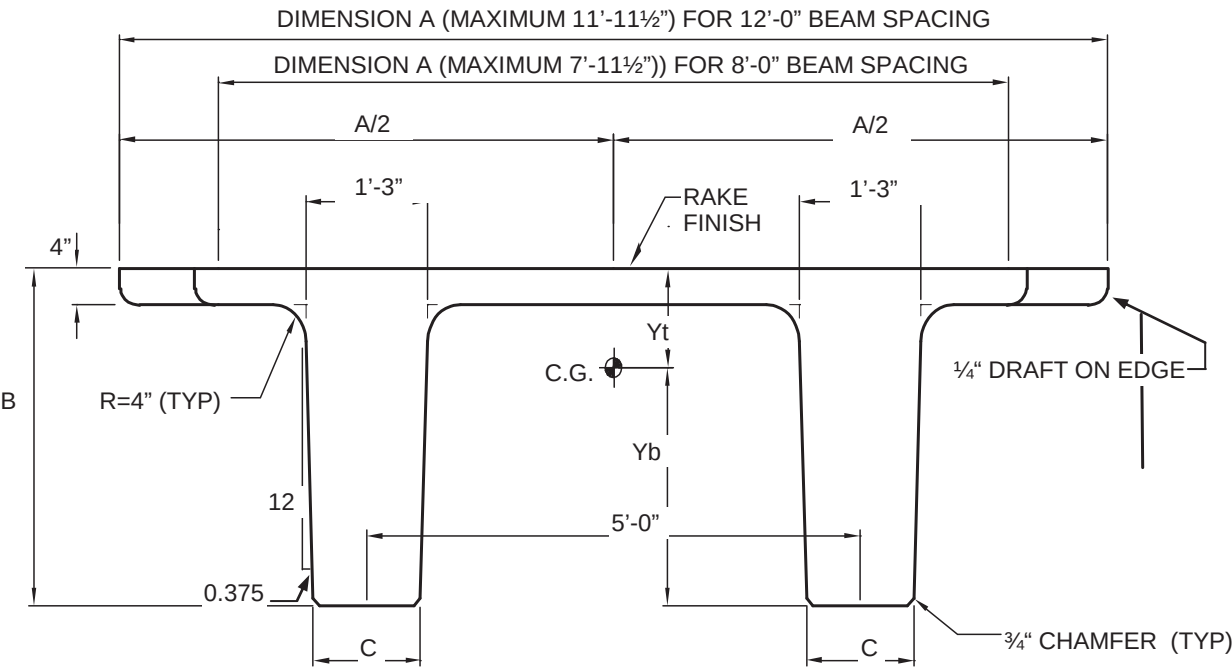


Beam Designation	Beam Width Inches	Beam Depth Inches	Base Stem Width Inches	Area IN ²	I IN ⁴	Yb Inches	Yt Inches	St IN ³	Sb IN ³	Weight PLF
	A	B	C			D	E			
Minimum Width Beams										
Next 40 D	96.00	40.00	13.00	1666	238059	25.47	14.54	16378	9348	1735
Next 36 D	96.00	36.00	13.25	1562	176674	23.03	12.97	13624	7671	1627
Next 32 D	96.00	32.00	13.50	1455	126111	20.57	11.43	11033	6131	1516
Next 28 D	96.00	28.00	13.75	1346	85651	18.06	9.94	8620	4742	1402
Maximum Width Beams										
Next 40 D	120.00	40.00	13.00	1858	258171	26.55	13.45	19201	9722	1935
Next 36 D	120.00	36.00	13.25	1754	191453	24.01	11.99	15973	7973	1827
Next 32 D	120.00	32.00	13.50	1647	136502	21.44	10.57	12920	6368	1716
Next 28 D	120.00	28.00	13.75	1538	92597	18.80	9.20	10069	4924	1602

AASHTO/PCI REGIONAL PRODUCTS

Next F Beams

NEXT F BEAMS



Beam Designation	Beam Width Inches	Beam Depth Inches	Base Stem Width Inches	Area IN²	I IN⁴	Yb Inches	Yt Inches	St IN³	Sb IN³	Weight PLF
	A	B	C			D	E			
Minimum Width Beams										
Next 36 F	95.50	36.00	13.00	1287	160240	21.77	14.23	11261	7361	1341
Next 32 F	95.50	32.00	13.25	1182	115813	19.51	12.49	9272	5936	1231
Next 28 F	95.50	28.00	13.50	1075	79901	17.24	10.76	7426	4635	1120
Next 24 F	95.50	24.00	13.75	966	51823	14.95	9.05	5726	3466	1006
Maximum Width Beams										
Next 36 F	143.50	36.00	13.00	1479	185525	23.36	12.64	14678	7942	1541
Next 32 F	143.50	32.00	13.25	1374	134258	20.98	11.02	12183	6399	1431
Next 28 F	143.50	28.00	13.50	1267	92661	18.57	9.43	9826	4990	1320
Next 24 F	143.50	24.00	13.75	1158	60045	16.12	7.88	7620	3725	1206

PCI Zone 6 (SE Region) Spliced U-Girders



PCI
Prestress/Posttension Concrete Institute

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 THE INFORMATION NECESSARY TO THE PROPER DESIGN, FABRICATION AND ERECTION 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 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 DEMONSTRATES THAT THE POTENTIAL FOR APPLICATION OF PRECAST CONCRETE FOR USE IN LONG-SPAN BRIDGES IS UNLIMITED. THE JOINTS ARE DESIGNED TO BE CONSTRUCTED BY THE ENGINEER. 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 SPICE.
2. WEB THICKNESS FOR 3" & 4" PLASTIC DUCTS DETERMINED PER FOOT DPL 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:
CONCRETE UNIT WEIGHT = 155 PCF
8" STRUCTURAL + 8" 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:
DESIGN CURVED GIRDERS:
 $f_c = 2700 \text{ PSI}$
 $f_{se} = 270,000 \text{ PSI}$
LOW-LAX 0.6% STRAIN
 $K = 0.0002$, $\mu = 0.18$, 75% ULTIMATE
ALSO SEE SHORT-SPAN AND PROVISIONS FOR AN ADDITIONAL LONG TERM LOSS IN STRESS PER AASHTO GUIDELINES

NOTES TO DESIGNER

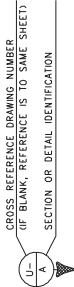
1. THE CONCEPTS PRESENTED IN THIS SET OF DRAWINGS ARE CONCEPTUAL ONLY. ALL DESIGNS PREPARED USING THE CONCEPTS PRESENTED MUST BE PREPARED BY A DESIGNER WHO IS A LICENSED PROFESSIONAL ENGINEER AND MUST CONFORM TO AASHTO AND ALL STATE AND LOCAL DESIGN REQUIREMENTS.
2. ALL DESIGNS MUST SATISFY SERVICE LOAD 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 SERVICEABILITY DURING ALL STAGES OF CASTING AND CONSTRUCTION.
5. THE DESIGNER SHALL VERIFY THAT CURVED, OPEN U GIRDERS ARE CLOSED PRIOR TO CASTING AND SHALL PROVIDE SUFFICIENT REINFORCEMENT 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 SECTIONS 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.

INDEX OF DRAWINGS

- U-1 GENERAL INFORMATION
- U-2 TYPICAL BRIDGE CROSS SECTION WITH PRECAST PANELS
- U-3 TYPICAL BRIDGE CROSS SECTION WITH PRECAST PANELS
- U-4 MAXIMUM DESIGN SPANS - THREE SPAN CONSTANT DEPTH GIRDERS
- U-5 MAXIMUM DESIGN SPANS - THREE SPAN HAUNCHED GIRDERS
- U-7 TYPICAL THREE SPAN CONSTANT DEPTH GIRDERS
- U-8 TYPICAL THREE SPAN HAUNCHED GIRDERS
- U-9 TYPICAL EXPANSION PIER
- U-10 TYPICAL EXPANSION PIER
- U-11 TYPICAL INTEGRAL INTERIOR PIER
- U-12 PRECAST PANEL DETAILS
- U-13 TYPICAL INTERIOR PIER
- U-14 TYPICAL END PIER
- U-15 TYPICAL END PIER
- U-16 CONSTANT DEPTH GIRDER CONSTRUCTION SEQUENCE
- U-17 HAUNCHED GIRDER CONSTRUCTION SEQUENCE
- U-18 ERECTION BRACING
- U-19 ERECTION BRACING
- U-20 EXAMPLE PRECISION PLAN DETAILS



Drawing/Sheet Number **U-1**

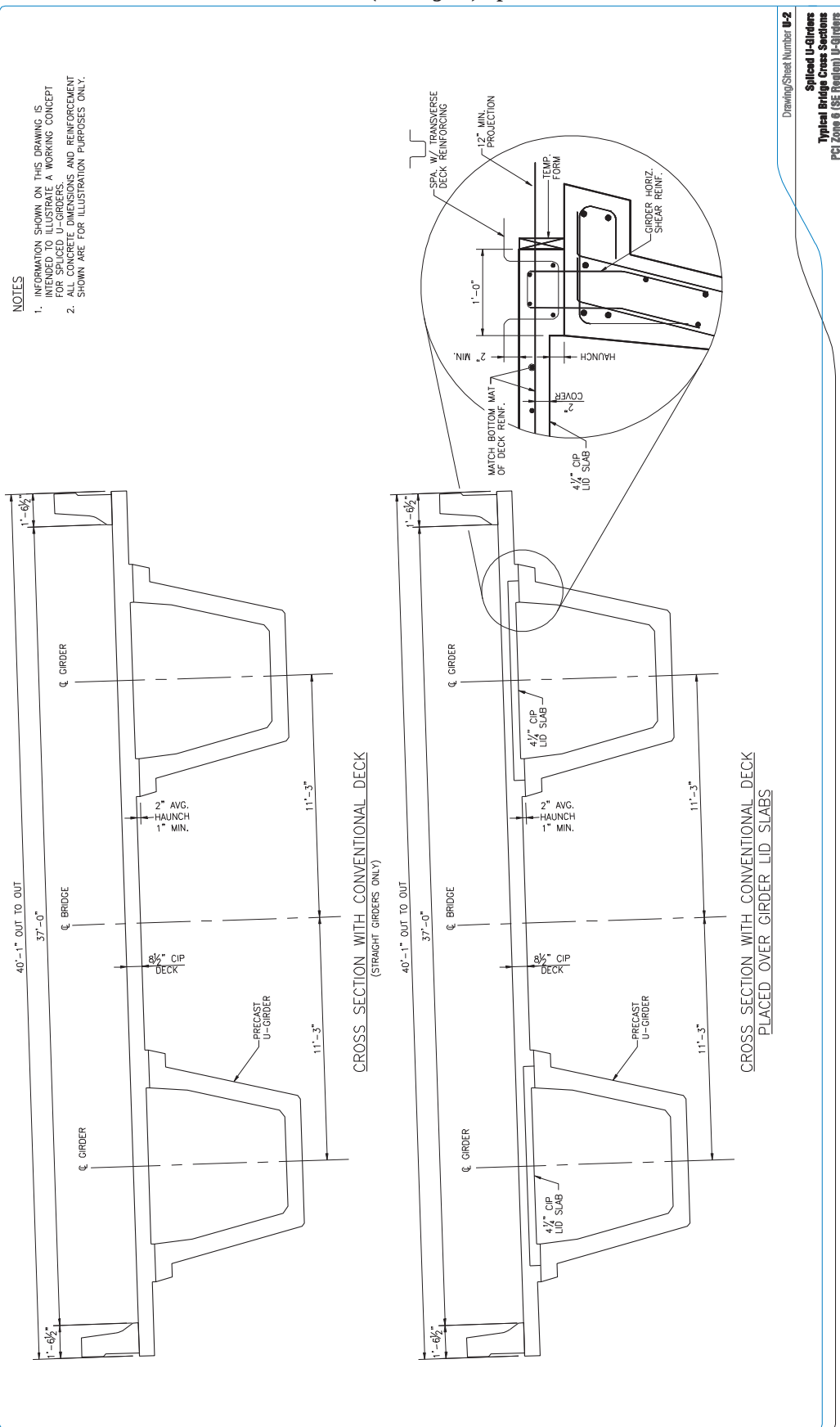
General Information
PCI Zone 6 (SE Region) U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders

PCI. Process. Protected. Proven.®

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

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



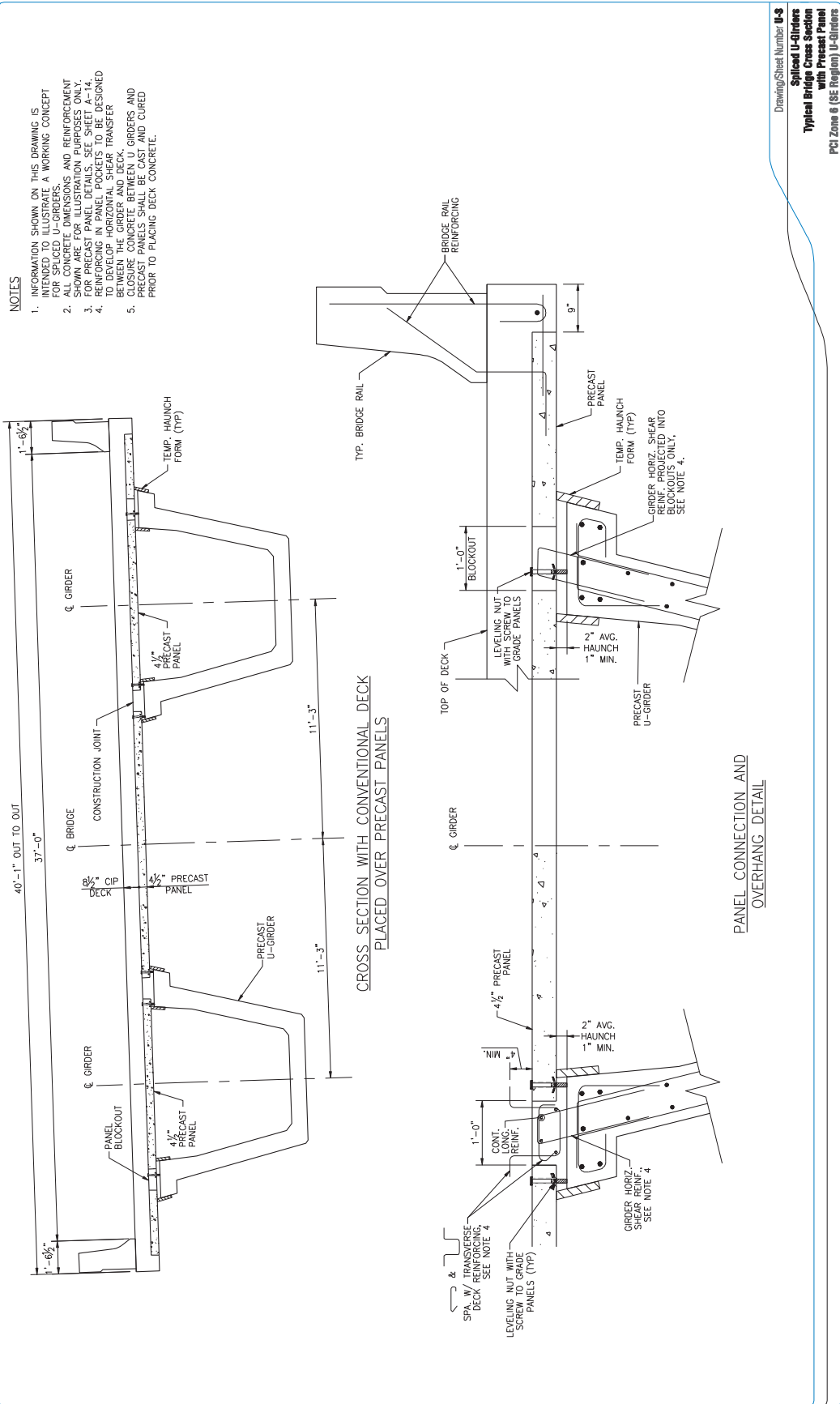
AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders



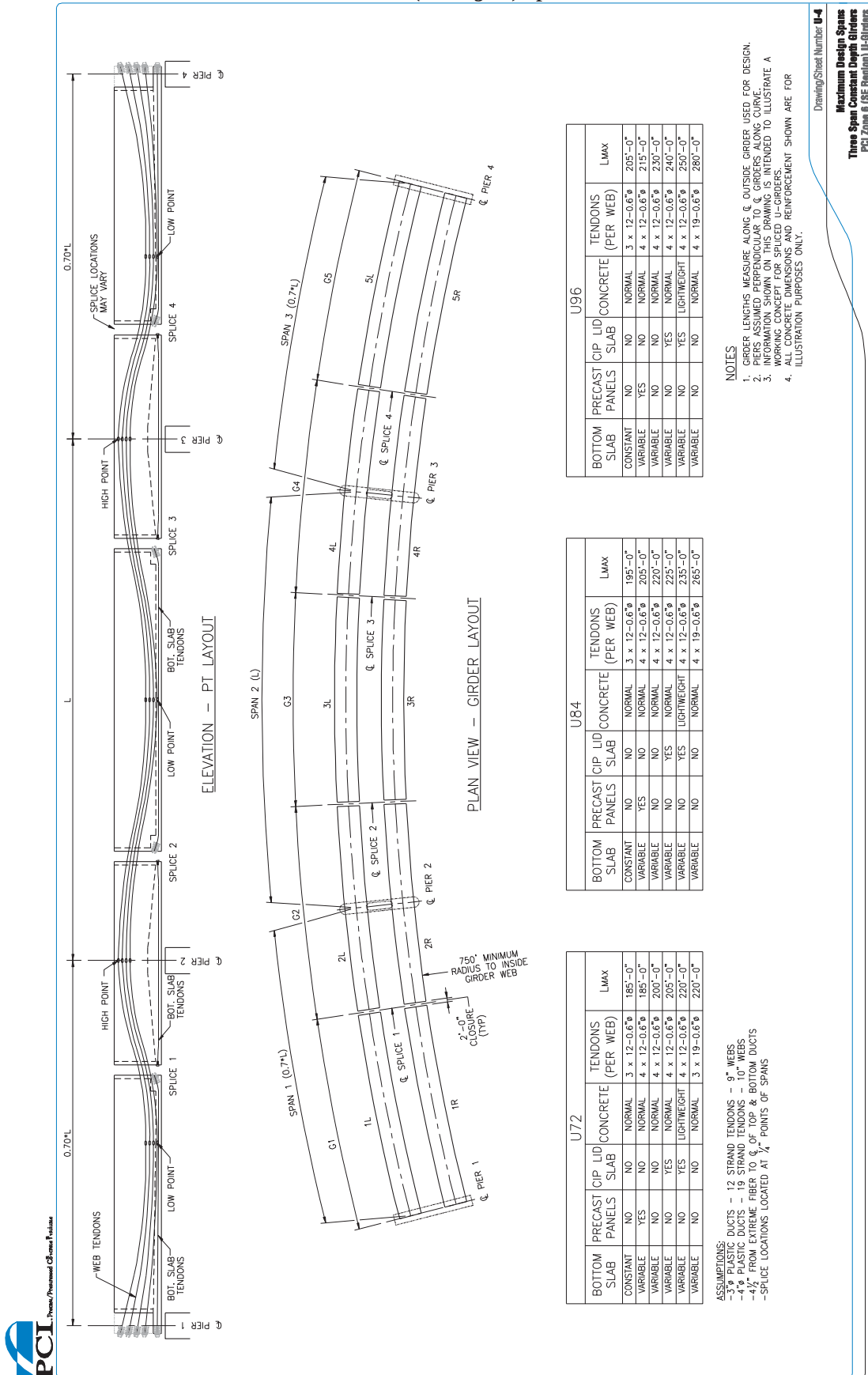
Precast/Prestressed Concrete Institute



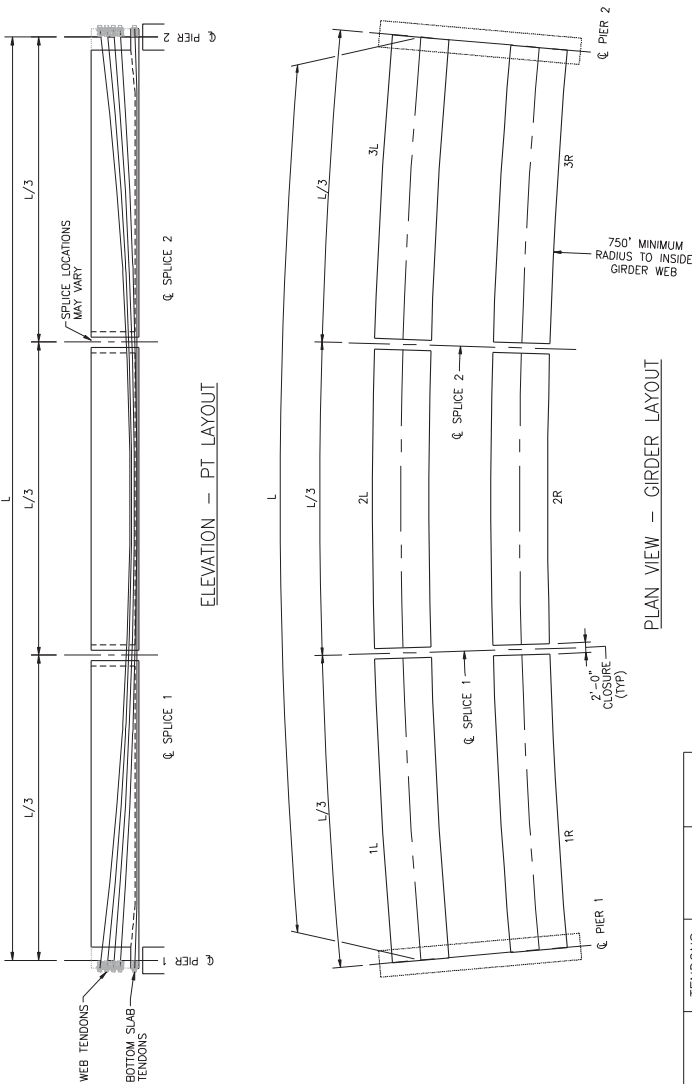
AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders



PCI Zone 6 (SE Region) Spliced U-Girders



GIRDER TYPE	PRECAST PANELS	CP 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"
U84	NO	NO	NORMAL	4 x 19-0.6%	4 x 12-0.6%	180'-0"
U96	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"
	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 C OF TOP & BOTTOM DUCTS

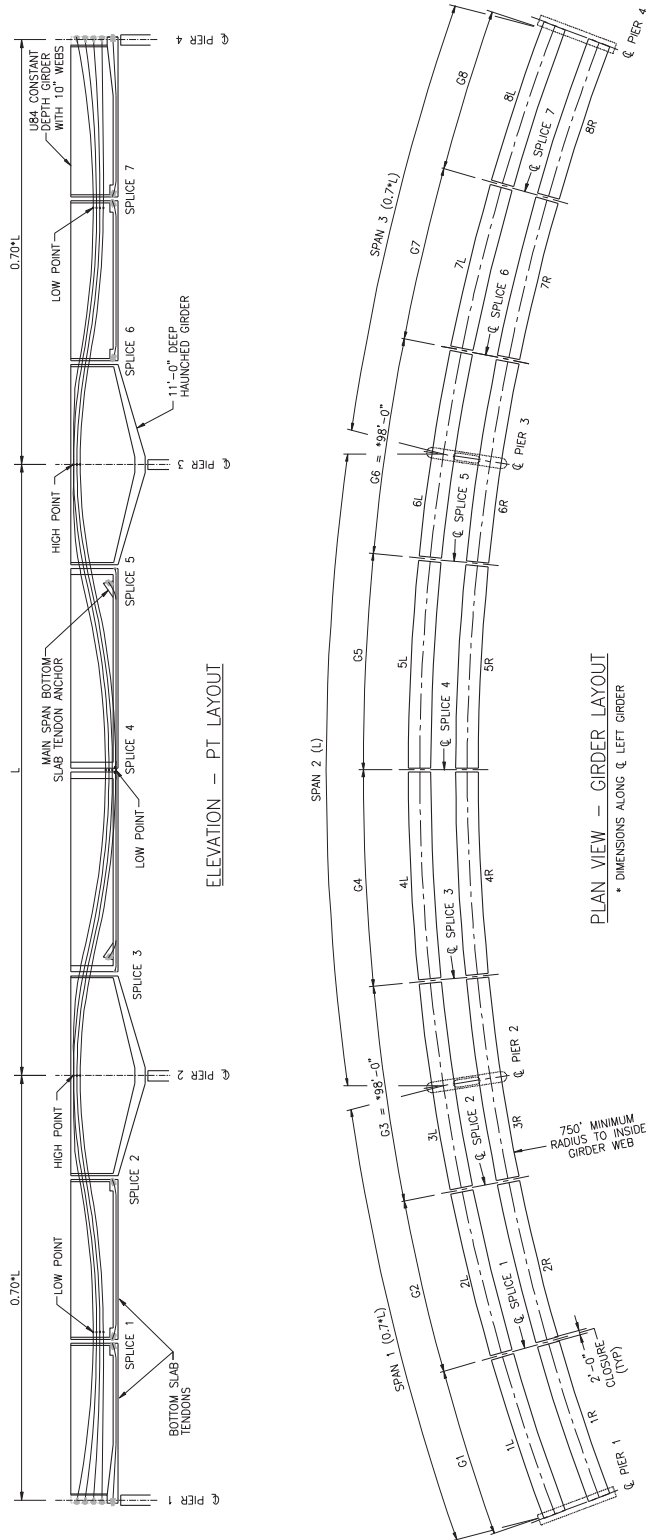
- NOTES
- GIRDER LENGTHS MEASURED ALONG & OUTSIDE GIRDER USED FOR DESIGN.
 - ALL SPAN RANGES DESIGNED ASSUMING DECK SLAB IS CAST USING SHORED CONSTRUCTION.
 - INFORMATION SHOWN ON THIS DRAWING IS BASED ON THE ASSUMPTIONS OF A WORKING CONCEPT FOR SPICED U-GIRDERS. A WORKING CONCEPT FOR SPICED U-GIRDERS AND REINFORCEMENT FOR ALL CONCRETE DIMENSIONS AND REINFORCEMENT SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY.

Drawing/Sheet Number **U-6**
Maximum Design Span
Simple Span Constant Depth Girders
PCI Zone 6 (SE Region) U-Girders

AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders



NOTES

1. GIRDER LENGTHS MEASURE ALONG C. OUTSIDE GIRDER USED FOR DESIGN.
2. PIERS ASSUMED PERPENDICULAR TO C. GIRDERS ALONG CURVE.
3. INFORMATION SHOWN ON THIS DRAWING IS INTENDED TO ILLUSTRATE A WORKING CONCEPT FOR SPICED U-GIRDERS.
4. ALL CONCRETE DIMENSIONS AND REINFORCEMENT SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY.

GIRDER TYPE	TENDONS (PER WEB)	BOT. SLAB MAIN SPAN TENDON	L _{MAX}
184/11132 HALINCH	4 x 19-0.6"	3 x 12-0.6"	300'-0"

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

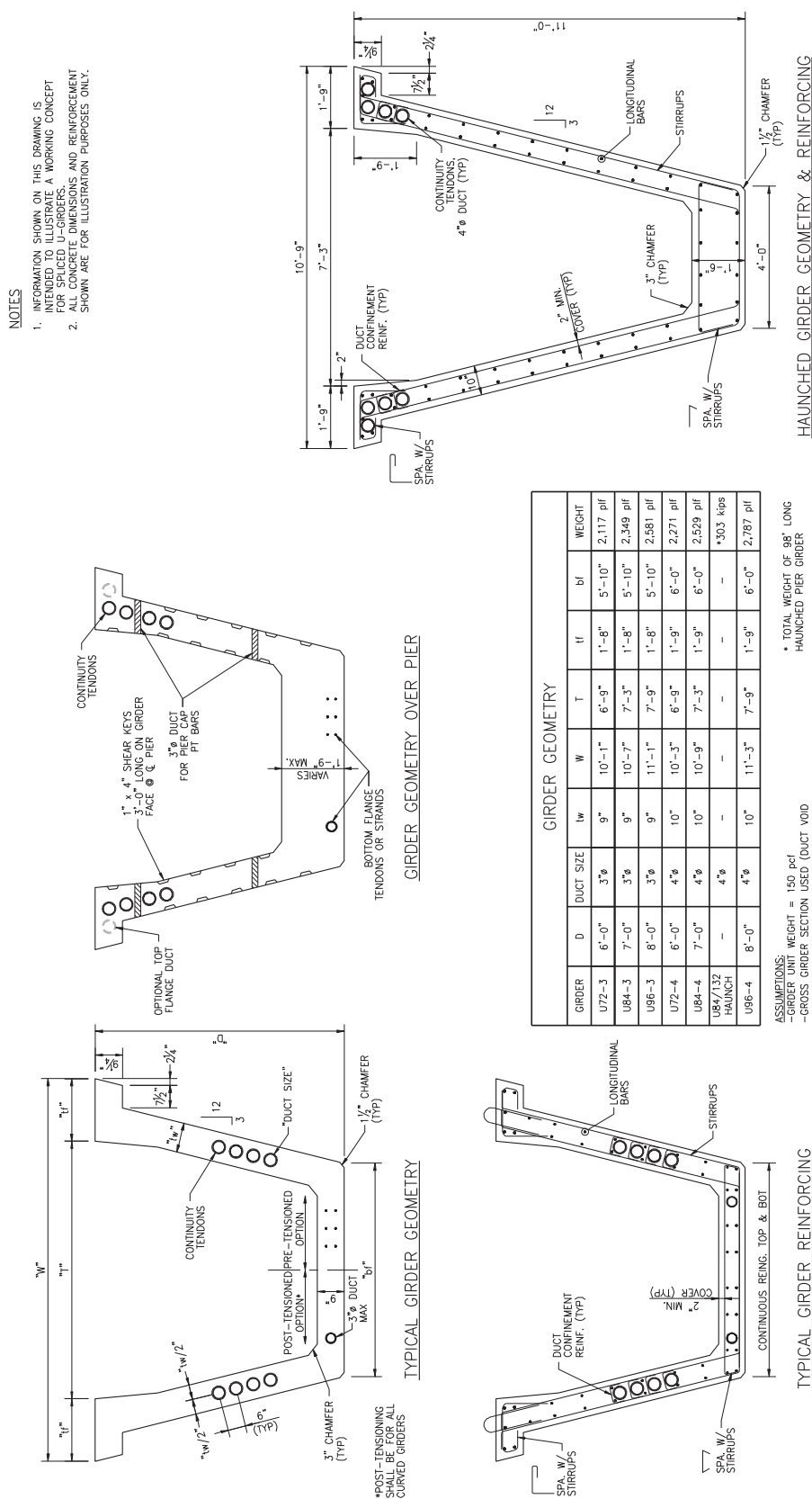
Drawing/Sheet Number **11-8**

**Maximum Design Span
Three Span Haunched Girders
PCI Zone 6 (SE Region) U-Girders**

AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders

Drawing/Sheet Number **U-7**

Spliced U-Girders Girder Dimensions and Reinforcement PCI Zone 6 (SE Region) U-Girders

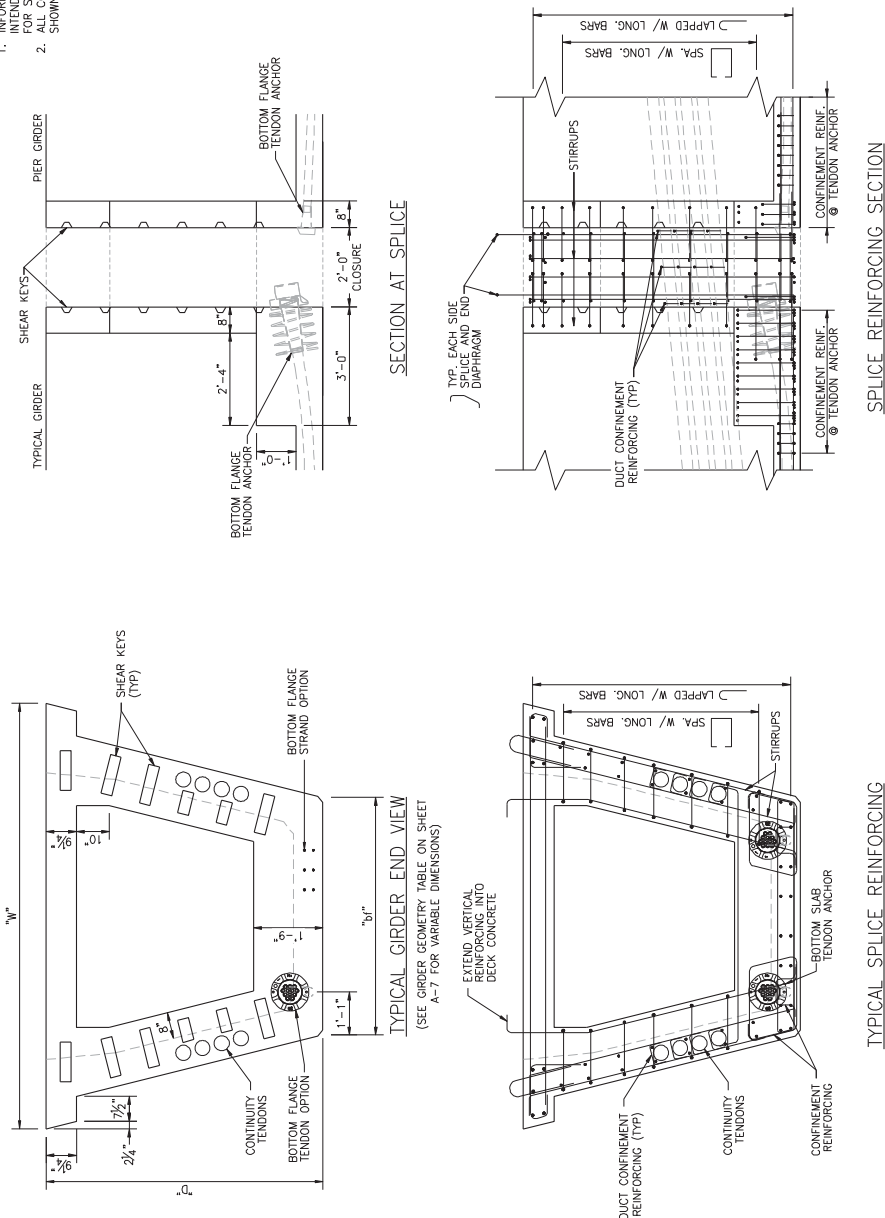
AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders

NOTES

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



Drawing/Sheet Number **U-4**
Spliced U-Girders
Girder End and Splice Details
PCI Zone 6 (SE Region) U-Girders

AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

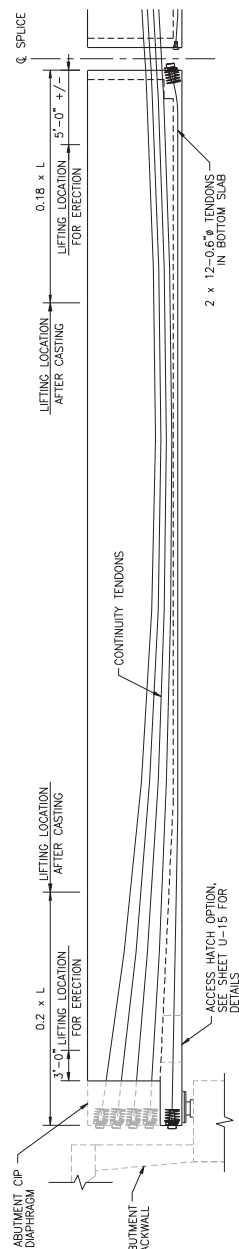
PCI Zone 6 (SE Region) Spliced U-Girders



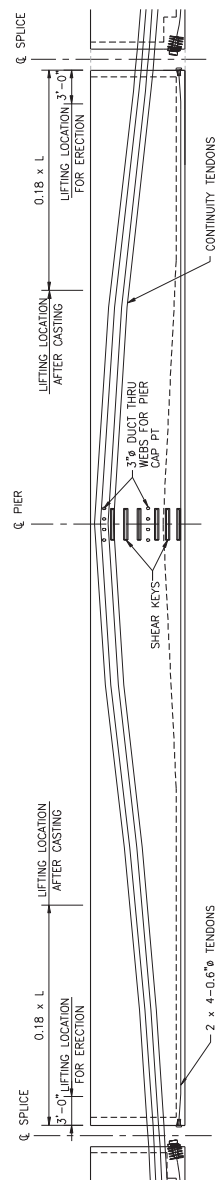
Prior Personnel Changes Pending

NOTES

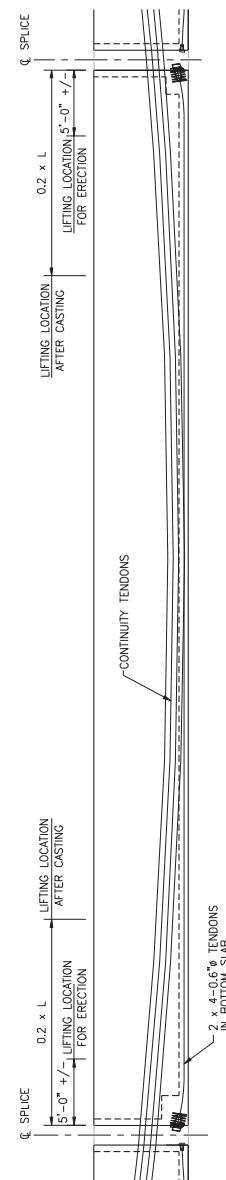
1. INFORMATION SHOWN ON THIS DRAWING IS INTENDED TO ILLUSTRATE A WORKING CONCEPT FOR SPliced U-GIRDERS.
2. ALL CONCRETE DIMENSIONS AND REINFORCEMENT SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY.



ELEVATION
TYPICAL END GIRDER



ELEVATION
TYPICAL PIER GIRDER



ELEVATION
TYPICAL MID-SPAN GIRDER

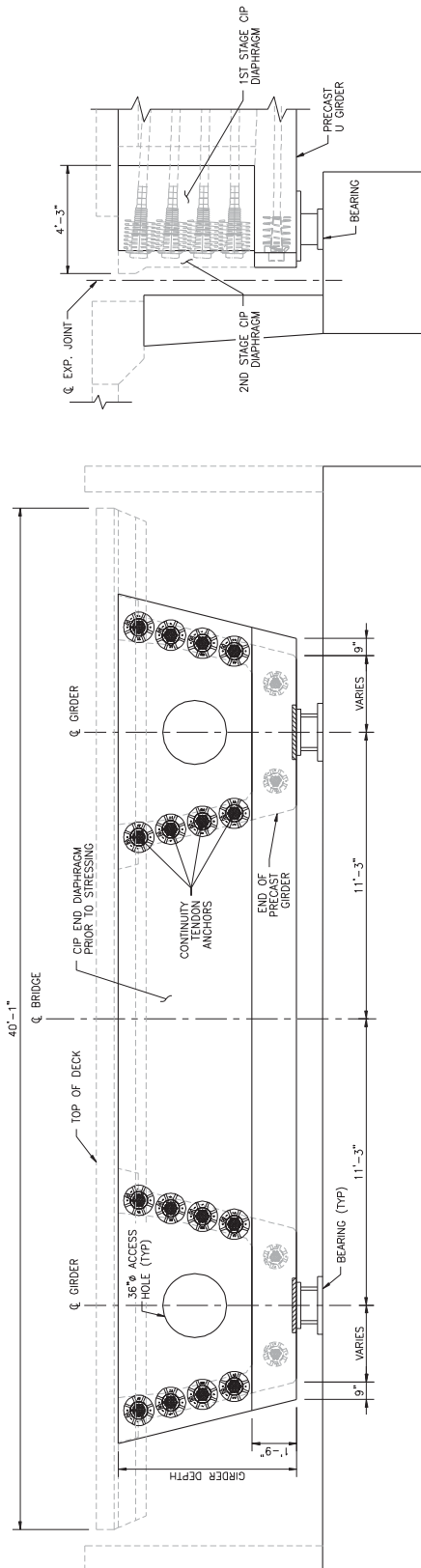
Drawing/Sheet Number **U-4**

Spliced U-Girders
Typical Three Span Constant Depth Girders
PCI Zone 6 (SE Region) U-Girders

AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders



SECTION AT ABUTMENT

ELEVATION AT ABUTMENT

NOTES

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

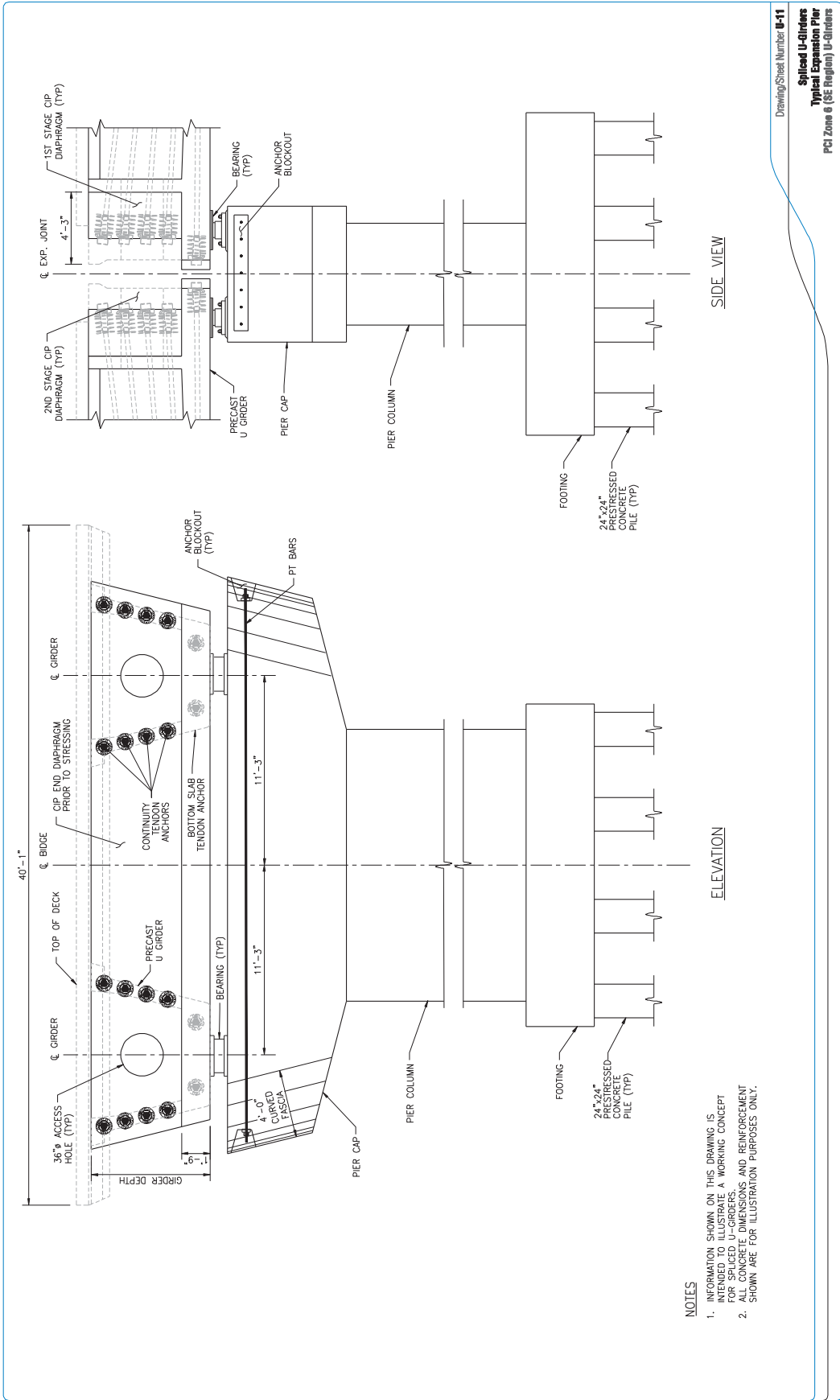
Drawing Sheet Number **B-10**

Spliced U-Girders
End Diaphragm at Abutment
PCI Zone 6 (SE Region) U-Girders

AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

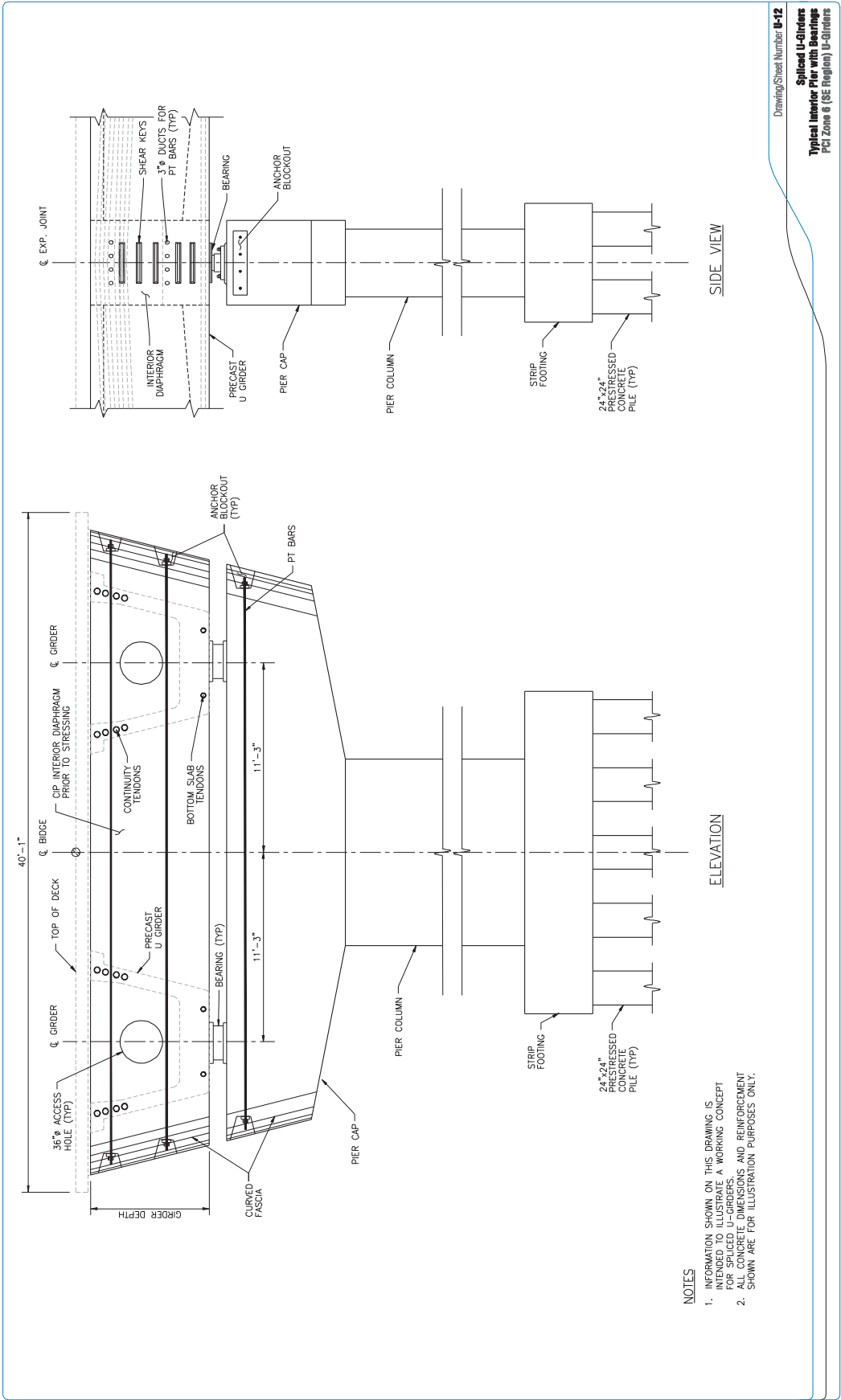
PCI Zone 6 (SE Region) Spliced U-Girders



AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

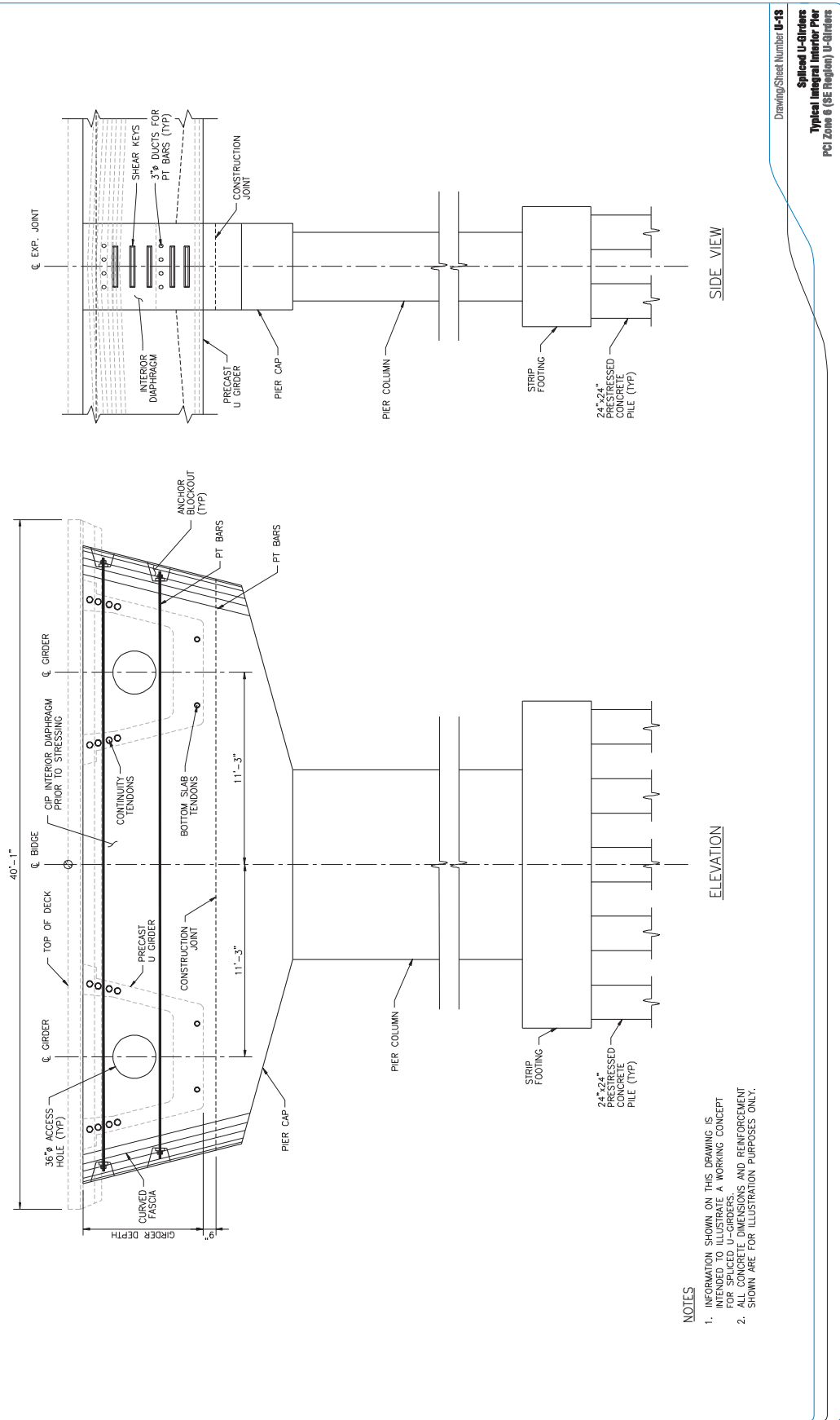
PCI Zone 6 (SE Region) Spliced U-Girders



AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders



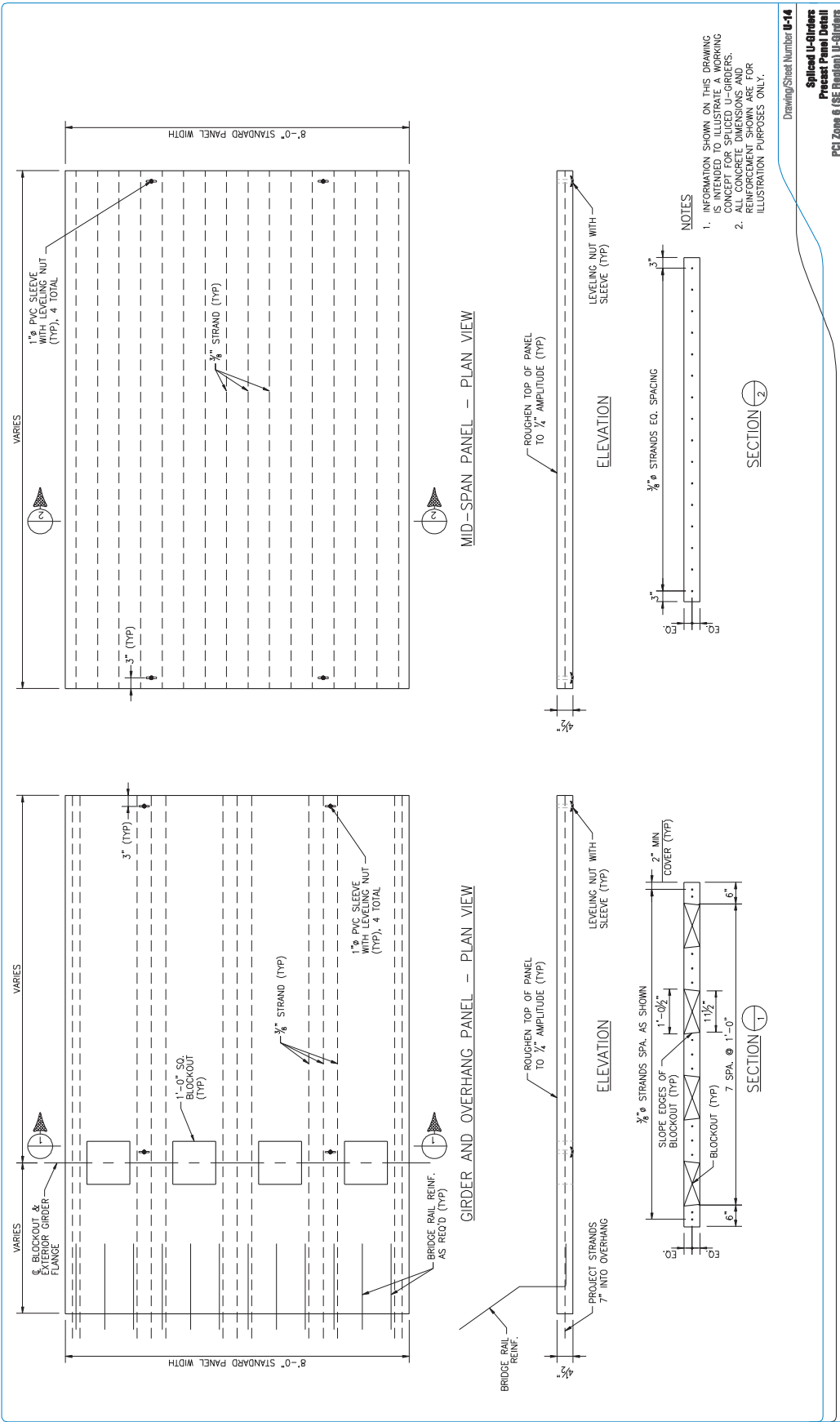
AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders



Precast/Prestressed Concrete Products



AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders

NOTES

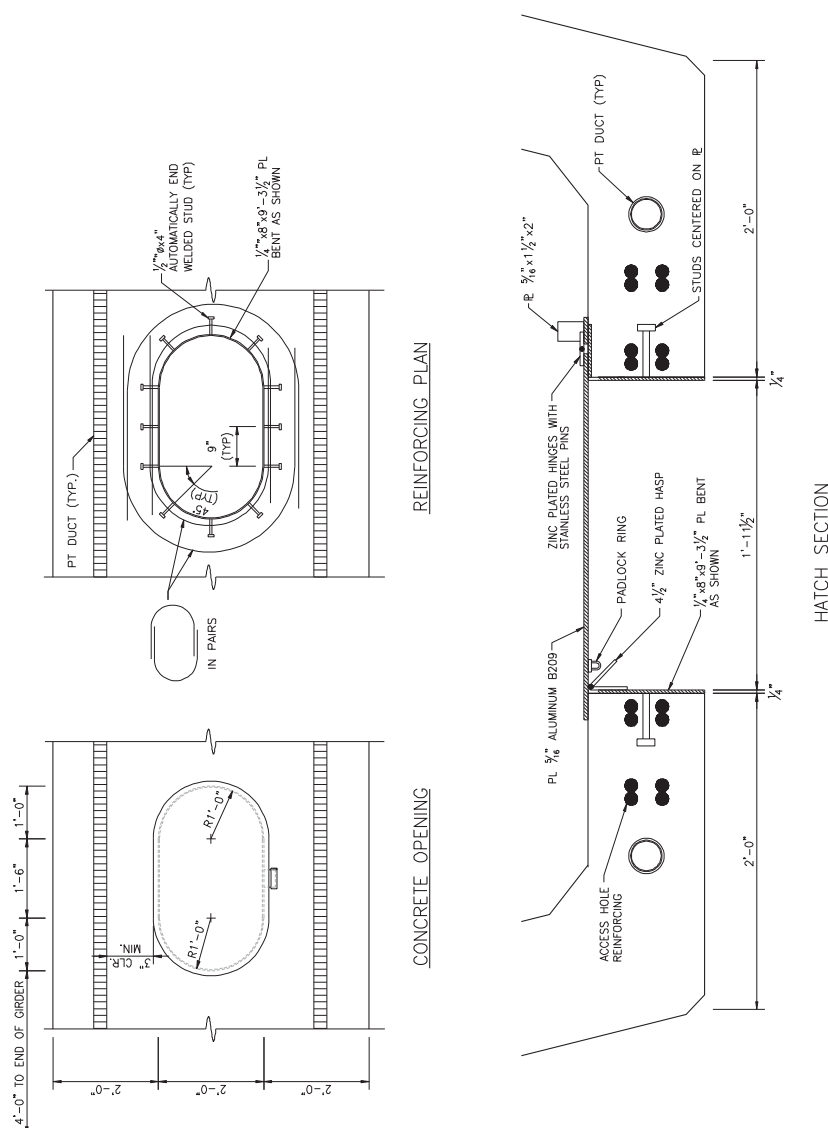
GRIND GALVANIZING FROM FRAME, WHERE HASP OR HINGE ATTACHES, PRIOR TO WELDING. AFTER WELDING PAINT THE SURROUNDING AREAS WITH ZINC RICH PAINT MEETING MILITARY SPECIFICATION DOD-P-210035A.

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.

Drawing/Sheet Number **U-15**

**Spliced U-Girders
Bottom Slab Access Hatch
PCI Zone 6 (SE Region) U-Girders**

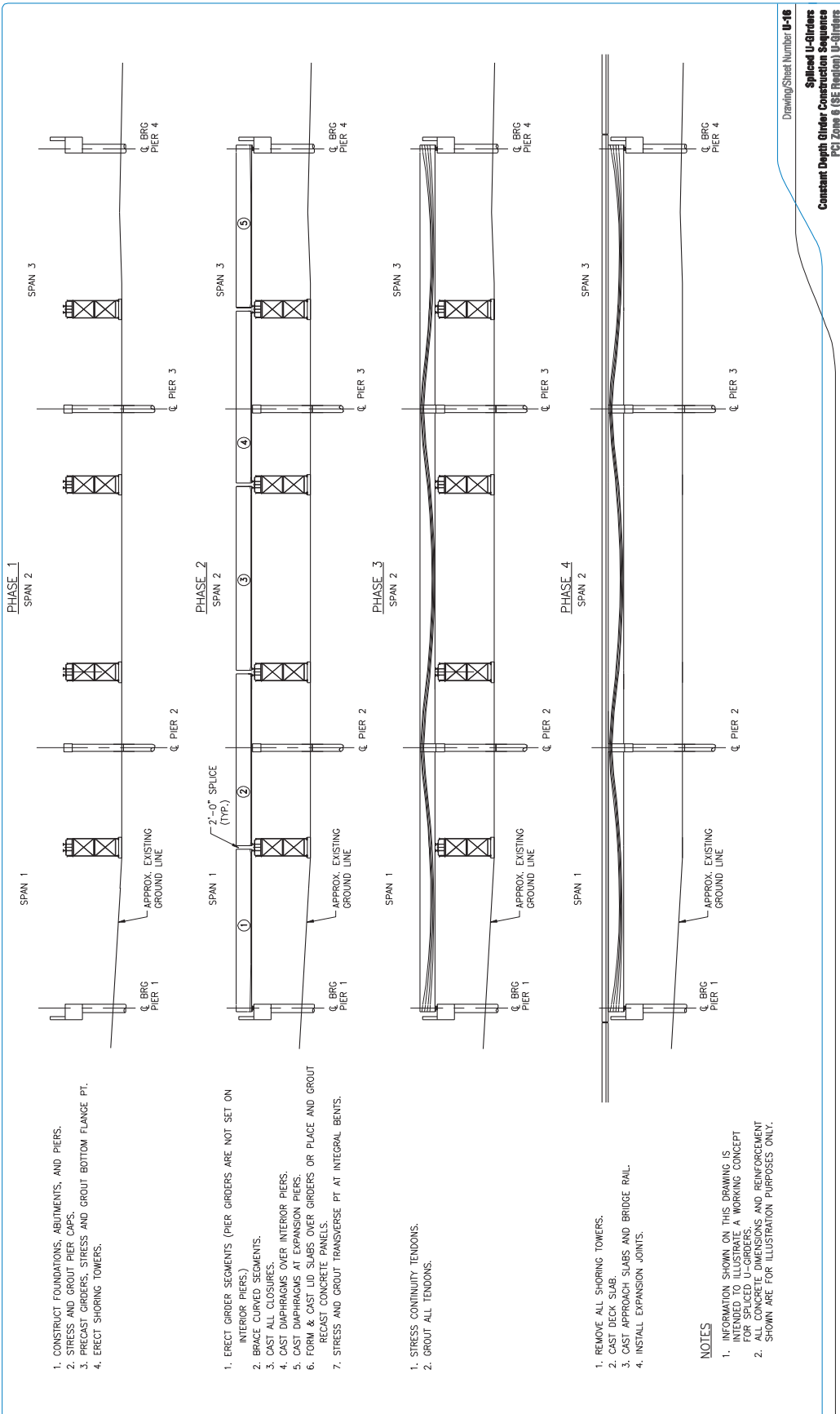
AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders



PCI
Products/Products of Concrete Products



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.

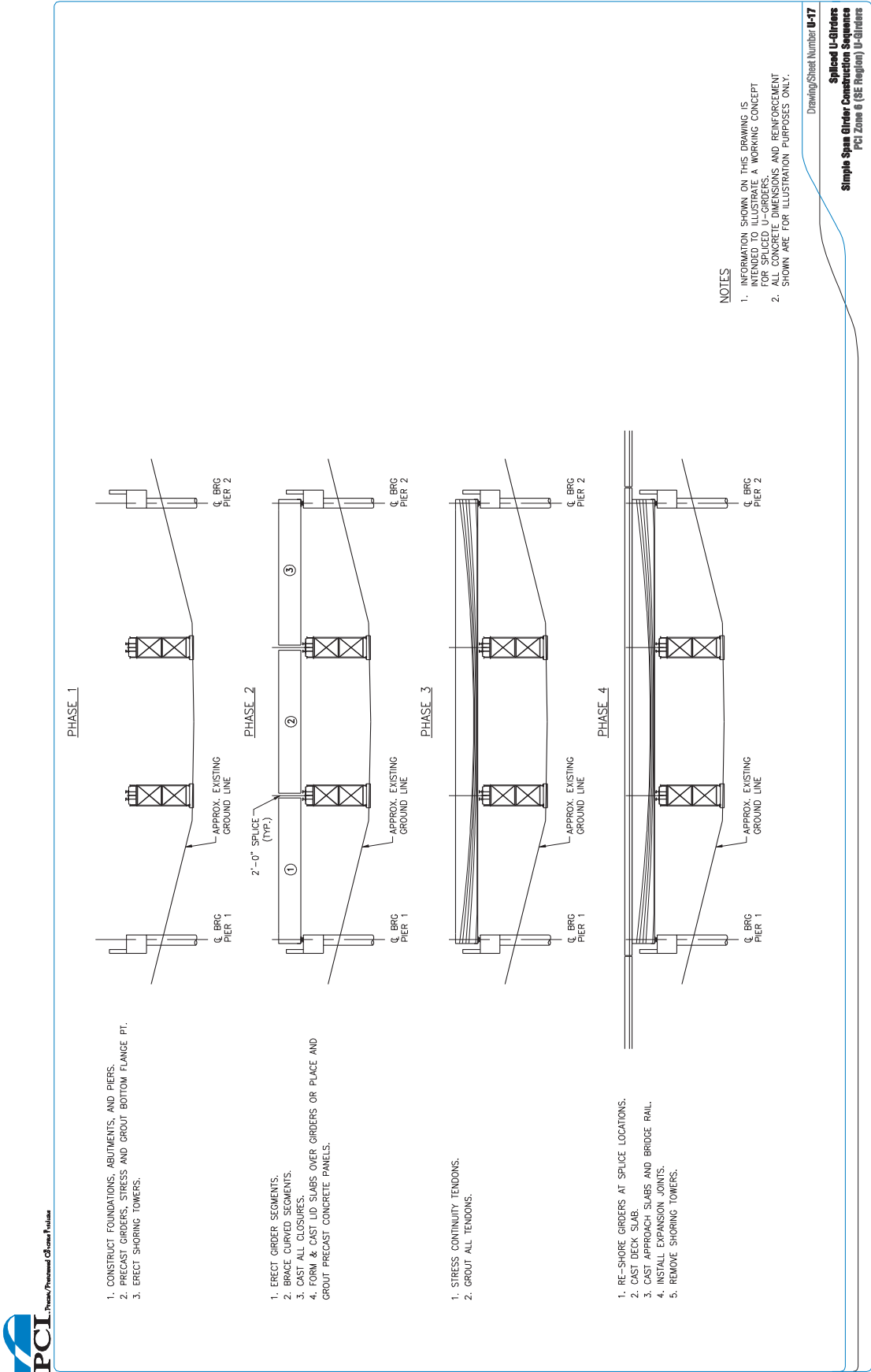
1. STRESS CONTINUITY TENDONS.
2. GROUT ALL TENDONS.

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

AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders



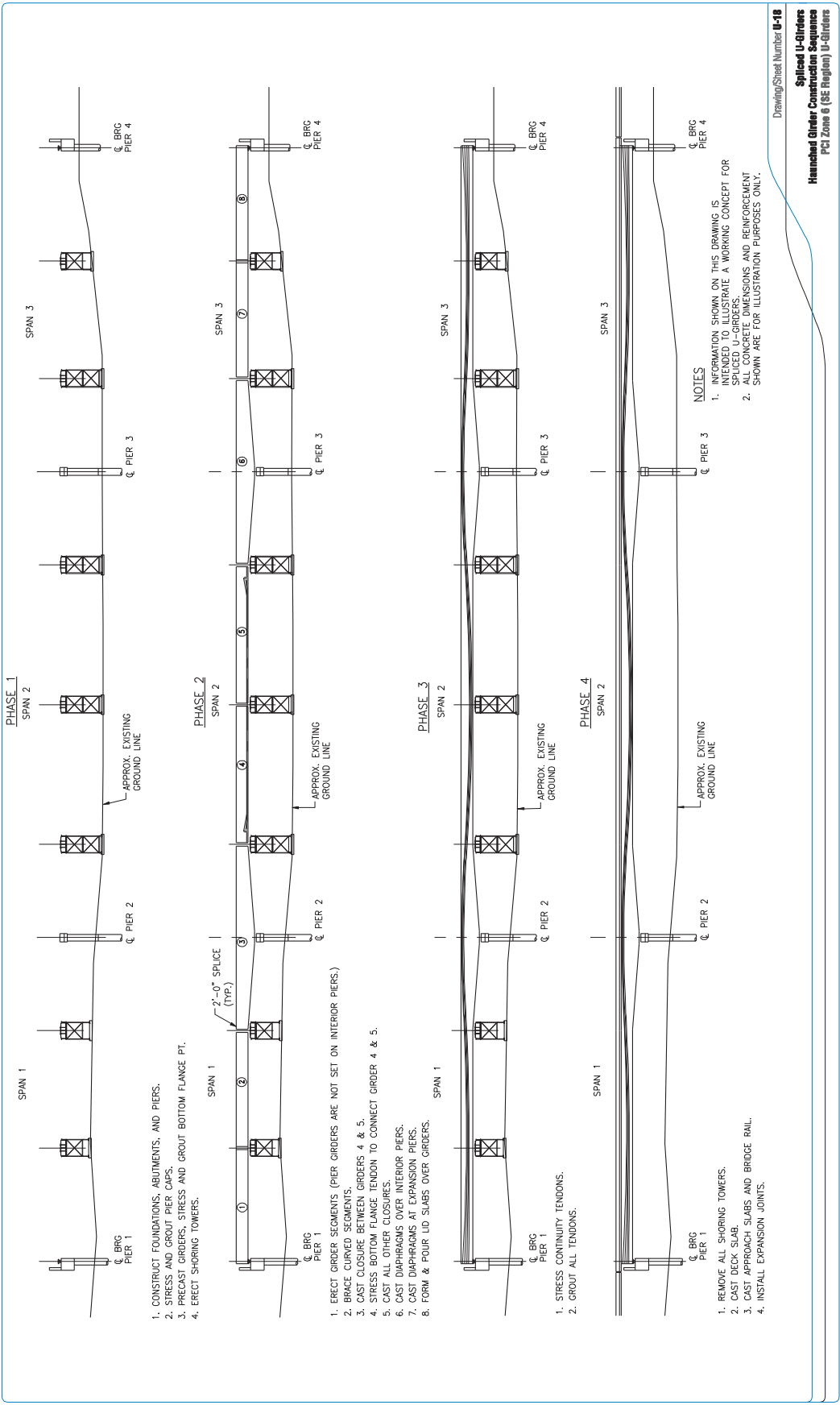
AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders



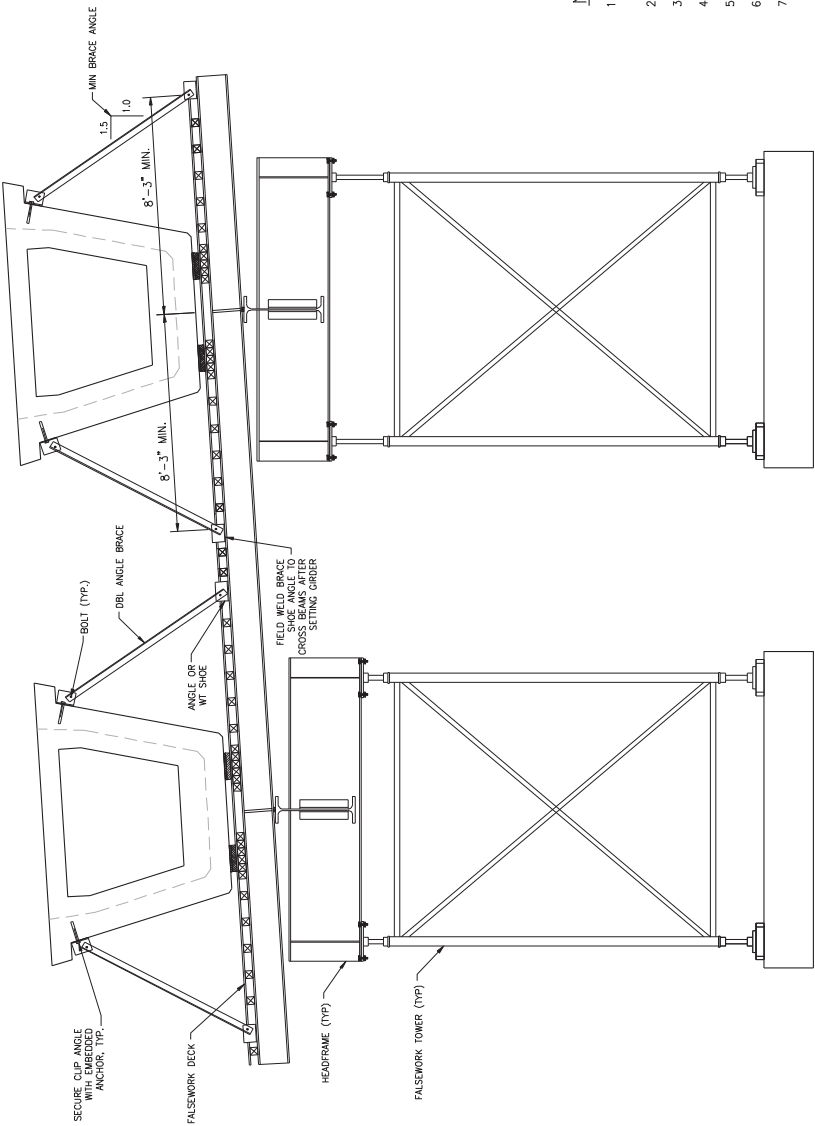
Precast/Prestressed Concrete Structures



AASHTO/PCI REGIONAL PRODUCTS

PCI Zone 6 (SE Region) Spliced U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders



NOTES:

- 1. THIS DRAWING IS INTENDED TO REPRESENT SUGGESTED METHODS FOR BRACING THE PRECAST GIRDERS DURING ERECTION. IT DOES NOT REPRESENT THE FINAL DESIGN. THE DESIGNER SHALL BE RESPONSIBLE FOR PROVIDING THE NECESSARY BRACING TO PREVENT EXCESSIVE DEFLECTIONS AND TORSIONAL STRESSES AND DEFLECTIONS.
- 2. GIRDERS SHALL BE SUPPORTED AND TORSIONALLY BRACED ON FALSEWORK AT EACH END AT EACH SPICE DURING ERECTION.
- 3. ALL GIRDERS SHALL BE BRACED AT EACH END PRIOR TO RELEASING ANY SIGNIFICANT BRACE LOADS TO PREVENT EXCESSIVE DEFLECTIONS AND TORSIONAL STRESSES.
- 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 THE BRACING OF PRECAST GIRDERS.
- 7. ALL CONCRETE DIMENSIONS, AND SPACING & SIZES OF REINFORCEMENT, SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY.

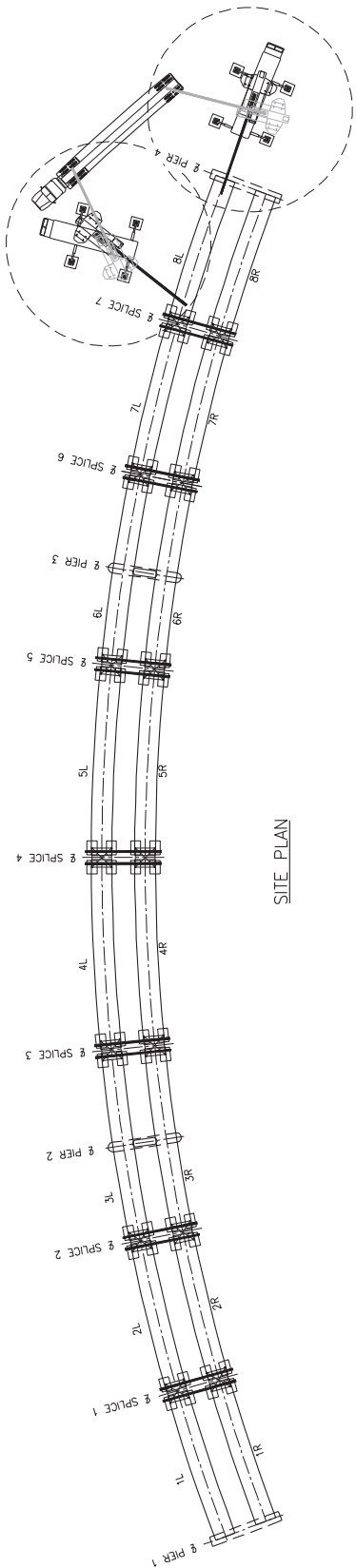
ERECTION BRACING AT ENDS OF PRECAST GIRDERS

Drawing/Sheet Number **U-19**
Spliced U-Girders
Erection Bracing
PCI Zone 6 (SE Region) U-Girders

PCI Zone 6 (SE Region) Spliced U-Girders



Product/Trademark of PCI



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 GIRDERS ERECTION.
6. GIRDERS ERECTION SHALL NOT PROCEED DURING INCLEMENT WEATHER OR WIND SPEEDS IN EXCESS OF 25 MPH.
7. GIRDERS SHALL CONFORM TO PCI TOLERANCES PER FOOT SPECIFICATION, BEAMS ACCEPTED BY THE OWNER ARE ASSUMED TO MEET THE PCI SPECIFICATIONS.
8. ACTUAL GIRDERS ERECTION SCHEDULE AND DETAILED SCHEDULE REGARDING WORKING HOUR RESTRICTIONS SHALL BE PROVIDED BY CONTRACTOR.
9. GIRDERS 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.

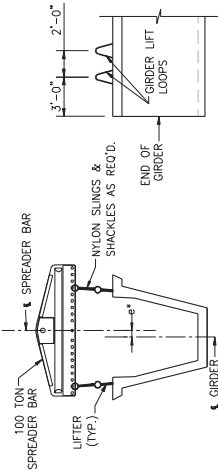
REPRESENTATIVE GIRDER LIFT CHART			
GIRDER NUMBER	MAX GIRDER LENGTH (ft.)	MAX GIRDER WEIGHT (kips)	MAX LIFT WEIGHT CRANE (kips) **
1L&R	78.5	193.5	107.0
2L&R	78.5	203.0	112.0
3L&R	98.0	306.0	166.0
4L&R	98.0	248.0	135.0
5L&R	98.0	248.0	135.0
6L&R	98.0	306.0	166.0
7L&R	78.5	203.0	112.0
8L&R	78.5	193.5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

** LIFT WEIGHT INCLUDES 5000 LB BLOCK & RIGGING WEIGHT PLUS 3% IMPACT

ERECTION SEQUENCE

GIRDERS WILL BE ERECTED IN THE FOLLOWING ORDER:

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



RIGGING DETAILS

* RIGGING OFFSET ϕ IS TOWARD OUTSIDE OF GIRDER CURVE

GIRDER ERECTION PLAN

Drawing/Sheet Number **U-20**
Girder Erection
Example Erection Plan Details
PCI Zone 6 (SE Region) U-Girders