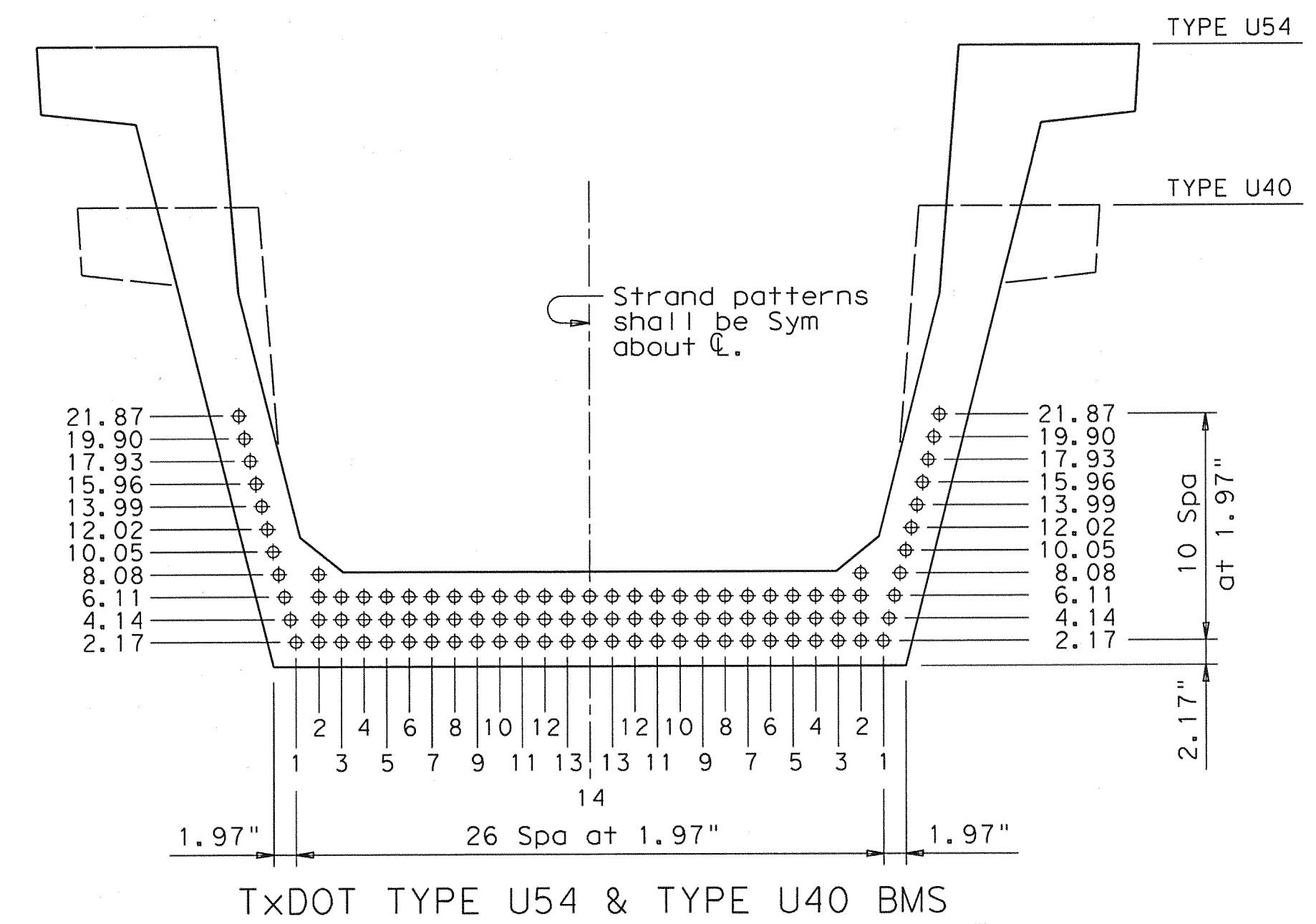


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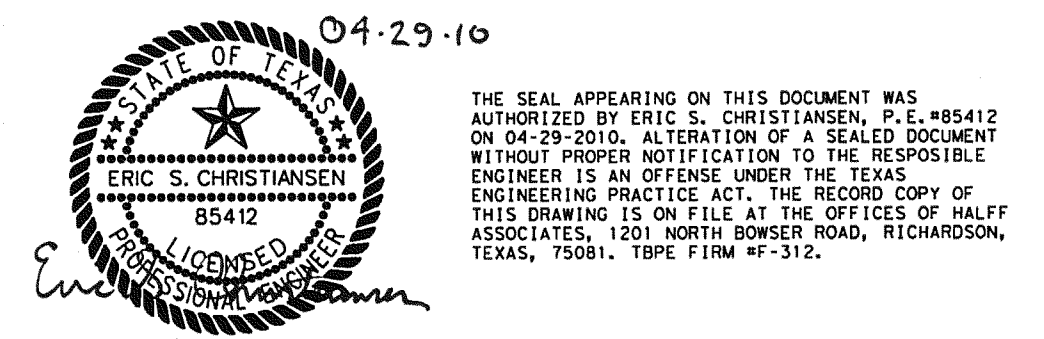
LEVELS DISPLAYED	ACC:
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STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)																	OPTIONAL DESIGN																				
	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS							DEBONDED STRAND PATTERN PER ROW										CONCRETE		DESIGN LOAD COMP STRESS (TOP ϕ) (SERV I) fct (ksi)	DESIGN LOAD TENSILE STRESS (BOTT ϕ) (SERV III) fcb (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRGTH I) (ft-kips)	LIVE LOAD DISTRIB FACTOR (1)												
				STRAND PATTERN NO.	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ϕ (in)	"e" END (in)	TOT NO. DEB	DIST FROM BOTTOM (in)	NO. OF STRANDS	NUMBER OF STRANDS DEBONDED TO (ft from end)														MINIMUM RELEASE STRGTH f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)										
													TOTAL	DE-BONDED	3	6	9	12	15																			
PONTE AVE BRIDGE	1	1 & 7	U54		95	1/2	270	17.12	15.88	32	2.17	27	20	0	10	4	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.105	9.675	5.590	-4.589	10,334	0.999
	1	2-6	U54		87	1/2	270	18.00	16.95	38	4.14	27	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.645	8.114	5.077	-4.304	10,268	0.392



GENERAL NOTES:
 Designed in accordance with AASHTO LRFD Specifications.
 All concrete must be Class H. Use Class H (HPC) if required elsewhere in plans. All reinforcing bars shall be Grade 60.
 When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a registered Professional Engineer.
 Optional designs must have a calculated residual camber equal to or greater than that of the designed beam.
 Prestress losses for the designed beams have been calculated for a relative humidity of 65 percent. Optional designs must likewise conform.
 Locate strands for the designed beam as low as possible on the 1.97" grid system. Fill row "2.17", then row "4.14", then row "6.11", etc., beginning each row in the "1" position and, distributing uniformly as practical, working inward until the required number of strands is reached. All strands, including those in the web, must be adequately tied to reinforcing steel, bar supports, or other devices to prevent displacement during concrete placement.
 Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Debonded lengths must decrease working inward, with debonding staggered in each row.
 Encase debonded strands in plastic tubing along entire debonded length, and seal ends of tubing with waterproof tape. Split plastic tubing may be used provided the seam of the tubing is sufficiently sealed with waterproof tape to prohibit grout infiltration. Wrapping of strands with tape to provide debonding is not permitted.
 Full-length debonded strands are not permitted in strand positions 1 and 2. If placing concrete in two stages, double wrap all full-length debonded strands in row "2.17" and internal vibrator diameter cannot exceed 1 1/8" diameter for first stage. Full-length debonding must comply with Item 426.4.F.4.
 Strands for the designed beam must be low relaxation strands pretensioned to 75 percent of fpu each.
 The grid pattern for the strands is based on exact conversions from a metric grid spacing of 50mm.

① Portion of full HL 93



HL93 LOADING

Texas Department of Transportation
Bridge Division

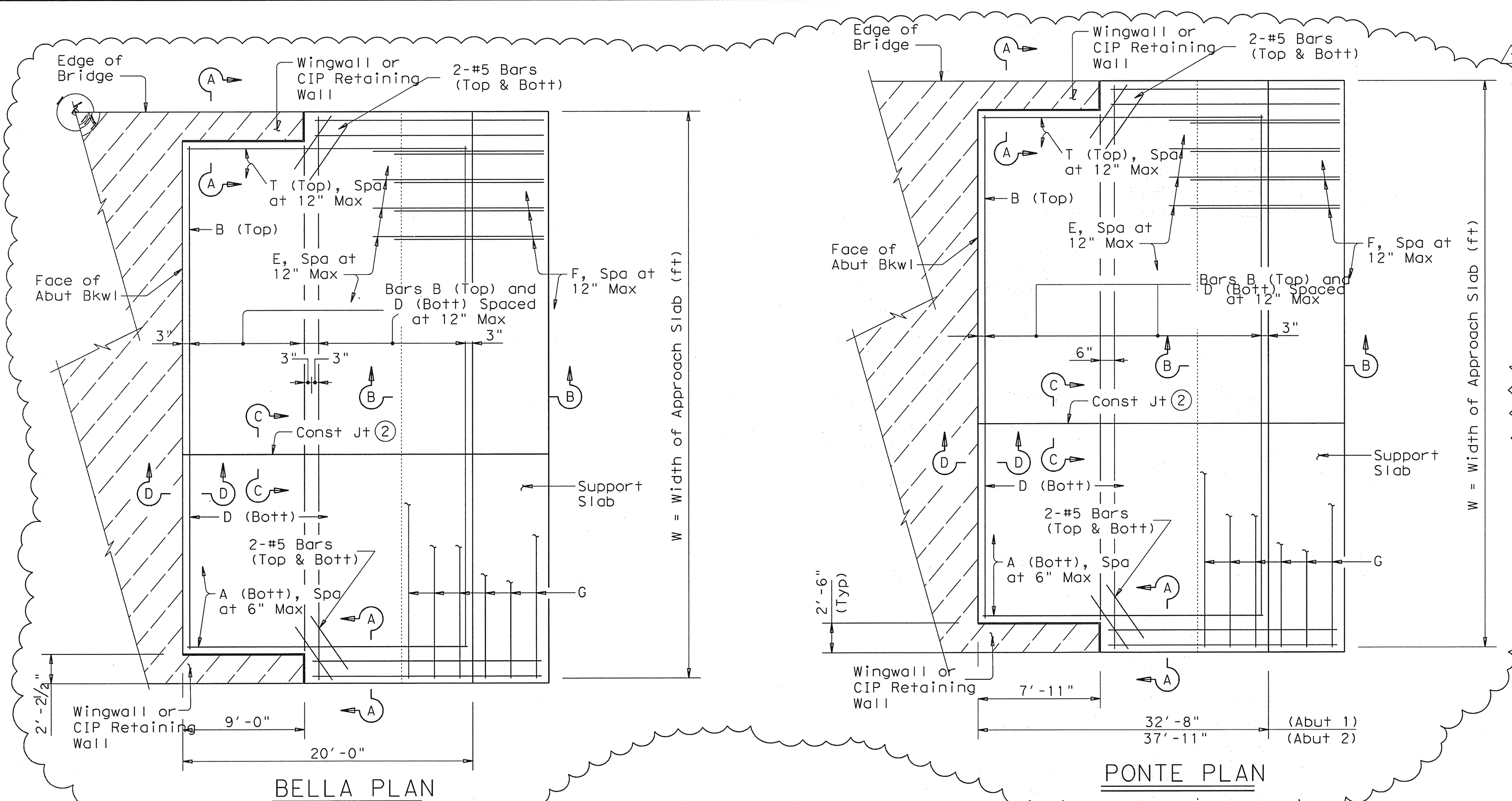
**PRESTRESSED
CONCRETE U-BEAMS
(DESIGN DATA)**

UBND

FILE: ubstde04.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
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LEVELS DISPLAYED	
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BAR	SIZE
A	#8
B	#5
D	#5
E	#5
F	#5
G	#5
T	#5

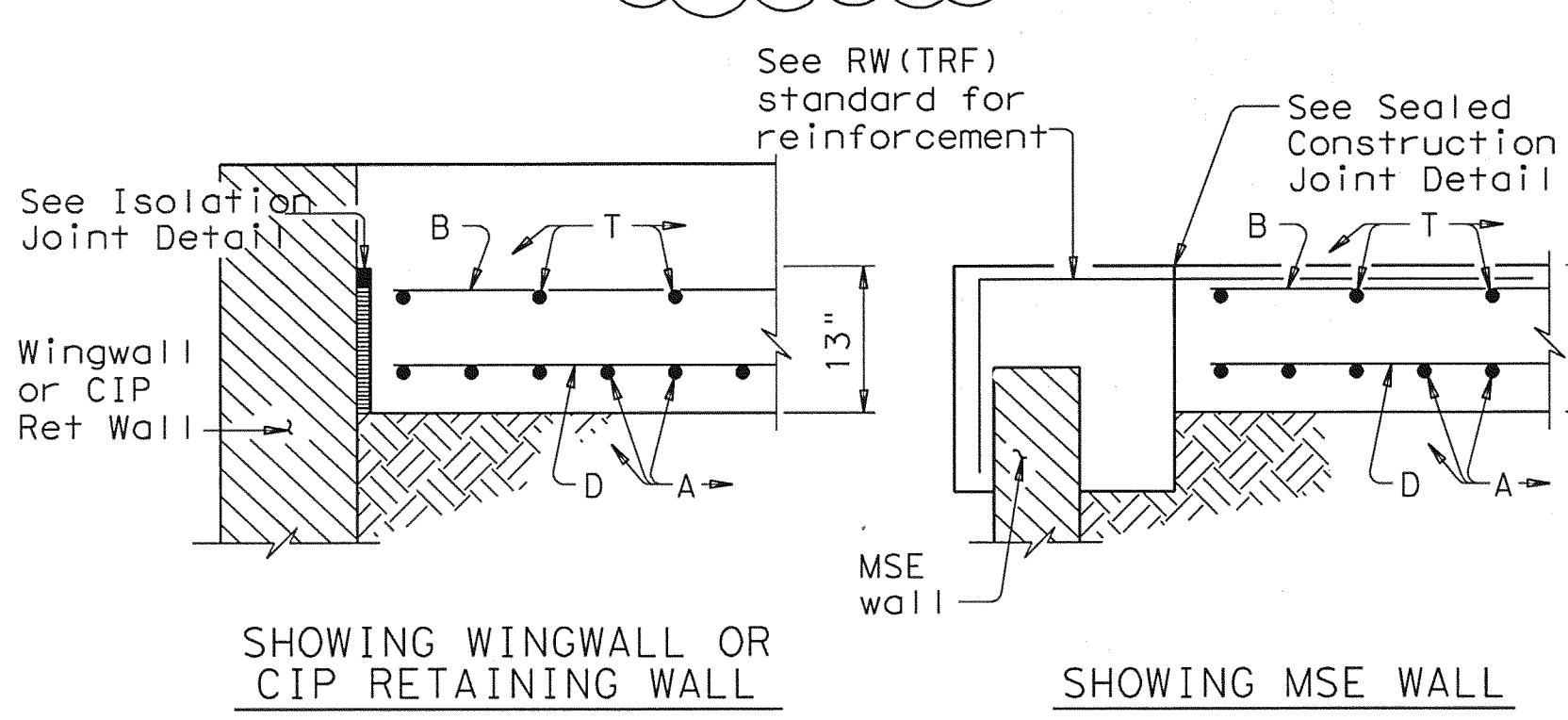
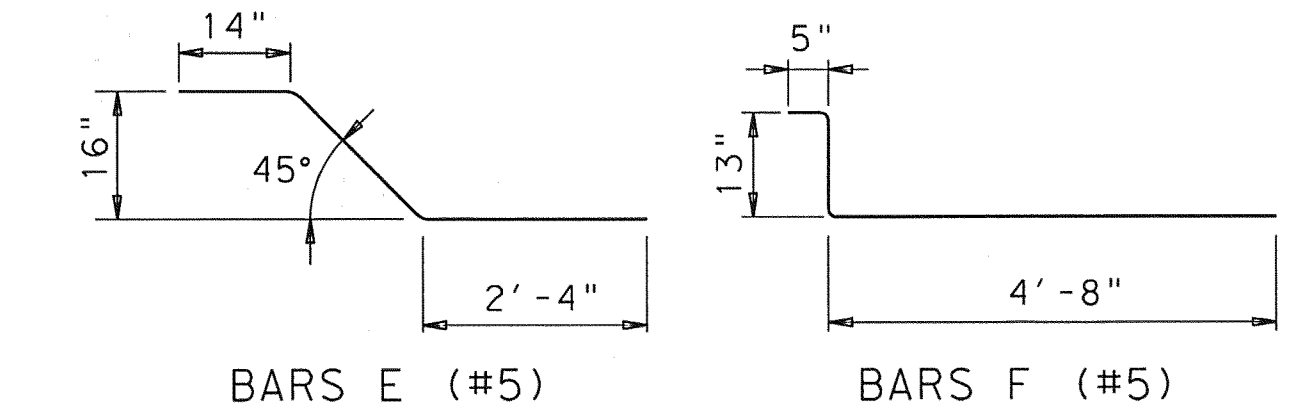
APPROXIMATE QUANTITIES ④

Reinf steel weight = 8.5 Lbs/SF of Approach Slab
 = 18.4 Lbs/LF of Support Slab

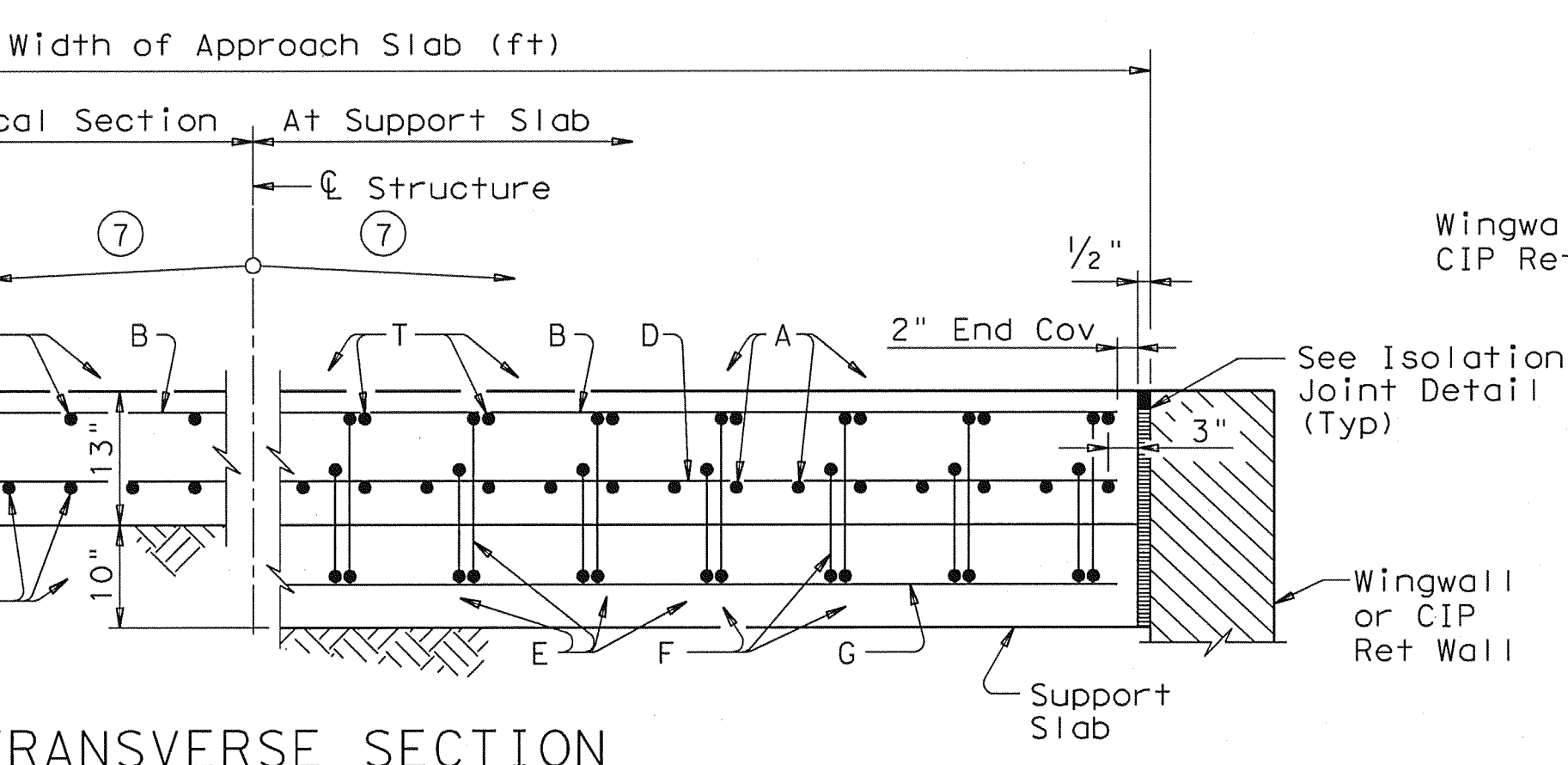
Area of Appr Slab = $20W + 0.5W^2 \tan S$ (SF)
 (Support Slab not included)

W = Width of Approach Slab Varies
 S = Skew Angle (deg)

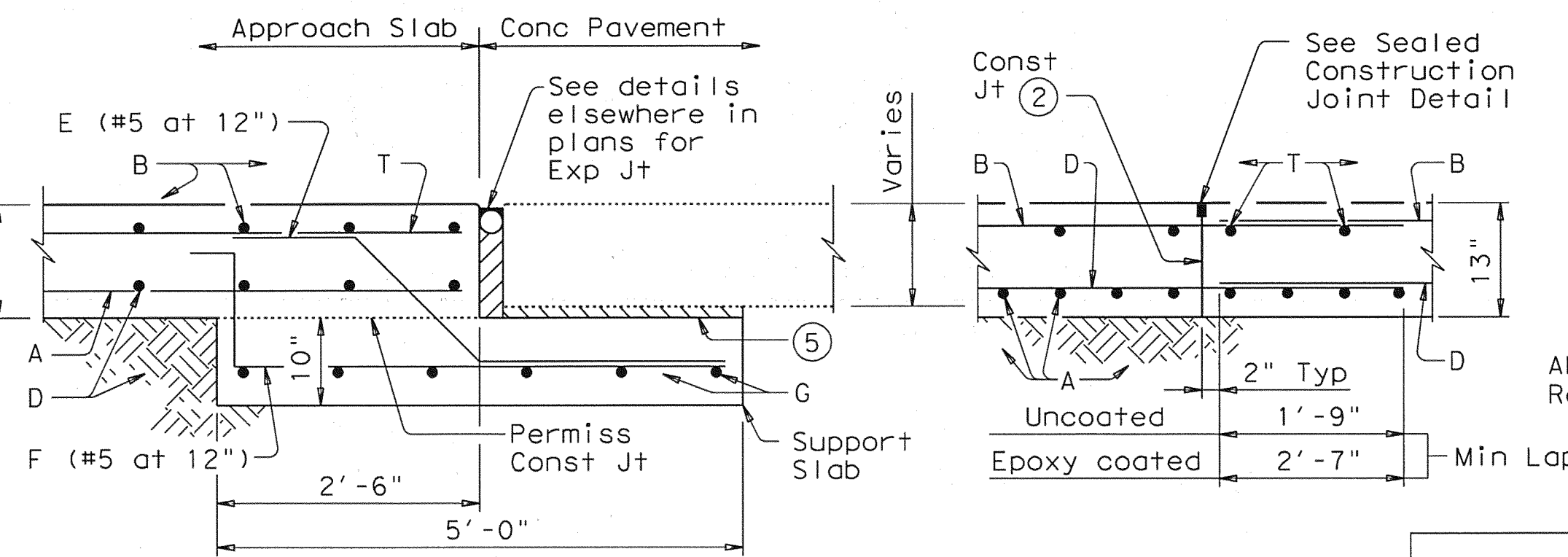
- Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.
- Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.
- See details elsewhere in plans for shoulder drain location and details.
- For Contractor's information only.
- On portion of support slab that supports the concrete pavement, adjust top surface elevation, if required, to accommodate concrete pavement thickness. Smooth trowel finish. Oil top of support slab with 60 grade oil and apply heavy coat of powdered graphite. Press down one layer of 30# roofing felt.
- Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.
- See details elsewhere in plans for required cross-slope.
- Place in accordance with Item 438.
- Backer rod shall be 25% larger than joint opening and shall be compatible with the sealant.
- Place 1/2" Preformed Bituminous Fiber Material between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.



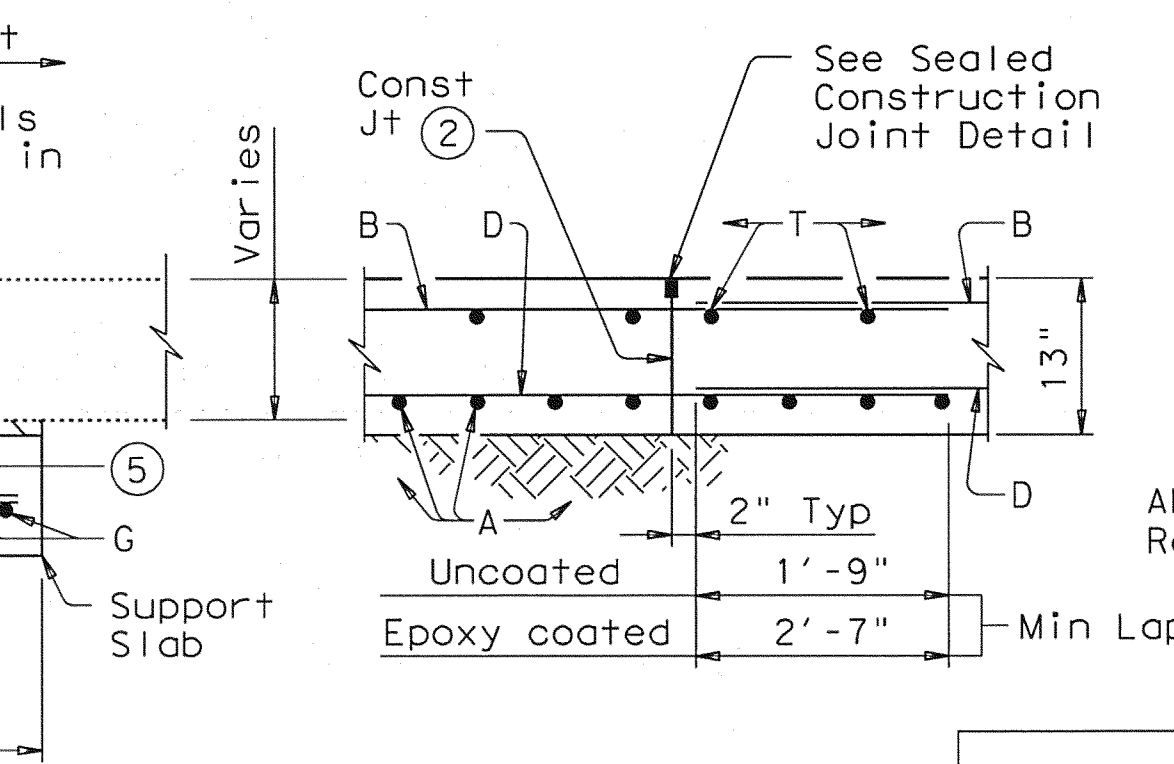
SECTION A-A



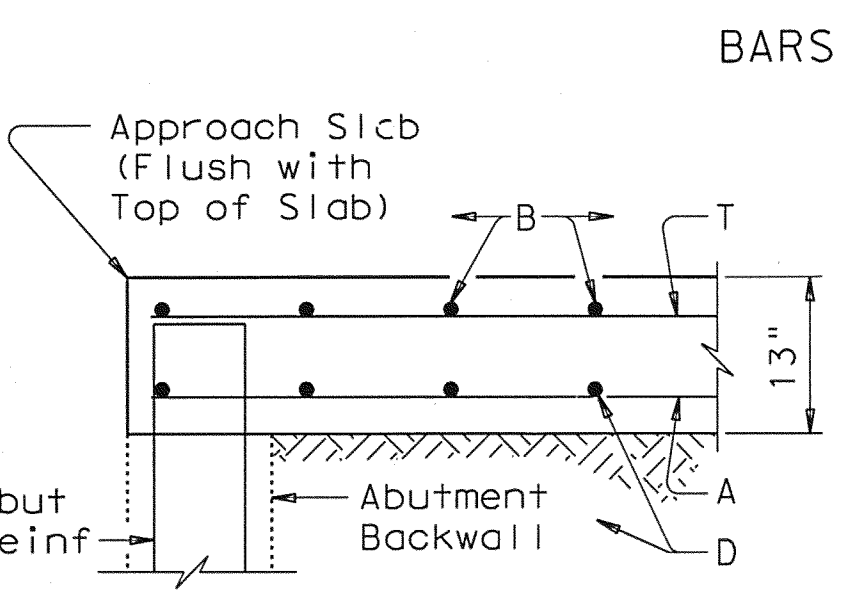
TRANSVERSE SECTION



SECTION B-B



SECTION C-C ⑥



SECTION D-D

Modifications ESC 04/29/10

1. Modified Plans for Bella Ln. and Ponte Ave.

GENERAL NOTES:

Construct approach slab in accordance with Item 420.

Concrete shall be Class "S" with a minimum compressive strength of 4,000 psi.

All reinforcing steel shall be Grade 60.

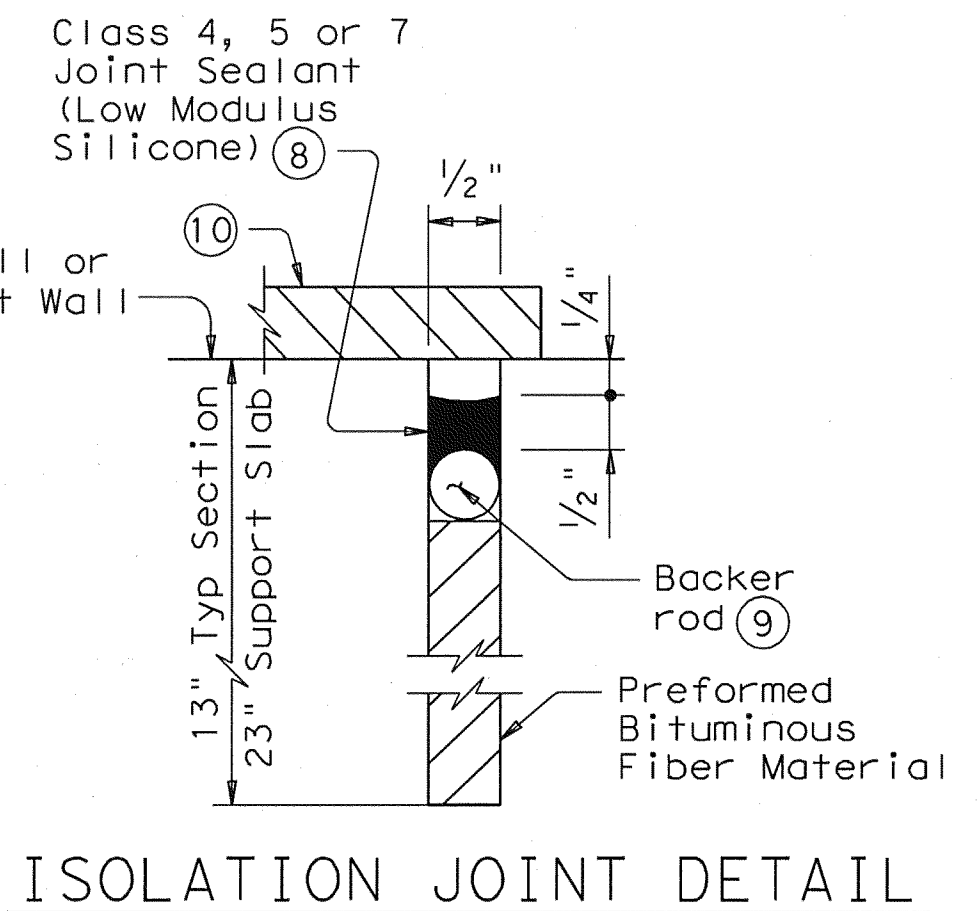
Construct the subgrade or subbase for the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

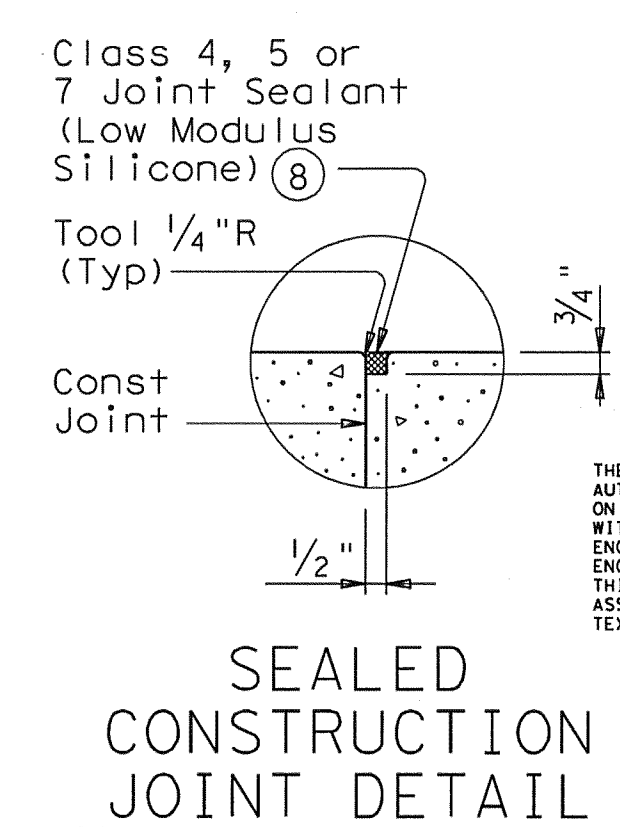
Cure for 4 days using water or membrane curing per Item 420.

Sealant, backer rod and preformed bituminous fiber material is subsidiary to approach slab concrete.

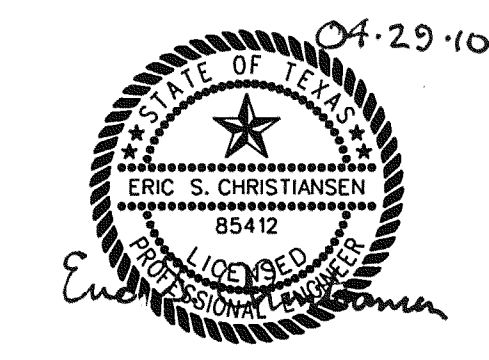
Provide a 1" bondbreaker (asphaltic concrete pavement or asphalt stabilized base) between the approach slab and cement stabilized backfill or cement treated base. Other bondbreakers may be used if approved by the Engineer.



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL



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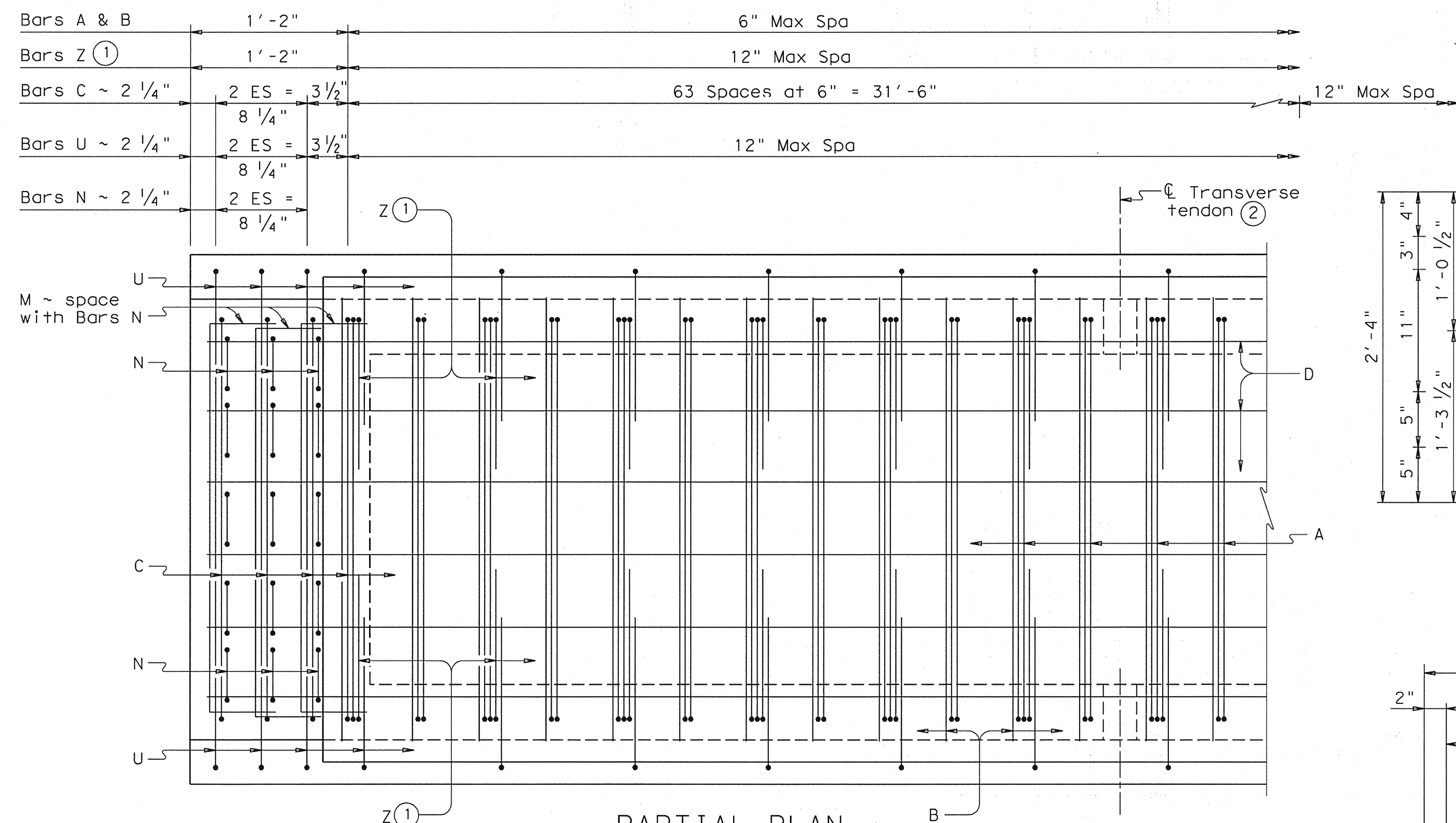
Texas Department of Transportation
 Bridge Division

**BRIDGE APPROACH SLAB
 CONCRETE PAVEMENT**

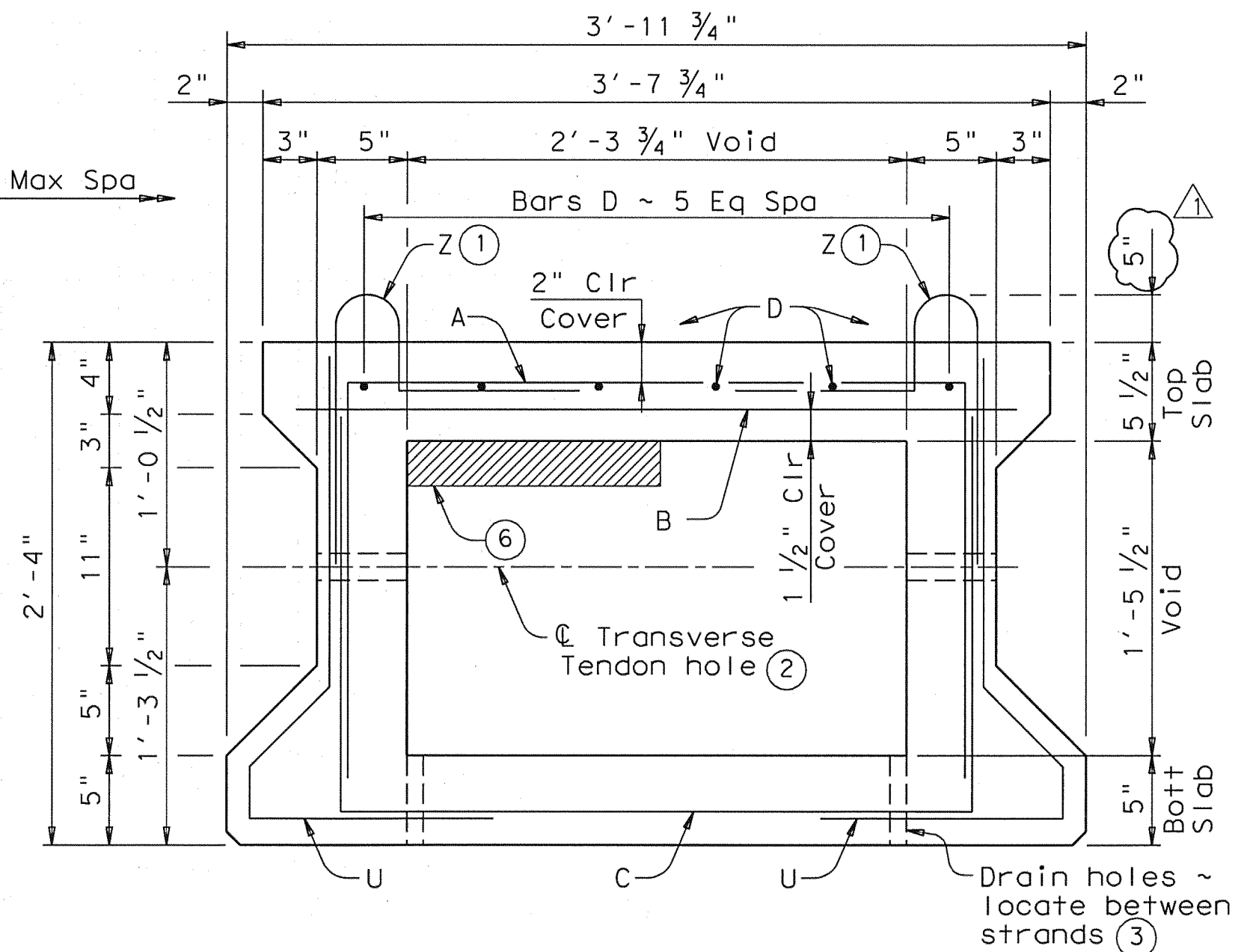
BAS-C (MOD)

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		JOB		HIGHWAY

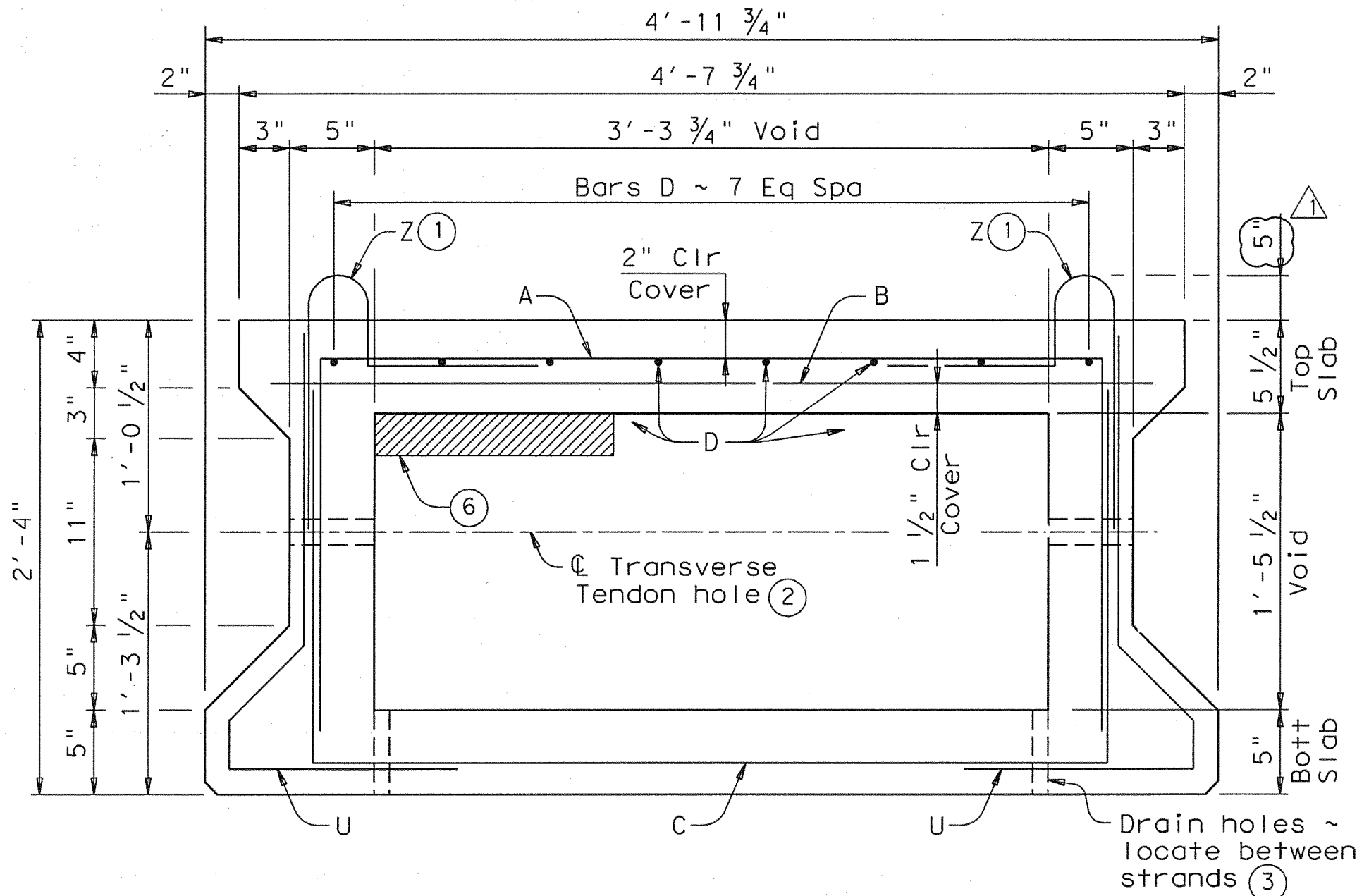
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PARTIAL PLAN
(Showing Type 4B28)



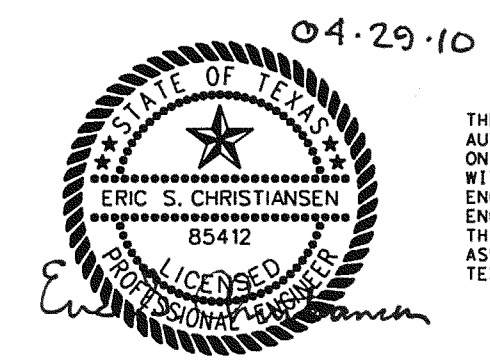
TYPICAL SECTION ~ TYPE 4B28



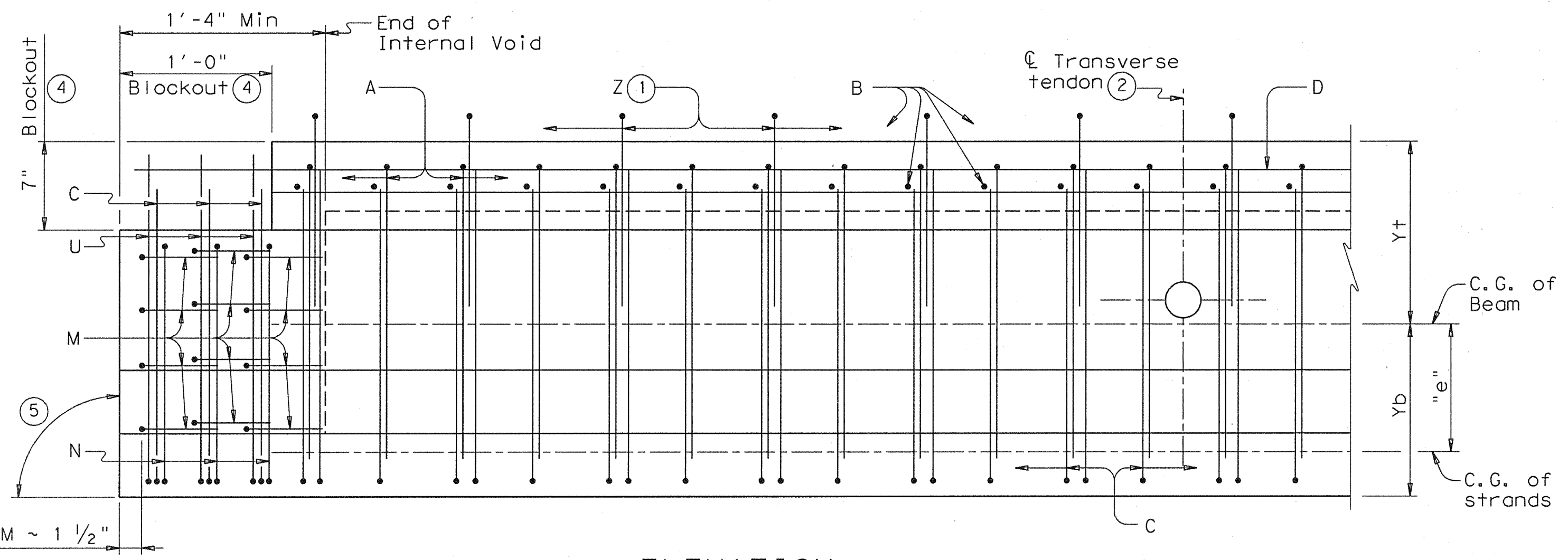
TYPICAL SECTION ~ TYPE 5B28

- Bars Z are required for beams topped with a cast-in-place concrete slab only.
- Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia holes in interior beams. See standard BBPT for details.
- Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".
- Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.
- 90° at conventional Interior Bents. Ends of beams shall be vertical at Abutment backwall and Inverted Tee Bent Stems.
- Showing void modification required in exterior beams not topped with a Min 5" cast-in-place concrete slab. See standard BBRA0 for void modification dimensions.
- Based on 150 pcf weight density of concrete. Weight of end blocks and interior diaphragms is not included.

GENERAL NOTES:
 Designed according to AASHTO LRFD Specifications. Use Class H concrete. Use Class H (HPC) if required elsewhere in plans. All reinforcing steel must be Grade 60.
 Two-stage monolithic casting is required. The concrete in the first stage cast (bottom beam flange) must remain plastic until the second stage cast (webs and top beam flange) is placed. Vibrate as required to ensure consolidation between the two casts.
 1/4" clear cover to reinforcement is required unless noted otherwise.
 See standard BBRAS or BBRA0 for railing anchorage at bridge edges to be cast in beams.
 An equal area of welded wire reinforcement (WWR) meeting the requirements of ASTM A 497 may be substituted for Bars A, B, C, and D.
 These details are applicable for skewers up to 30 degrees only.
 Chamfer bottom beam corners 3/4" or round to a 3/4" radius.



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ELEVATION

BEAM PROPERTIES			
		Type 4B28	Type 5B28
Area	in ²	678.8	804.8
Y top	in	14.38	14.26
Y bott	in	13.62	13.74
I	in ⁴	68,745	85,370
Weight 7	lb/ft	707	838

Modifications ESC 04/29/10
 Revised Z bar

HL93 LOADING SHEET 1 OF 3

Texas Department of Transportation
 Bridge Division
**PRESTRESSED CONCRETE
 BOX BEAM DETAILS
 (TYPE B28)**

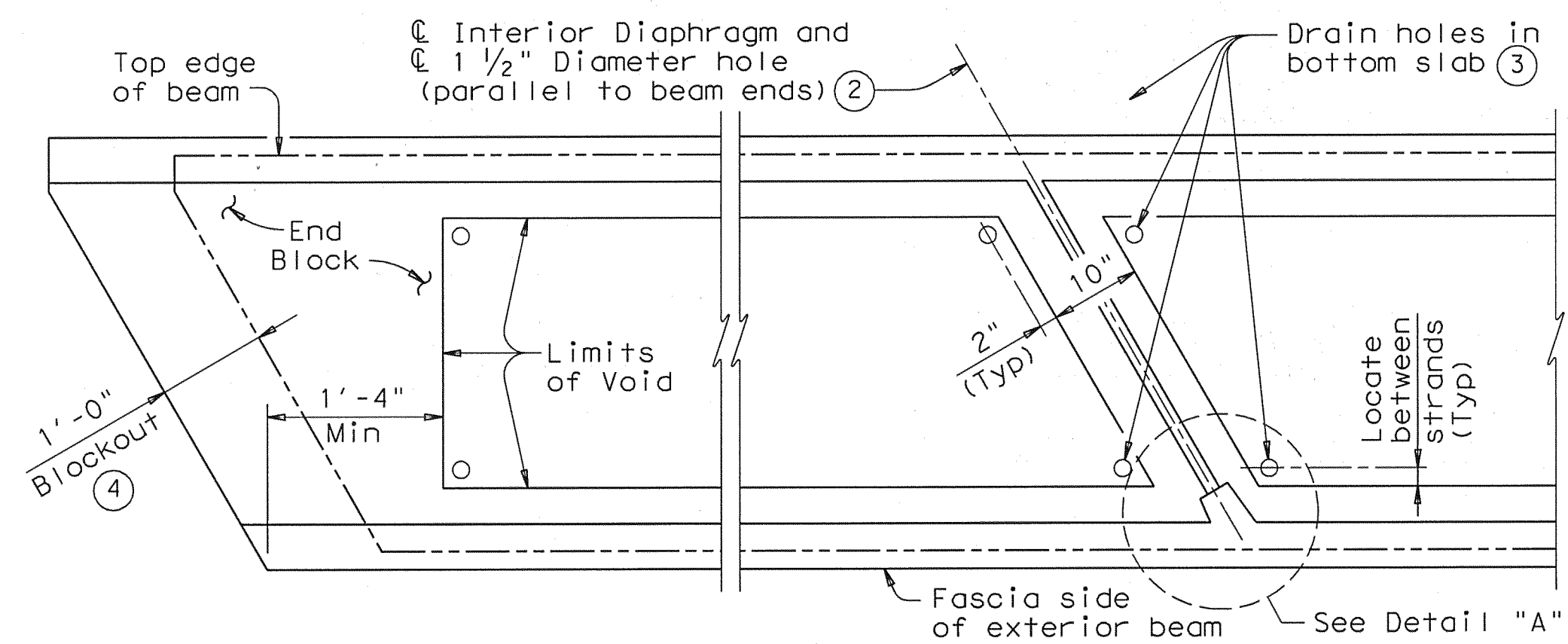
BB-B28 (MOD)

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				HIGHWAY

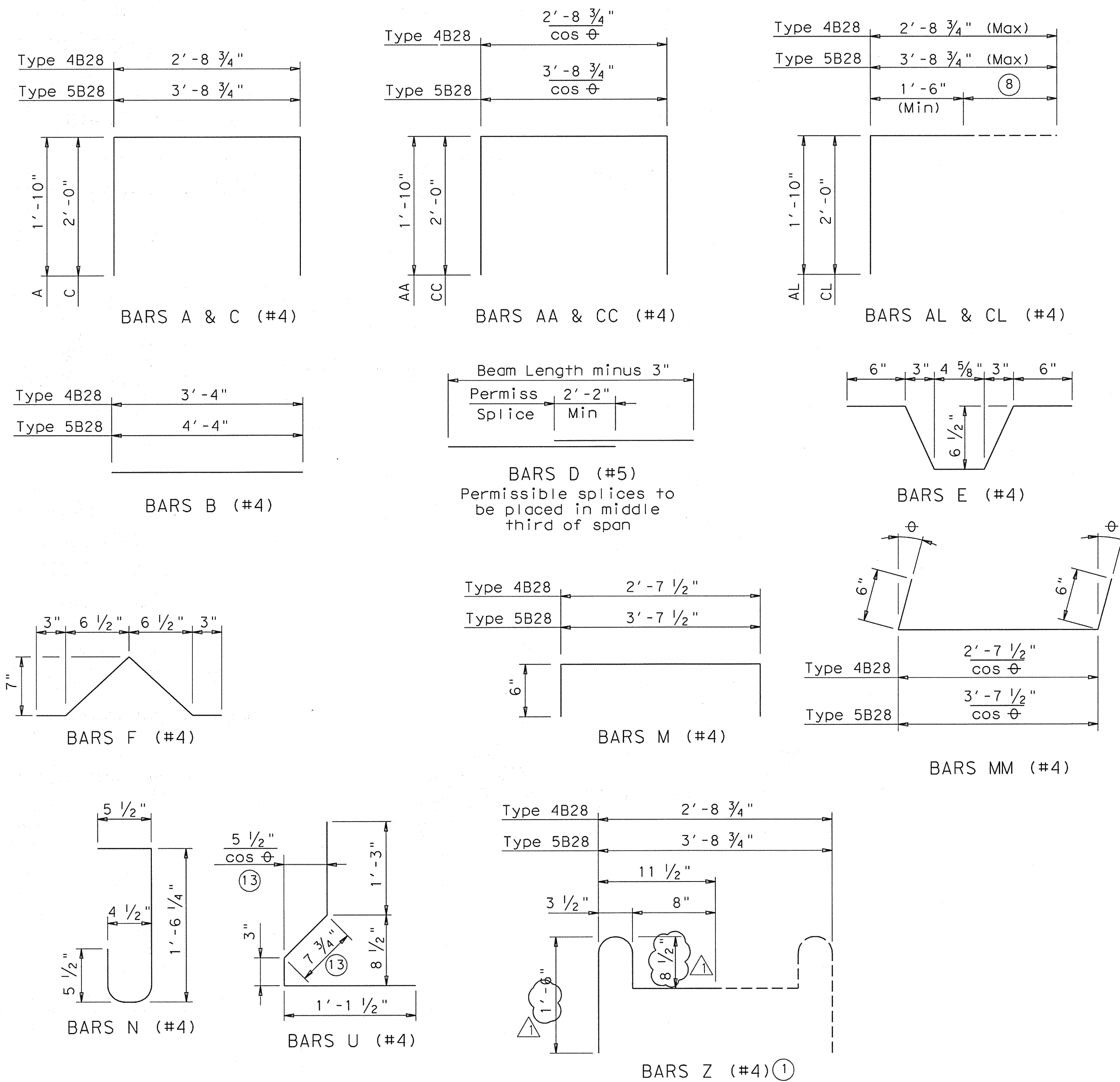
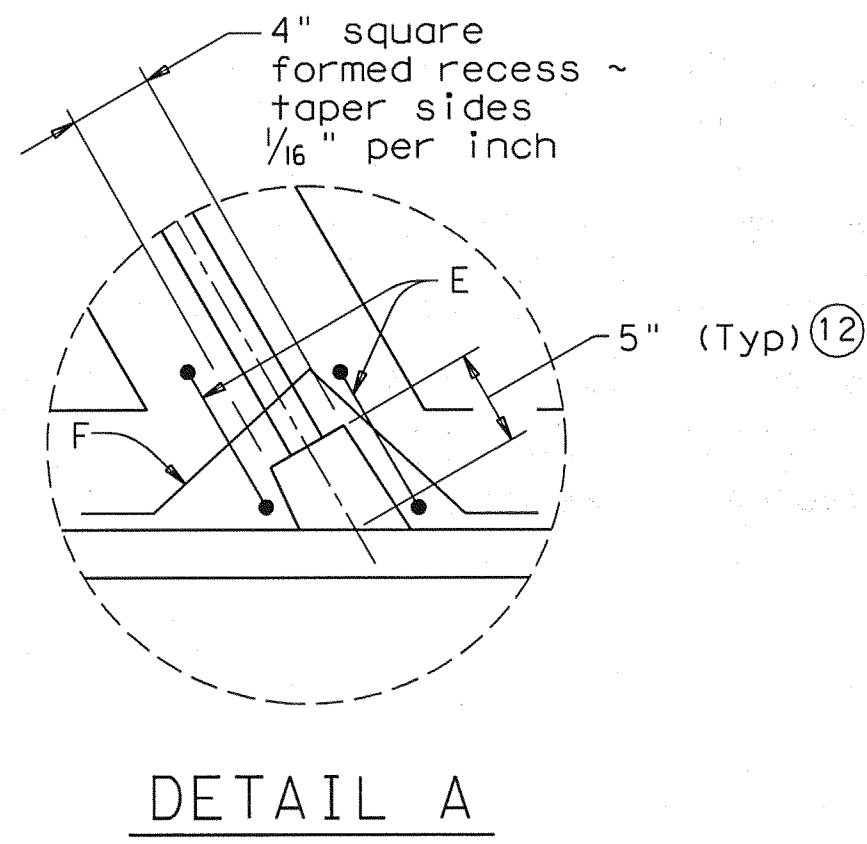
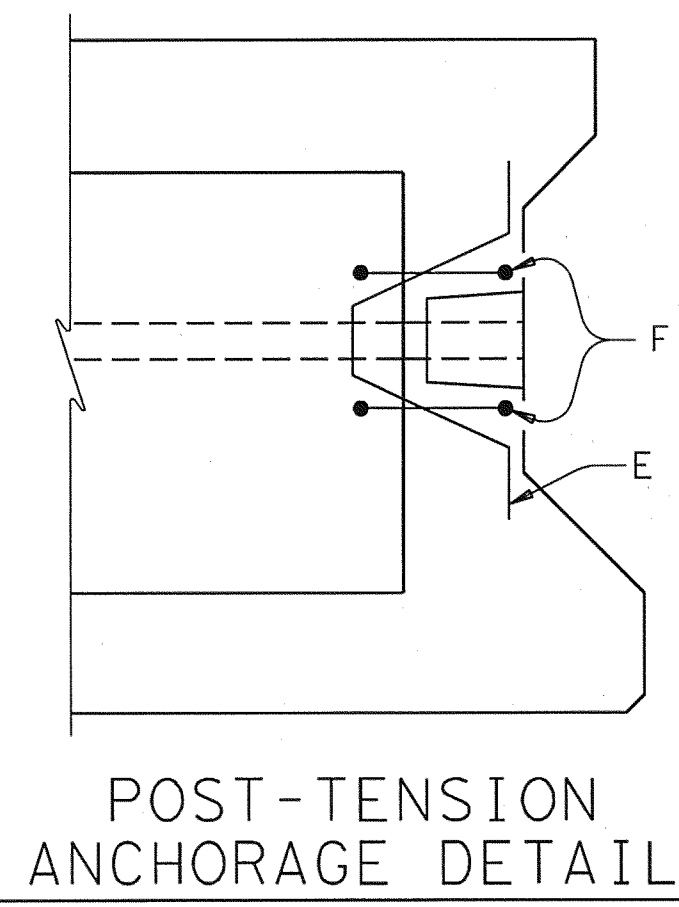
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LEVELS DISPLAYED: PATH:



BLOCKOUT, INTERIOR DIAPHRAGM AND DRAIN DETAILS
(Showing 30° skew)



- ① Bars Z are required for beams topped with a cast-in-place concrete slab only.
- ② Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. Form 3" Dia holes in interior beams. See "Blockout, Interior Diaphragm, and Drain Details". See standard BBPT for details.
- ③ Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".
- ④ Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.
- ⑧ Cut as required to maintain one inch clear between bars.
- ⑫ 5" (Typ) or sufficient depth to provide 1" Cover on cut-off tendon. See BBPT for details.
- ⑬ Dimension will vary slightly with skew. Adjust as necessary.

Modifications ESC 04/29/10
 Revised Z bar



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At fabricator's option, Bars Z pairs may be fabricated using one continuous bar. If this option is used, Bars B at Bar Z locations (only) may be omitted.

HL93 LOADING SHEET 3 OF 3

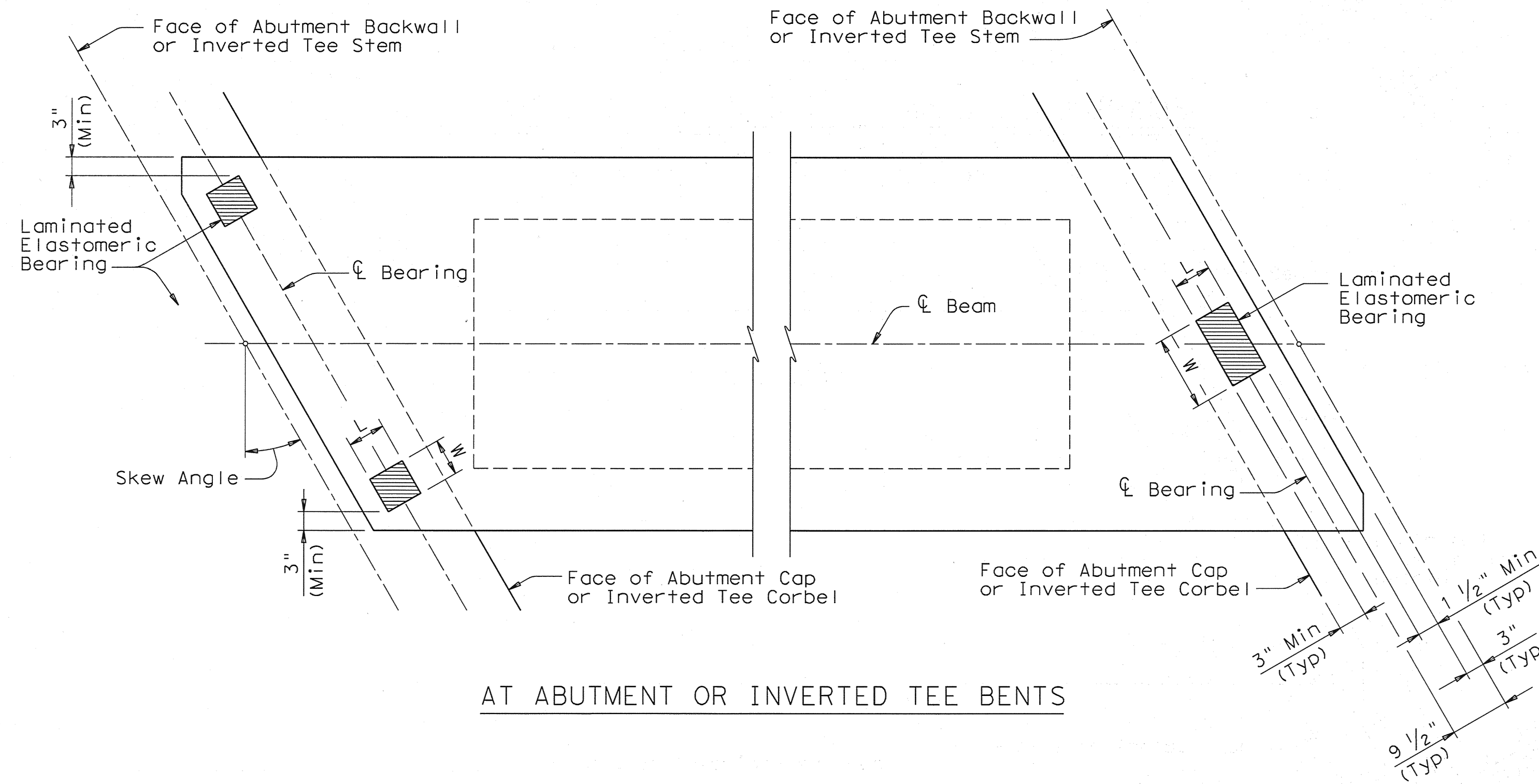
Texas Department of Transportation
 Bridge Division
**PRESTRESSED CONCRETE
 BOX BEAM DETAILS
 (TYPE B28)**

BB-B28 (MOD)

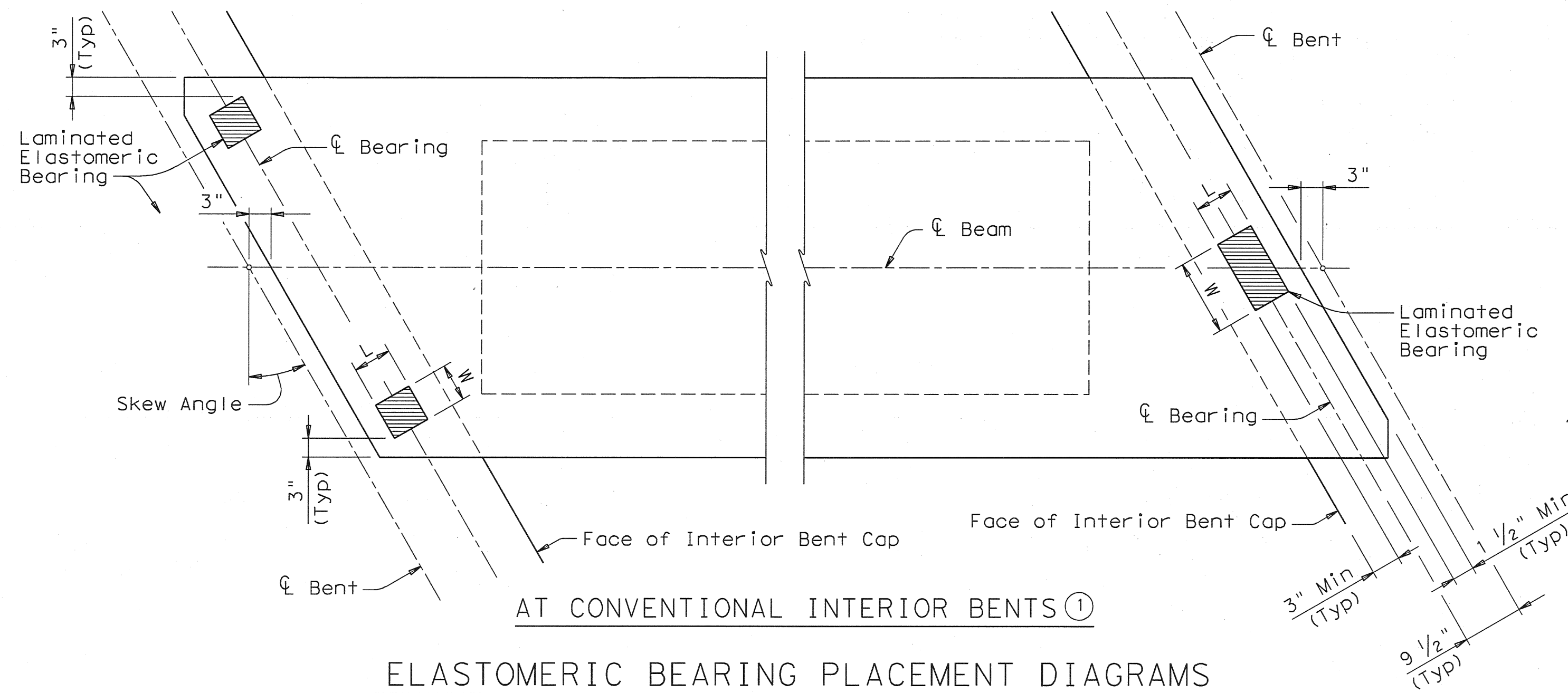
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REVISIONS		S4-06		
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LEVELS DISPLAYED
PATH:

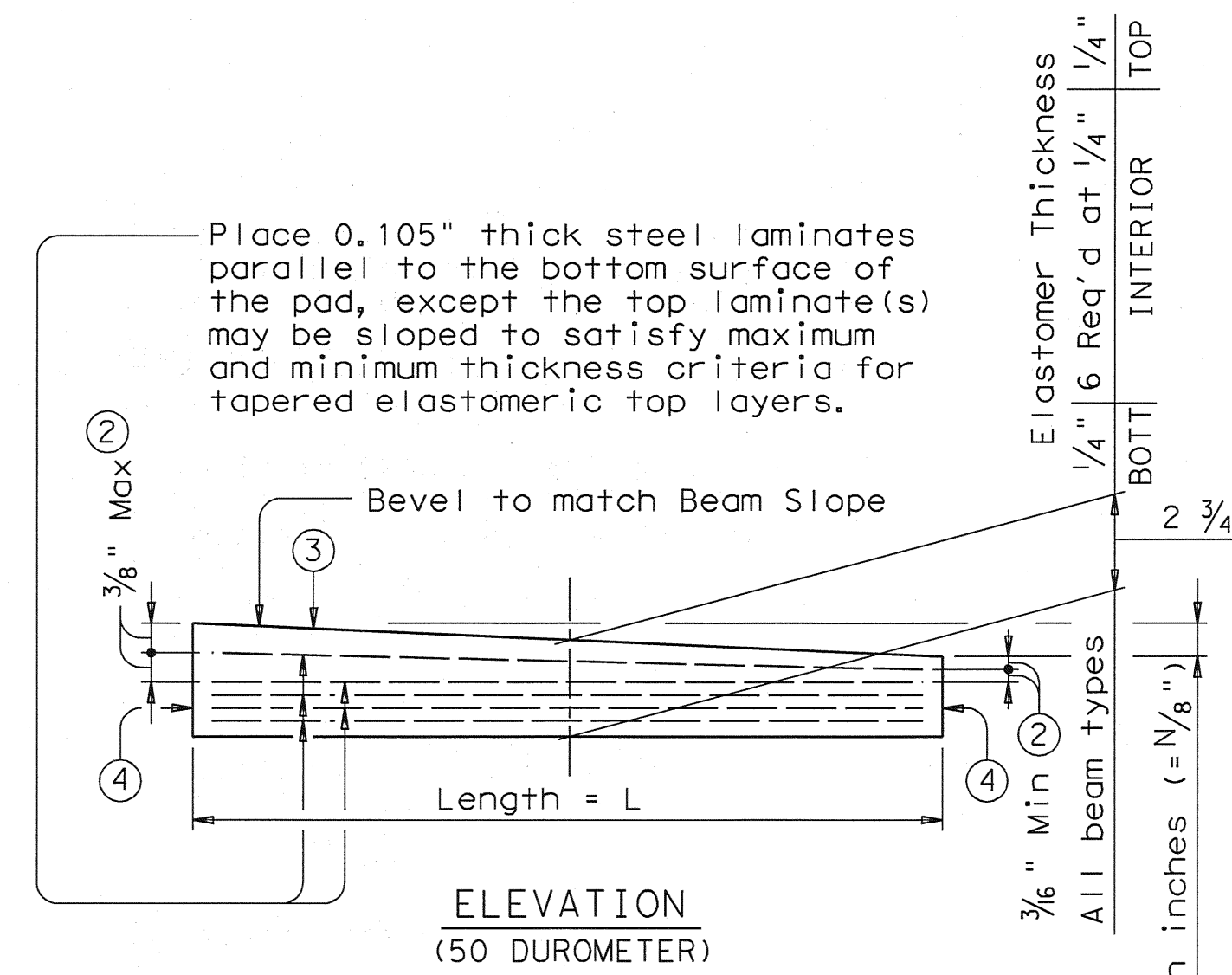


AT ABUTMENT OR INVERTED TEE BENTS



ELASTOMERIC BEARING PLACEMENT DIAGRAMS

The Forward Station Beam End will have one bearing and the Back Station Beam End will have two bearings.



ELASTOMERIC BEARING SECTION

(50 DUROMETER)

The use of Polyisoprene (natural rubber), for the manufacture of bearing pads, is not permitted.

- ① For Transition Bents with backwall, beams and elastomeric bearings will receive the same treatment as shown for Abutment Bents.
- ② Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.
- ③ Indicate BEARING TYPE on all pads. For tapered pads, BEARING TYPE will be located on the high side. The Fabricator will include the value of "N" (amount of taper in 1/8" increments) in this mark. Examples: N=0, (for 0" taper)
N=1, (for 1/8" taper)
N=2, (for 1/4" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $(\frac{0.0625"}{\text{Length}})$ IN/IN.
- ④ Locate Permanent Mark here.

ELASTOMERIC BEARING DIMENSIONS					
BEARING TYPE	BEAM TYPE	ONE BEARING		TWO BEARINGS	
		L	W	L	W
B20-"N"	4B20	6"	12"	6"	6"
	5B20	6"	12"	6"	6"
B28-"N"	4B28	6"	14"	6"	7"
	5B28	6"	14"	6"	7"
B34-"N"	4B34	6"	16"	6"	8"
	5B34	6"	16"	6"	8"
B40-"N"	4B40	6"	20"	6"	10"
	5B40	6"	20"	6"	10"

GENERAL NOTES:

Set beams on elastomeric bearings of the dimensions shown. Center bearings as near nominal L bearing as possible within limits shown.
Constant thickness bearings may be used for moderate beam slopes up to 0.0113 ft/ft.
For skewed supports, Bearings beveled for beam slope may not provide uniform contact. However, predicted contact is considered within allowable tolerances.
Shop drawings for approval are required.
A bearing layout which identifies location and orientation of all bearings will be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.
Cost of furnishing and installing elastomeric bearings is to be included in unit price bid for "Prestressed Concrete Box Beams".
Details are drawn showing right forward skew. See Bridge Layout for actual direction.
These details are applicable for skews up to 30 degrees only.

HL93 LOADING

Texas Department of Transportation
Bridge Division

ELASTOMERIC BEARING DETAILS
PRESTR CONC BOX BEAMS

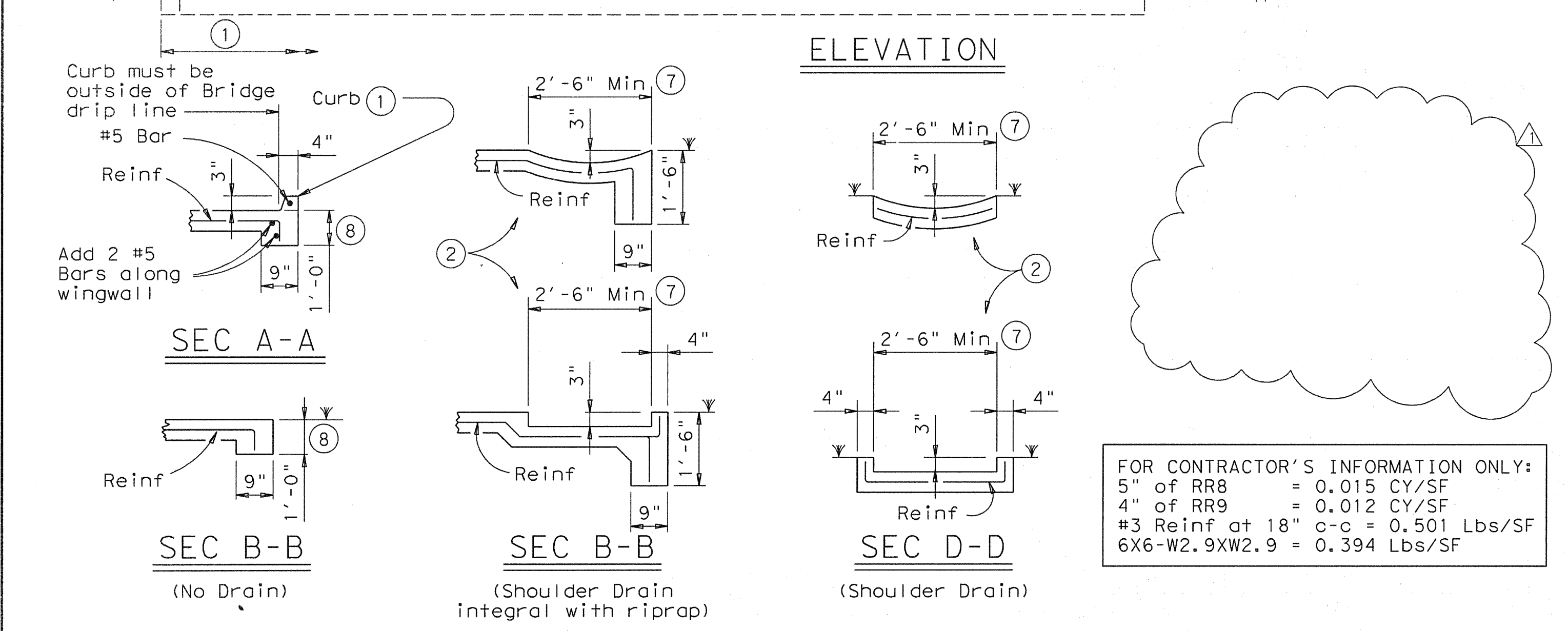
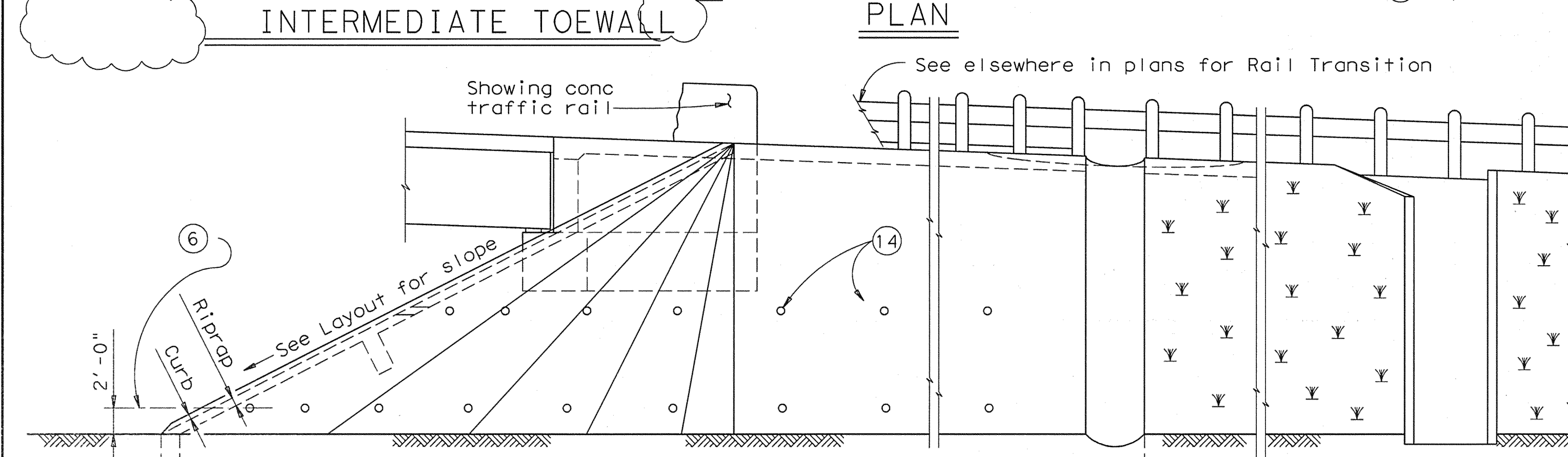
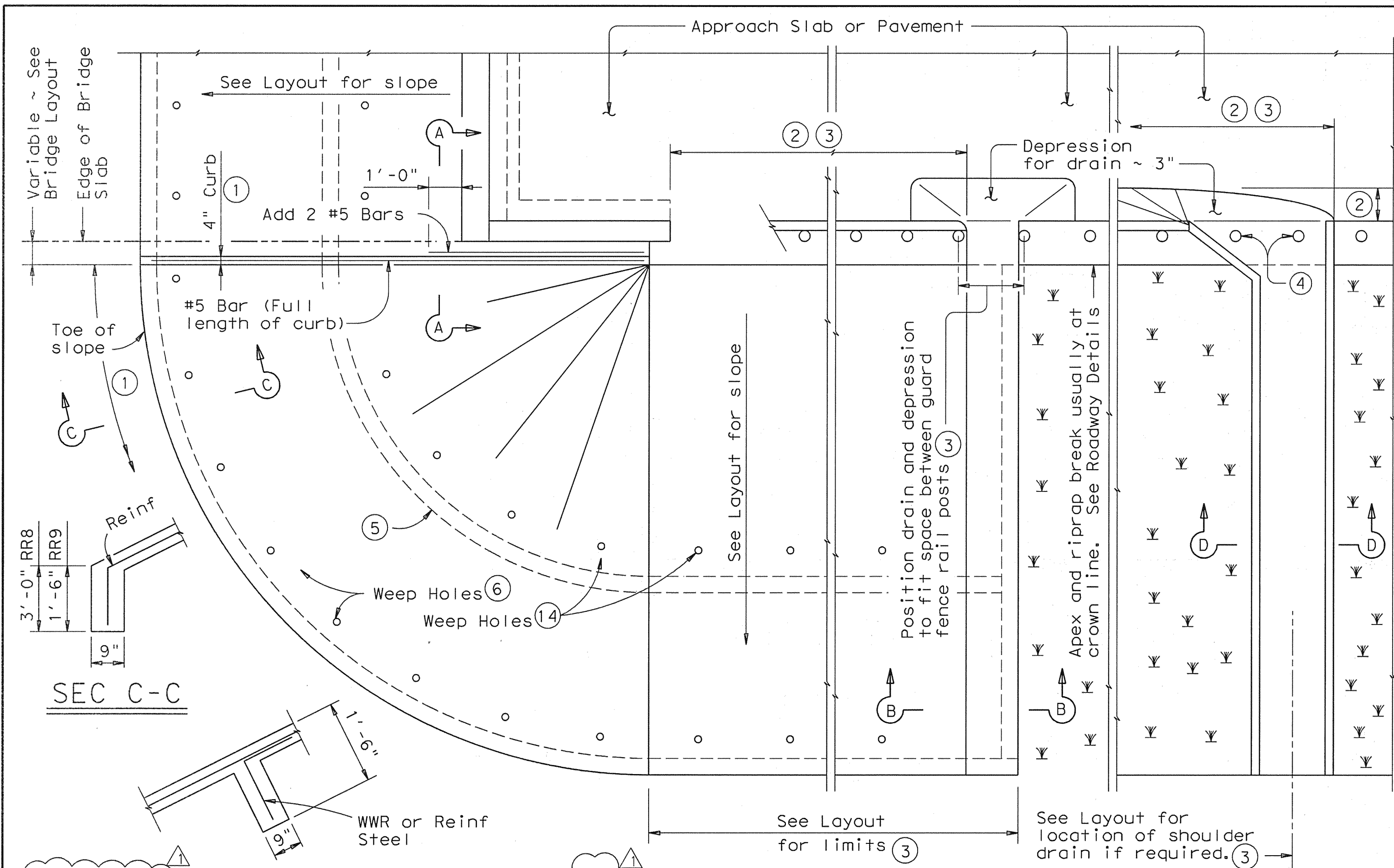
BEB

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REVISIONS				S4-07
COUNTY		CONTROL	SECT	JOB
				HIGHWAY

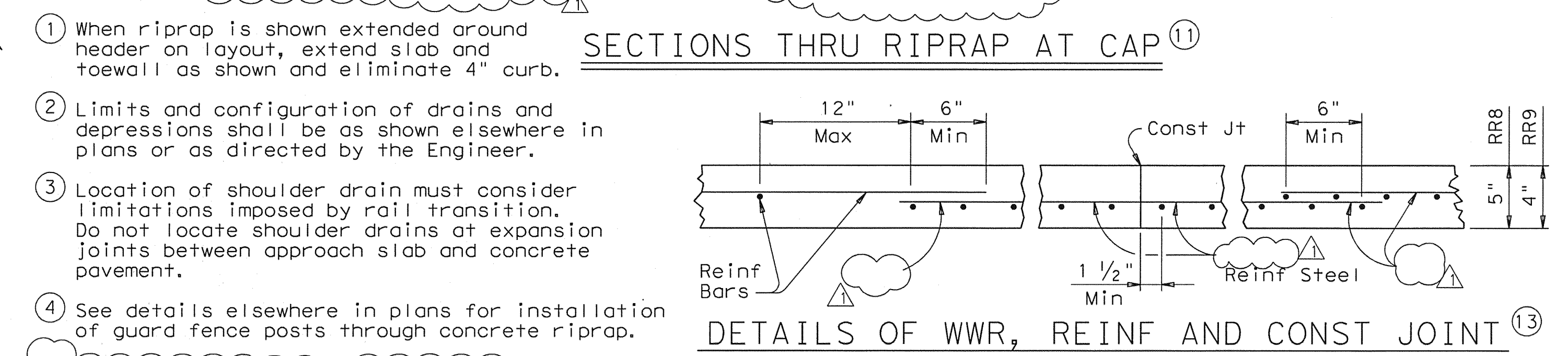
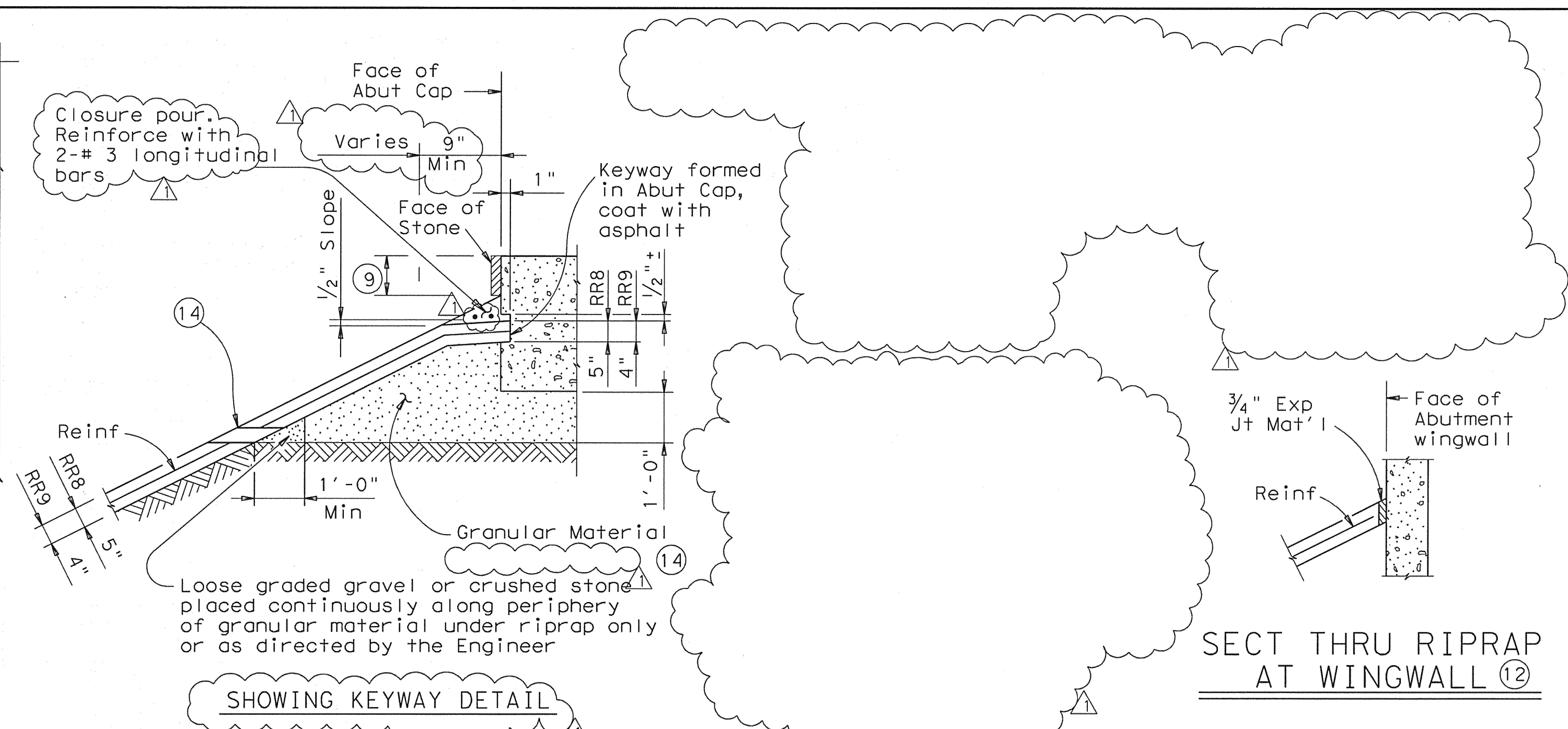
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LEVELS DISPLAYED

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FOR CONTRACTOR'S INFORMATION ONLY:
 5" of RR8 = 0.015 CY/SF
 4" of RR9 = 0.012 CY/SF
 #3 Reinf at 18" c-c = 0.501 Lbs/SF
 6X6-W2.9XW2.9 = 0.394 Lbs/SF



- When riprap is shown extended around header in layout, extend slab and toewall as shown and eliminate 4" curb.
- Limits and configuration of drains and depressions shall be as shown elsewhere in plans or as directed by the Engineer.
- Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
- See details elsewhere in plans for installation of guard fence posts through concrete riprap.
- Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
- Wider or other drain configurations shall be used if shown elsewhere in plans or if directed by the Engineer.
- Wall extension may be reduced or modified if approved by the Engineer. Wall extension shall be increased to 1'-6" whenever the optional intermediate toewall is called for in the plans.
- Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
- 8" x 18 Gage Galv Sheet Metal
- The sealing option of the joint between the face of cap and riprap shall be as designated by the Engineer or as shown elsewhere on plans.
- Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
- Reinforcing bars shall be #3 at 18" Spd c-c. Lap splices shall be a minimum of 6 inches, measured from the ends of reinforcing bars.
- provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.

GENERAL NOTES:
 Concrete shall be Class "B" with a minimum compressive strength of 2,000 psi unless noted elsewhere in plans.
 All reinforcing steel shall be Grade 60.
 Reinforcing other than that shown may be used by substituting reinforcement of equal or greater unit cross-sectional area. The maximum reinforcement spacing shall be 18 inches.
 Construction joints or grooved joints extending the full slant slope height shall be at intervals of approximately 20 feet unless otherwise directed by the Engineer.
 Hardware cloth, loose graded stone behind weep holes, flashing, or other sealing material shall not be paid for directly but shall be subsidiary to the bid item "Riprap".
 Unless specified elsewhere in the plans to be only reinforcing bars, the riprap reinforcing may be composed of reinforcing bars, Welded Wire Reinforcement (WWR), or any suitable combination of both types.
 See Layout for limits of riprap.
 RR8 is to be used on stream crossings.
 RR9 is to be used on other embankments.



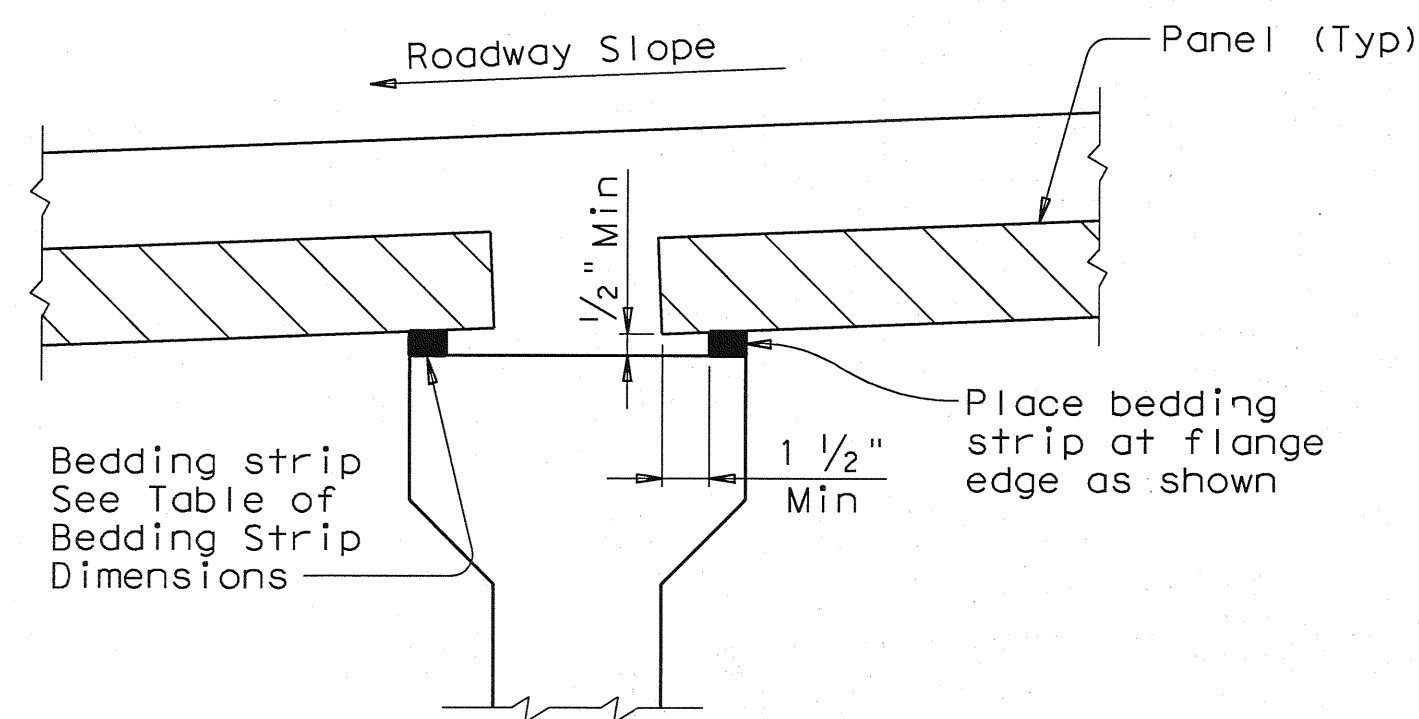
04-29-10
 THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY ERIC S. CHRISTENSEN, P.E. #85412 ON 04-29-2010. ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT. THE RECORD COPY OF THIS DRAWING IS ON FILE AT THE OFFICES OF HALFF ASSOCIATES, 1201 NORTH BOWSER ROAD, RICHARDSON, TEXAS, 75081. TPBE FIRM #F-312.

Modifications ESC 04/29/10
 Revised cap options, revise reinforcing revise keyway.

Texas Department of Transportation
 Bridge Division
CONCRETE RIPRAP AND SHOULDER DRAINS
 EMBANKMENTS
 AT BRIDGE ENDS
 (TYPES RR8 & RR9)
 CRR (MOD)

FILE: crrstde1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2006	DISTRICT	FEDERAL AID PROJECT	SHEET	
08-2007: Revised Note 6, removed "H" reference, added Note 14 & changed weep hole size & spacing.	COUNTY	CONTROL SECT	JOB	HIGHWAY
				S4-08

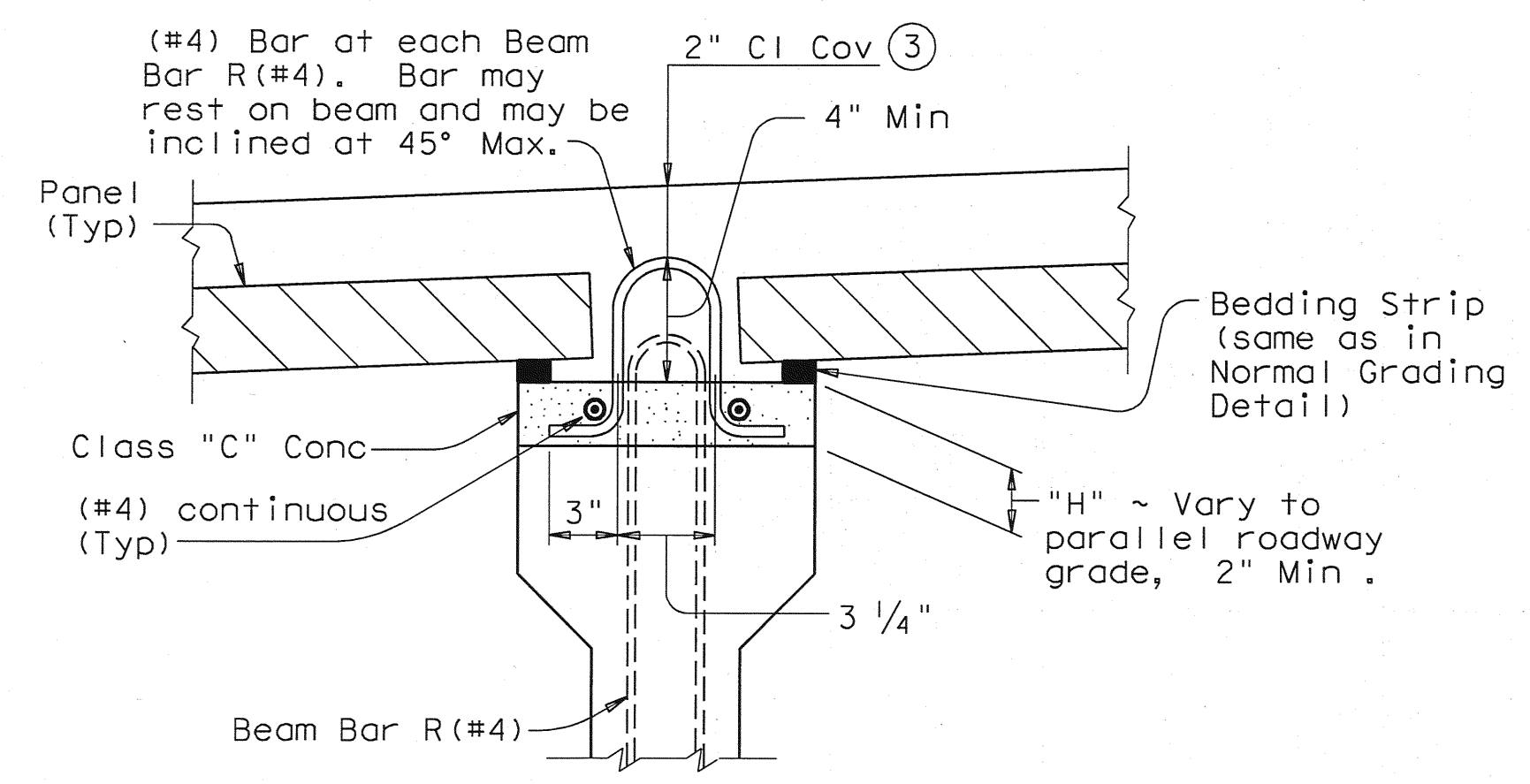
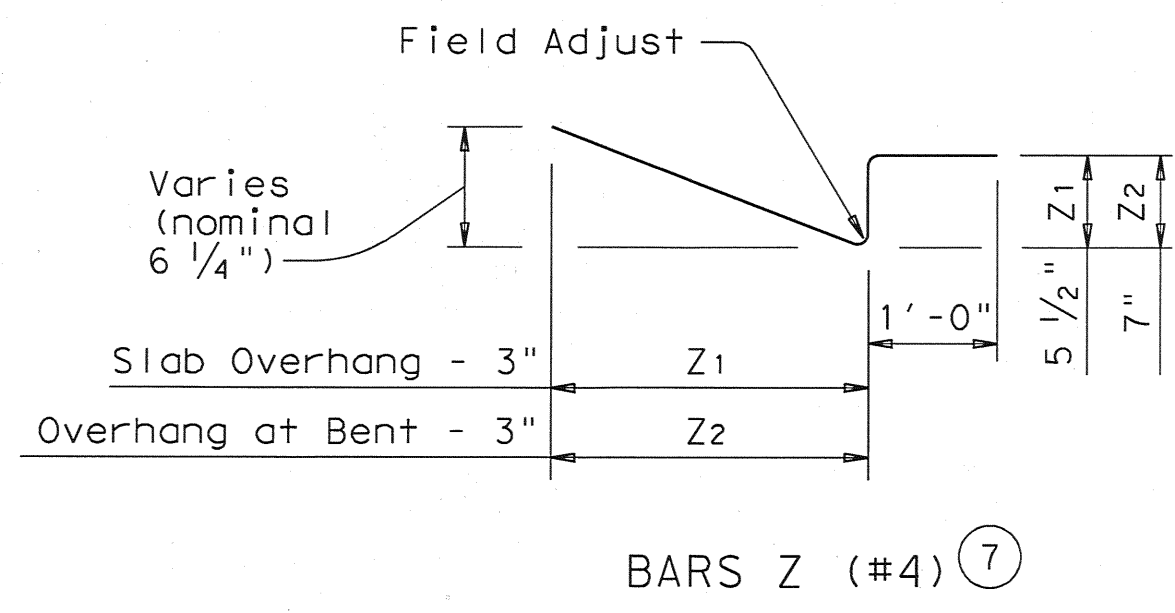
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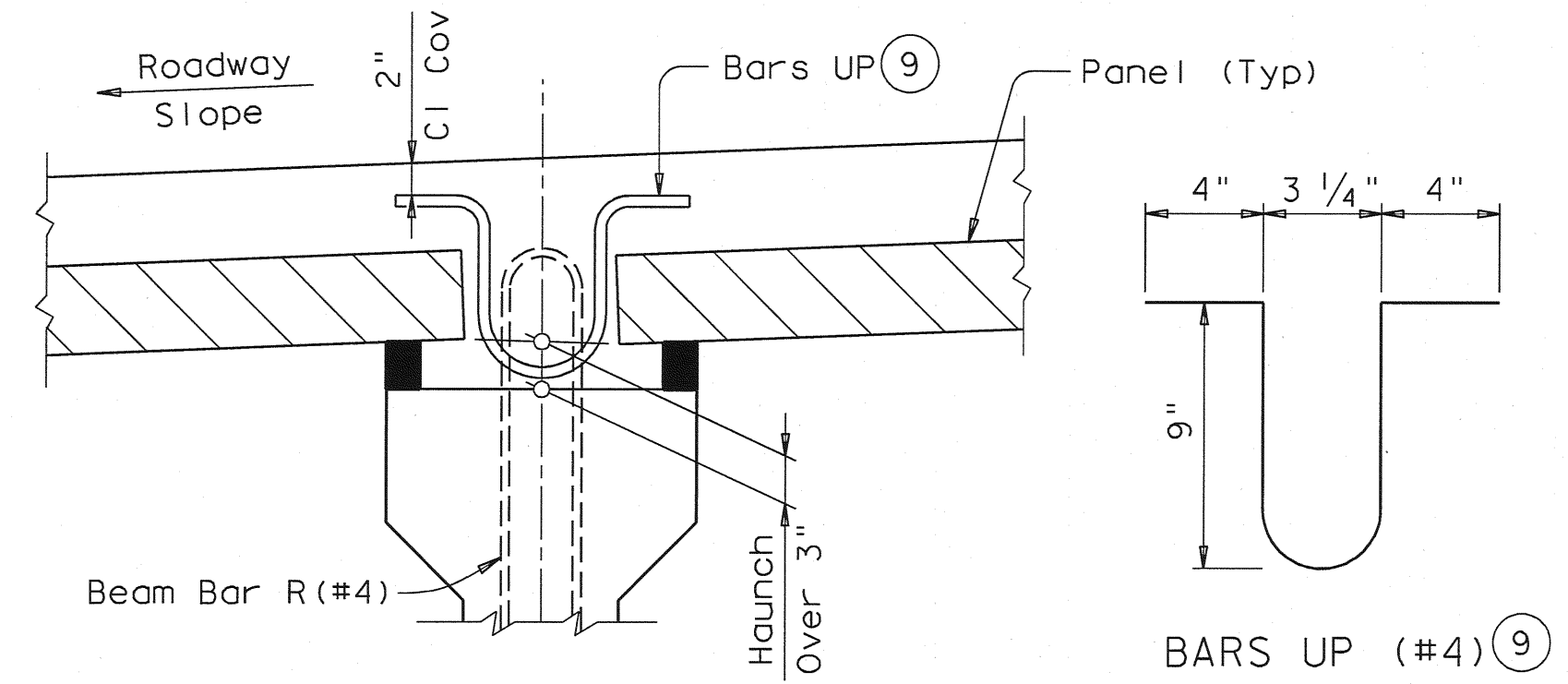
NORMAL GRADING DETAIL ①
 Showing Prestressed Concrete I-Beams.
 (Other Beam Types Similar)

TABLE OF BEDDING STRIP DIMENSIONS

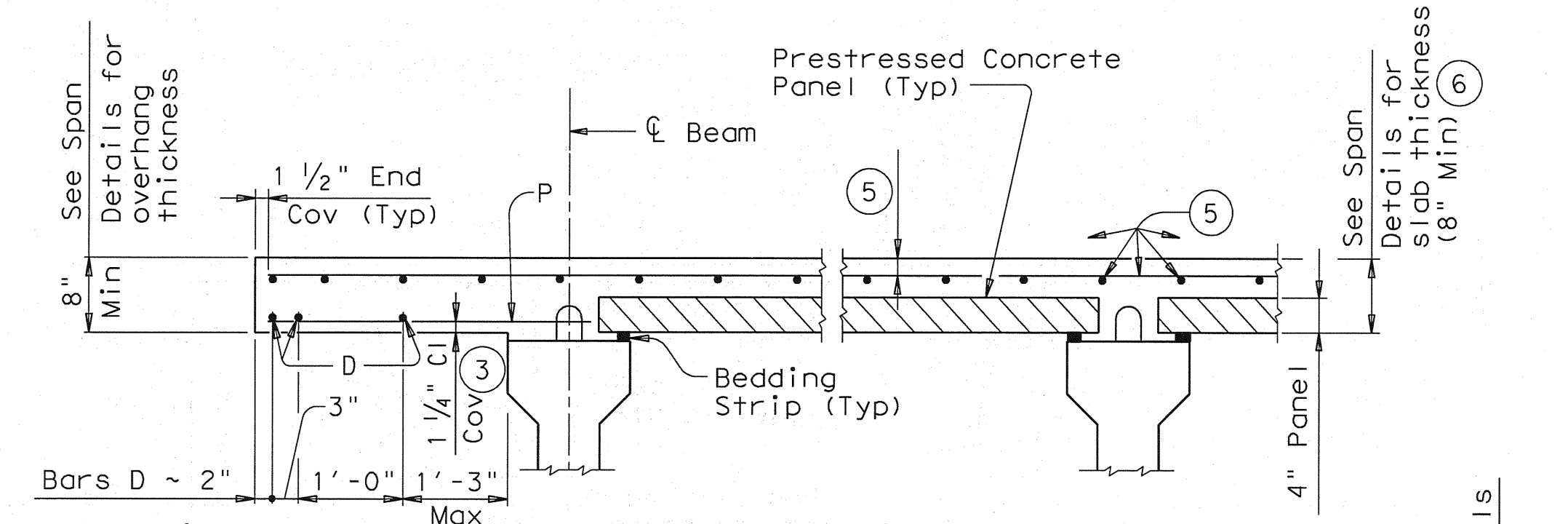
WIDTH	HEIGHT ②	
	Min	Max
1" (Min)	1/2"	2"
1 1/4"	1/2"	2 1/2"
1 1/2"	1/2"	3"
1 3/4"	1/2"	3 1/2"
2" (Max)	1/2"	4"



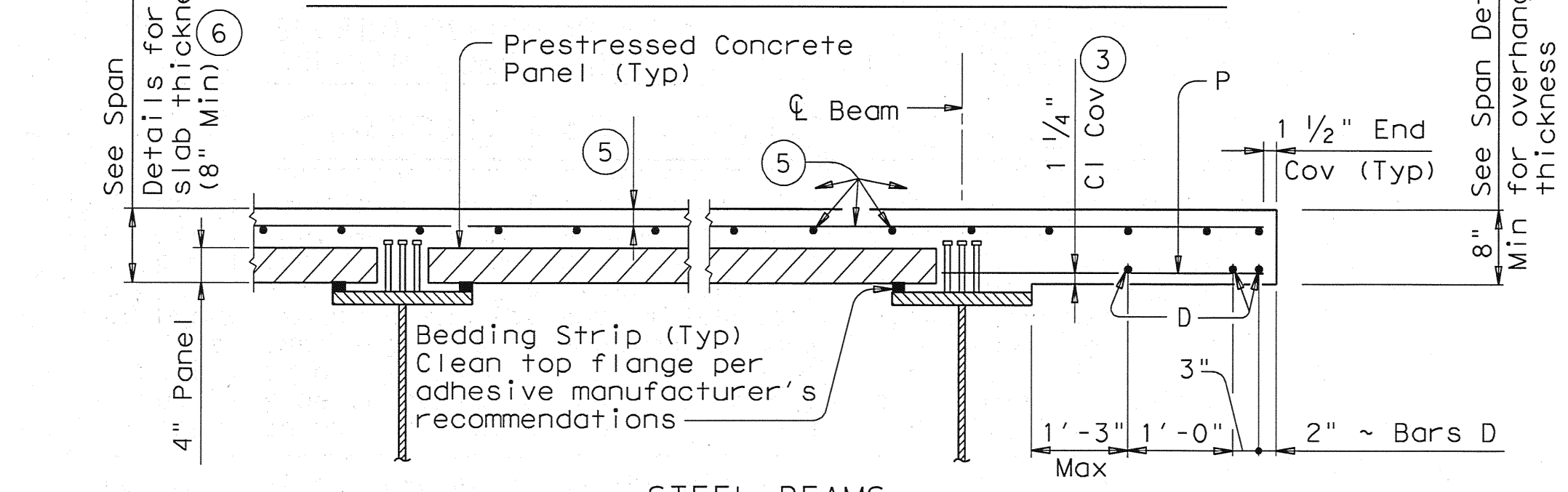
SPECIAL GRADING DETAILS FOR CONCRETE BEAMS ④
 Showing Prestressed Concrete I-Beams.
 (U-Beams and I-Girders Similar)



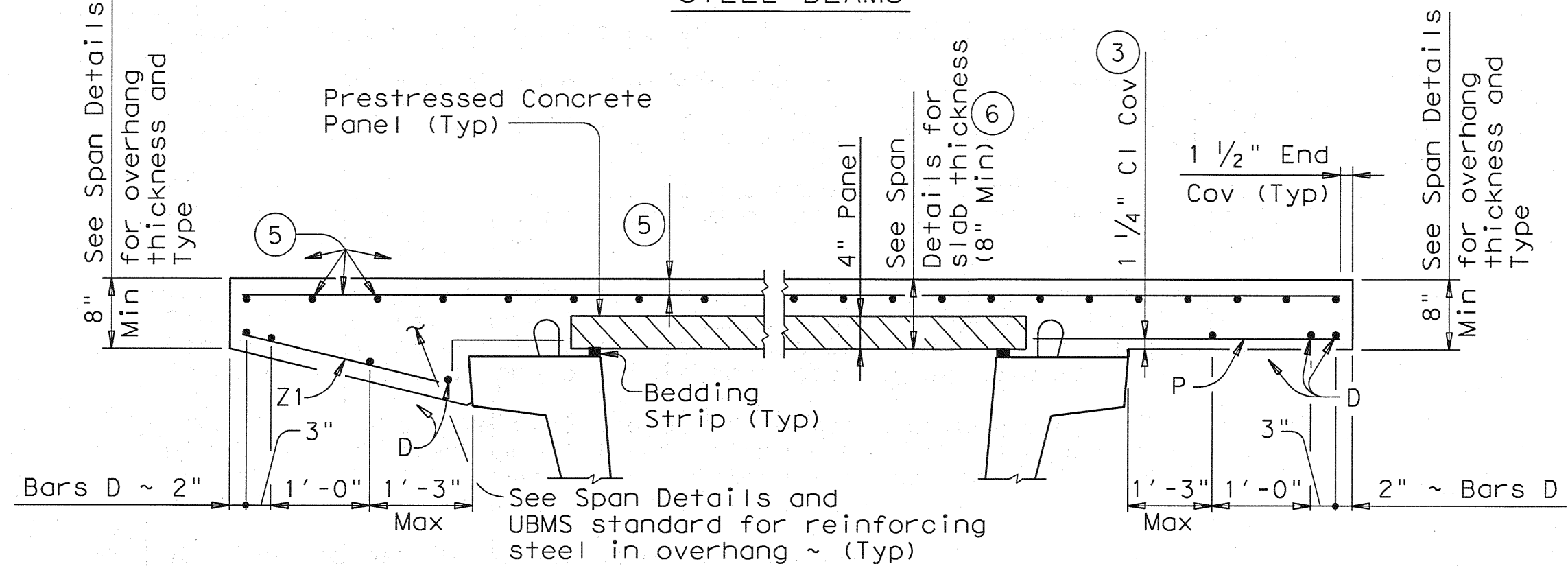
HAUNCH REINFORCING DETAIL
 Showing Prestressed Concrete I-Beams.
 (U-Beams and I-Girders Similar)



PRESTRESSED CONCRETE I-BEAMS OR I-GIRDERS



STEEL BEAMS



SLOPED OVERHANG WITH PRESTR CONC U-BEAMS **NORMAL OVERHANG WITH PRESTR CONC U-BEAMS**

TYPICAL PART TRANSVERSE SECTIONS

- ① To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in 1/4" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels must be 1/4". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division.
- ② Height must not exceed twice the width.
- ③ Clear cover shall be as indicated unless otherwise shown on Span Details.
- ④ For use where the distance between top of beam and finished grade can not be achieved within tolerances on cast-in-place slab thickness and thickness of bedding strips. Control dimensions shown in Normal Grading Detail still apply.
- ⑤ See Span Details for top slab reinforcement and clear cover. Longitudinal top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- ⑥ The actual thickness constructed may exceed the slab thickness shown on the Span Details but, the extra thickness shall be no more than 2" for Prestressed Concrete I-Beams and 1" for Prestressed Concrete U-Beams and Steel Beams. Bearing Seat Elevations or finished grade may be adjusted.
- ⑦ Bars Z1(#4) shall be field adjusted to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inv-T stems only.
- ⑧ Max Spacing as listed unless otherwise shown.
- ⑨ Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3".

CONSTRUCTION NOTES:

Erected panels must bear uniformly on bedding strips of extruded polystyrene placed along top flange edges.

If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be considered subsidiary to deck construction.

Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete mortar under the edges of the panels. Bedding strips must be placed at beam flange edges so that adequate space is provided for the mortar to flow a minimum of 1 1/2" under the panels as the slab concrete is placed.

To allow the proper amount of mortar to flow between beam and panel, the minimum vertical opening must be at least 1/2". Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required.

All reinforcing steel in the cast-in-place slab must be Grade 60. See Table of Reinforcing Steel for size and spacing of reinforcement. Orientation of reinforcement (normal or skewed) must match that shown on the Span Details.

If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the A, D, E, P, & Z bars must be epoxy coated.

For clear span between U-beams less than or equal to 18", see Permissible Slab Forming Detail on Miscellaneous Slab Detail sheets, UBMS.

Bar Laps, where required, must be as follows:

- Uncoated ~ #4 = 1'-5"
- ~ #5 = 1'-9"
- Epoxy Coated ~ #4 = 2'-1"
- ~ #5 = 2'-7"

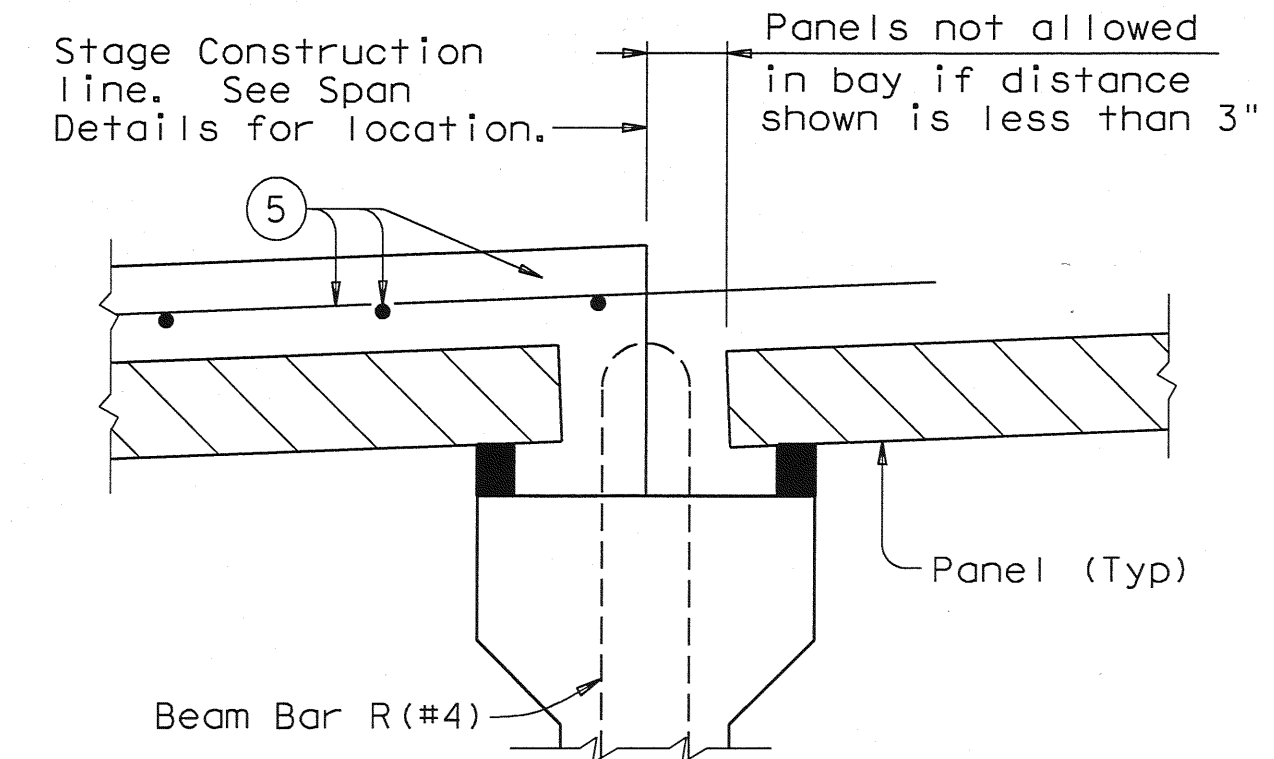
GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

These details are to be used in conjunction with the Span Details and applicable Standard sheets.

Any additional reinforcement or concrete required on this standard is to be considered subsidiary to the bid item "Reinforced Concrete Slab".



STAGE CONSTRUCTION LIMITATIONS ON PANELS
 Showing Prestressed Concrete I-Beams.
 (Other Beam Types Similar)

TABLE OF REINFORCING STEEL ⑧

BAR	SIZE	Max Spa (in.)
A	#5	~
D	#5	9
E	#5	6
P	#4	18
UP	#4	~
Z	#4	18

HL93 LOADING SHEET 1 OF 4

Texas Department of Transportation
 Bridge Division

PRESTRESSED CONCRETE PANELS
OPTIONAL DECK DETAILS FOR BEAM SPANS

PCP

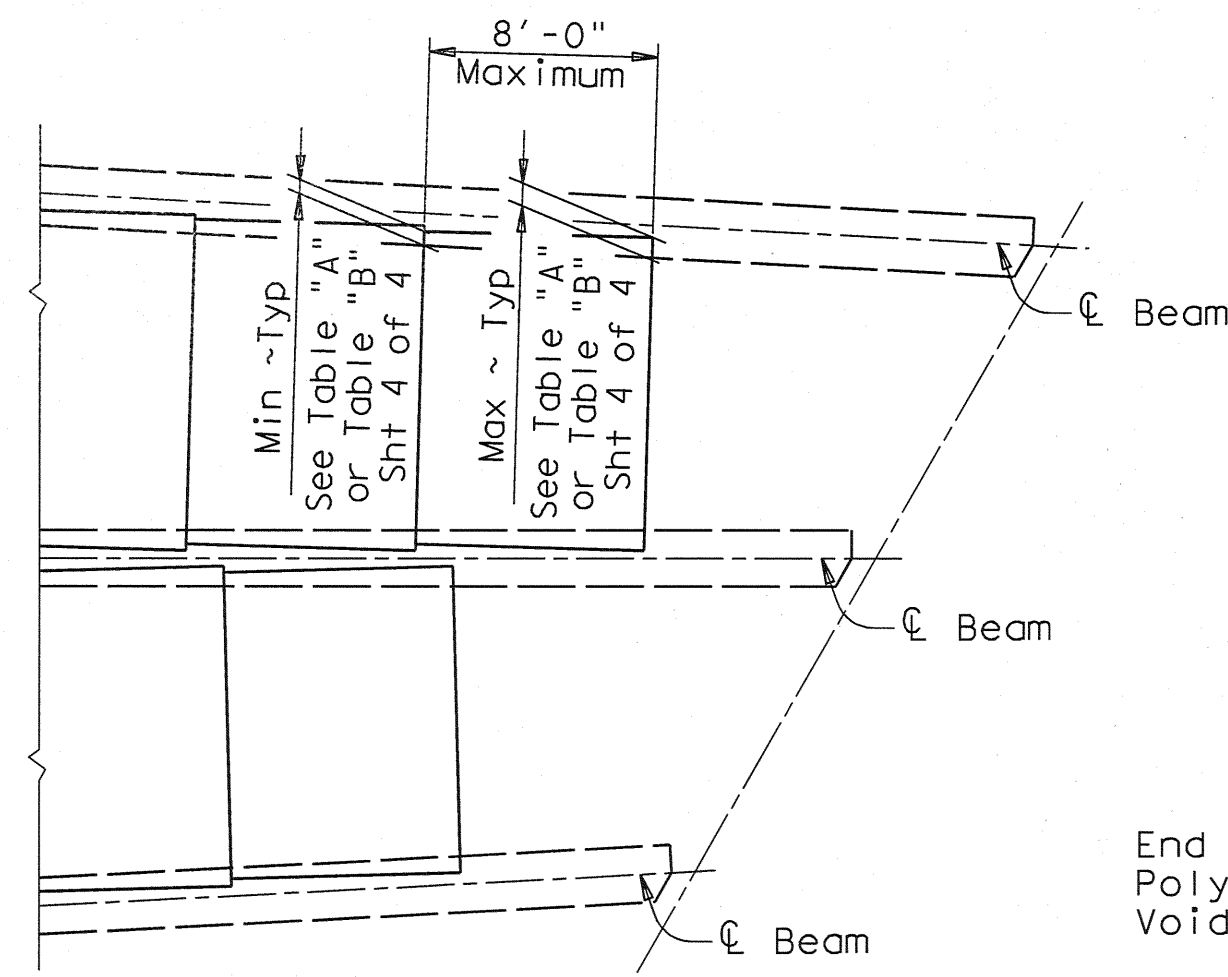
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© TxDOT April 2006	DISTRICT	FEDERAL AID PROJECT	SHEET	
REVISIONS		S4-09		
08-07: Added I-Girders and added note to WWR splice detail.	COUNTY	CONTROL	SECT	JOB HIGHWAY

ACC:

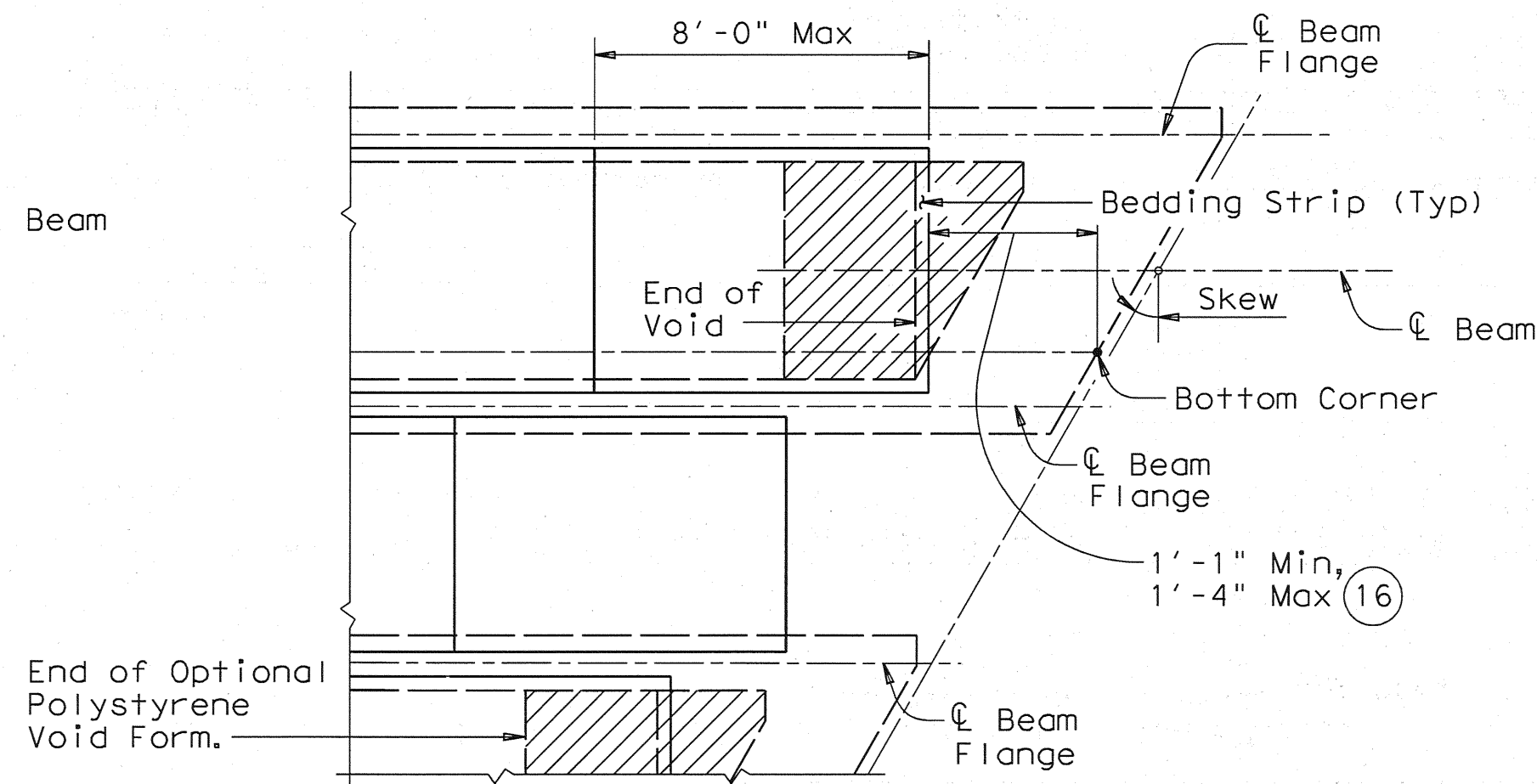
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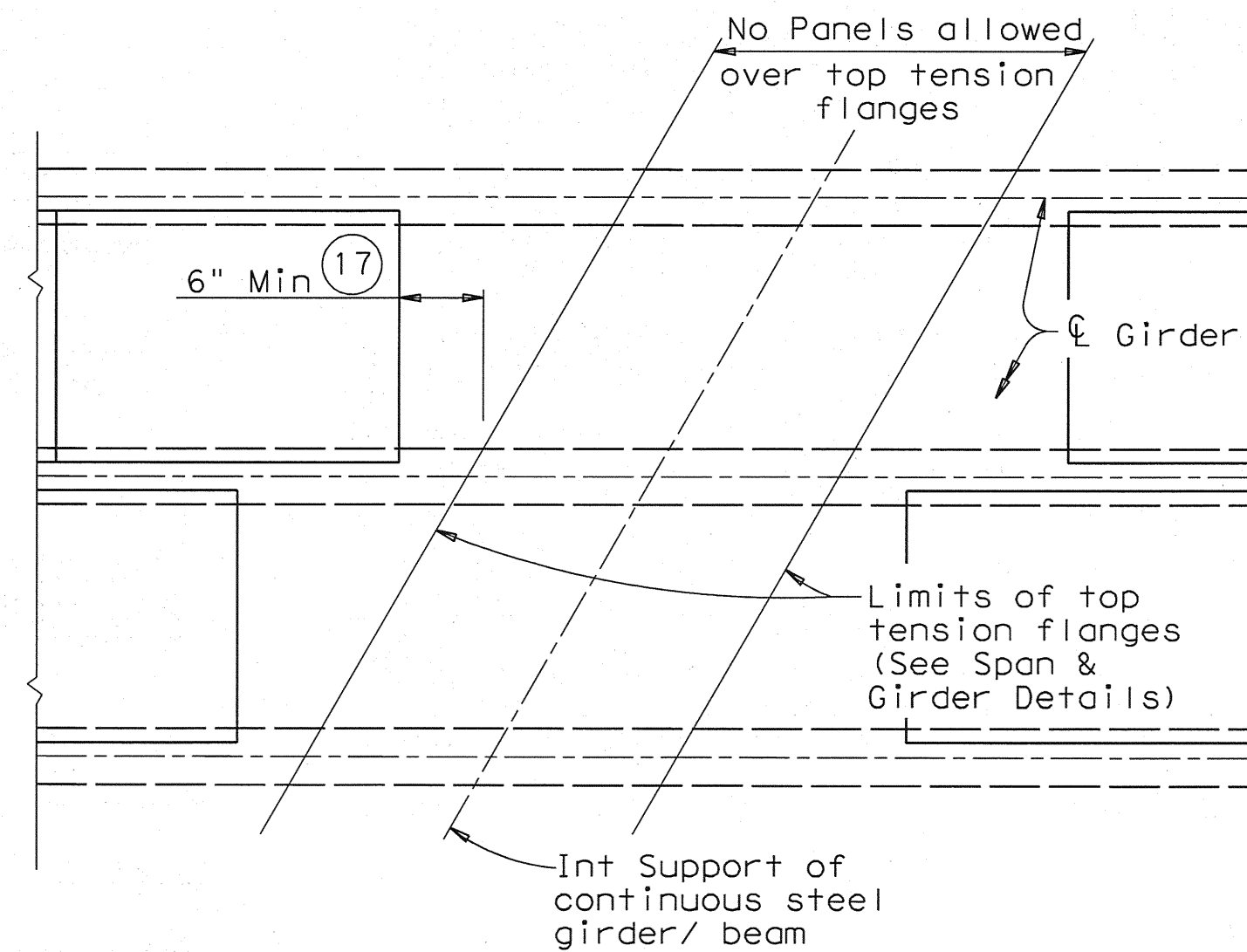
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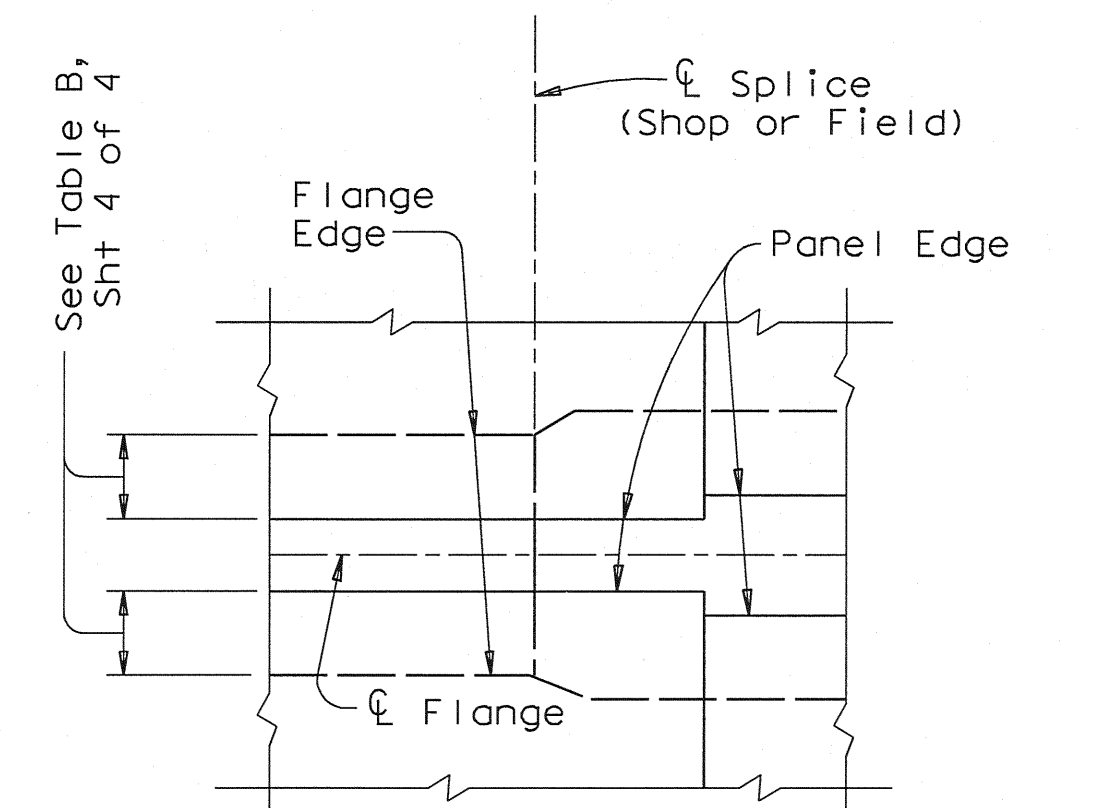
AT ENDS OF FLARED I-BEAMS OR I-GIRDERS
(Showing thickened slab end condition)



AT ENDS OF CONC U-BEAMS

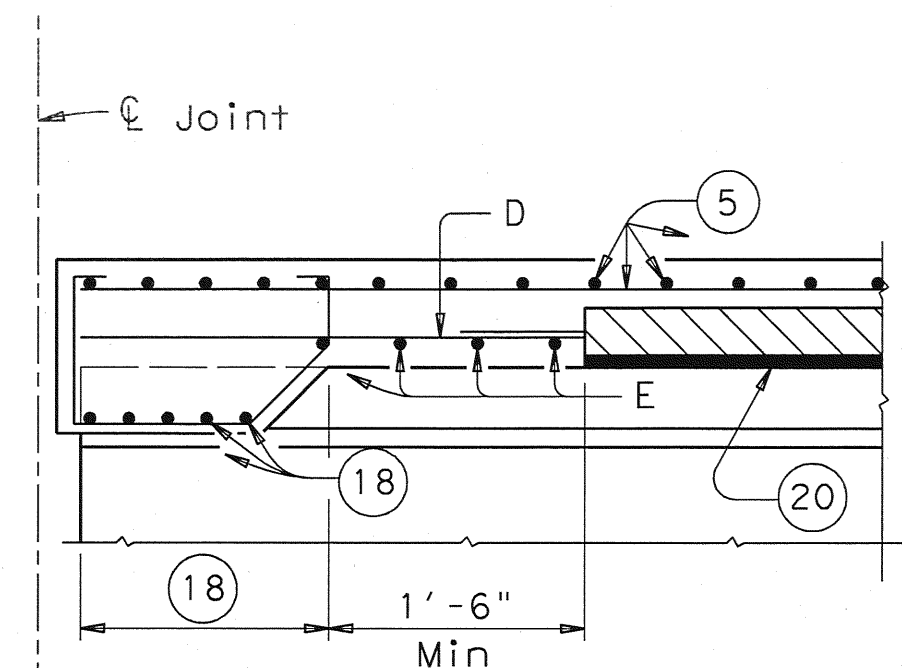


AT INT SUPPORTS OF CONTINUOUS STEEL GIRDERS

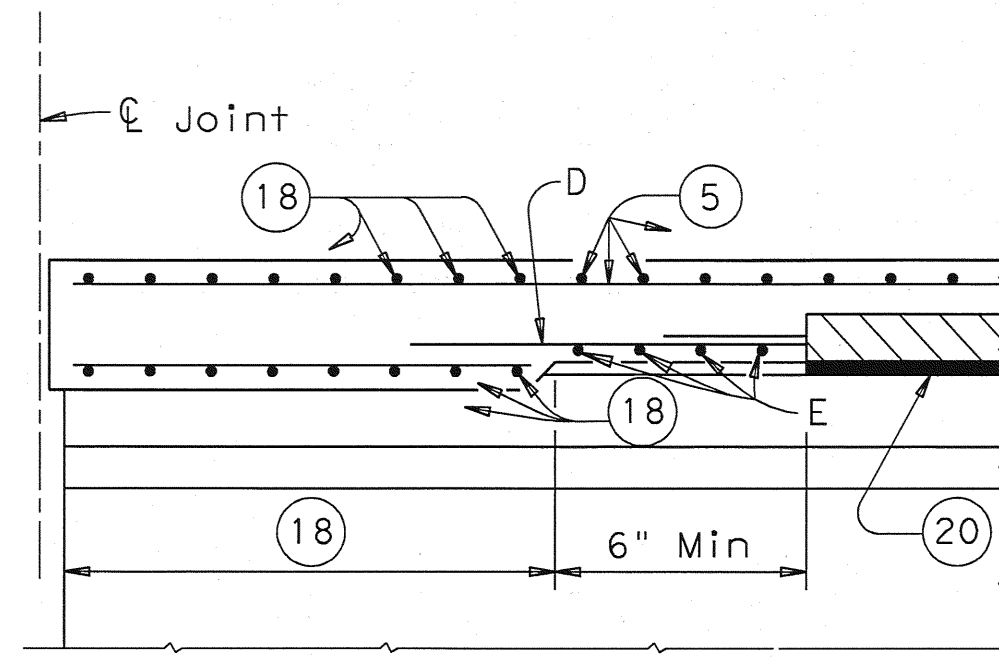


PLAN AT SPLICE
(Showing Steel Bms with flange width transition)

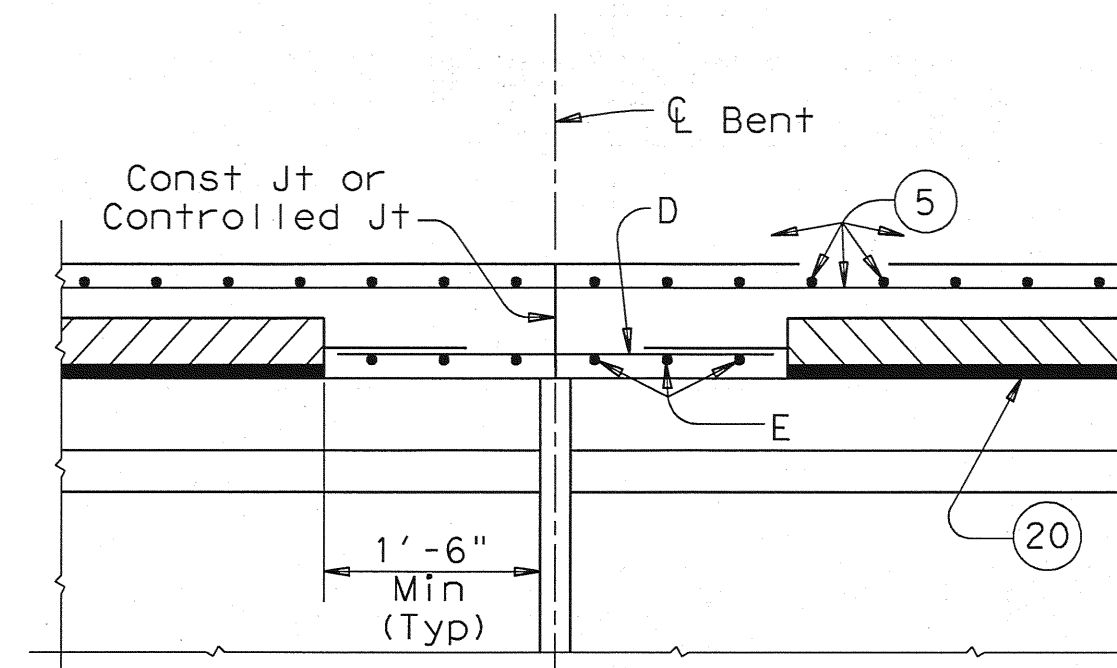
PART PLANS OF PANEL PLACEMENT



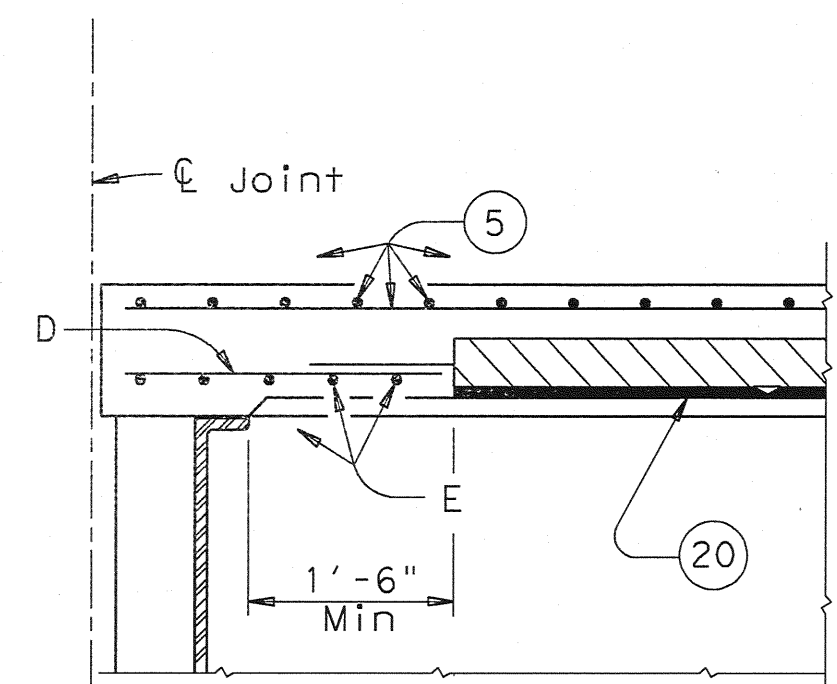
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



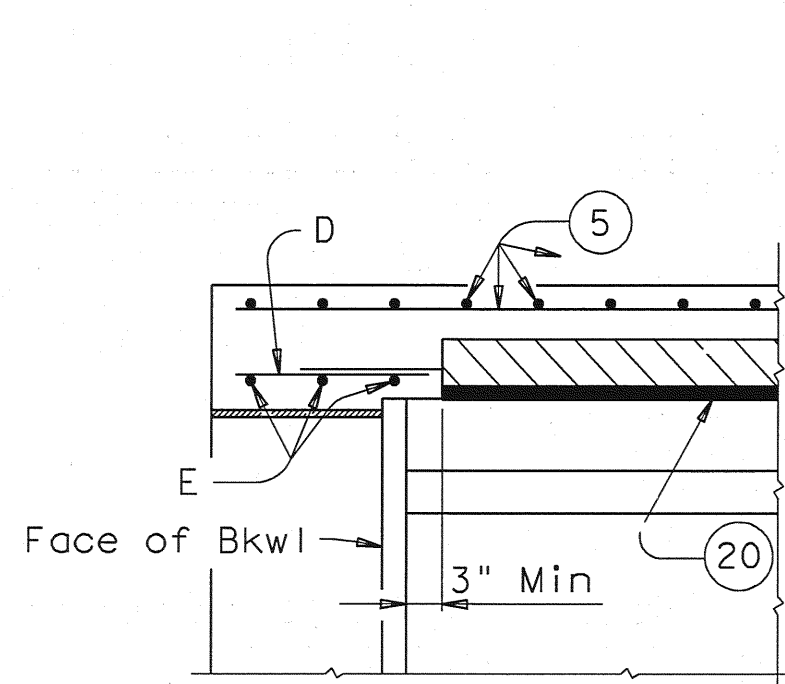
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



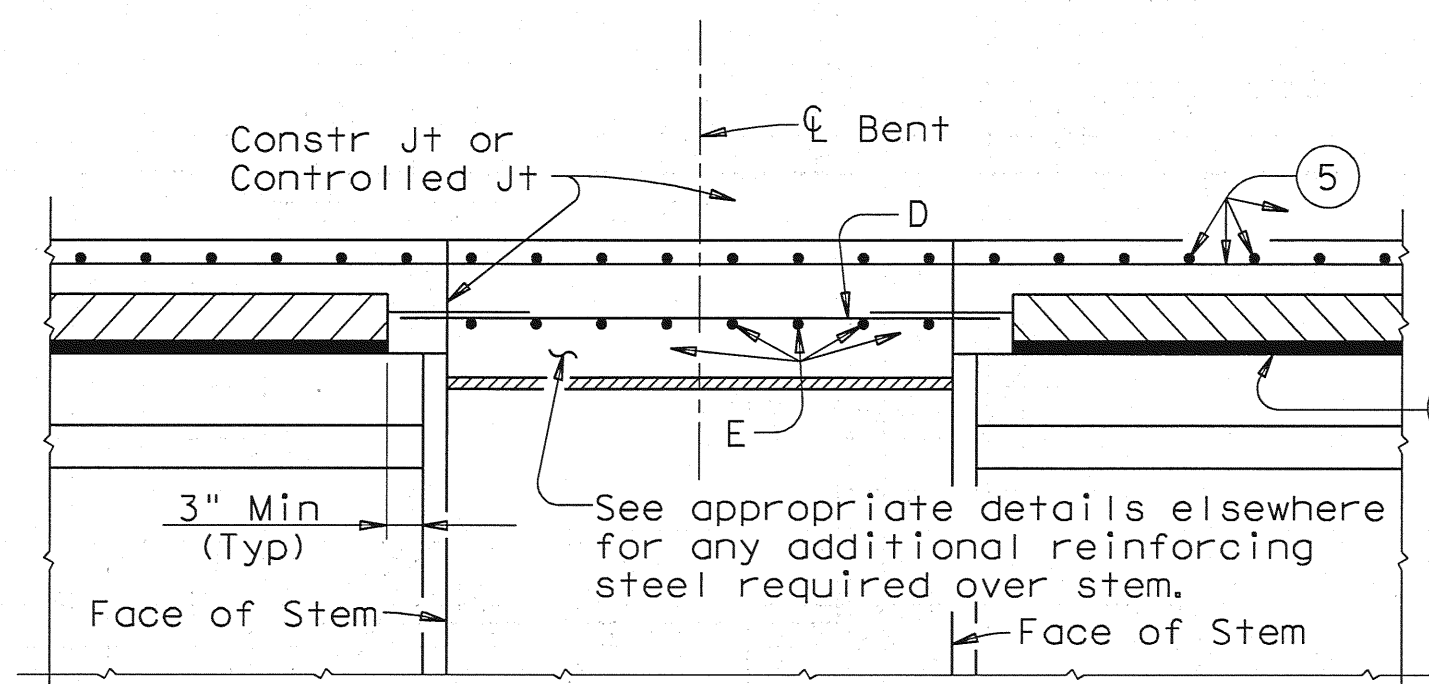
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS

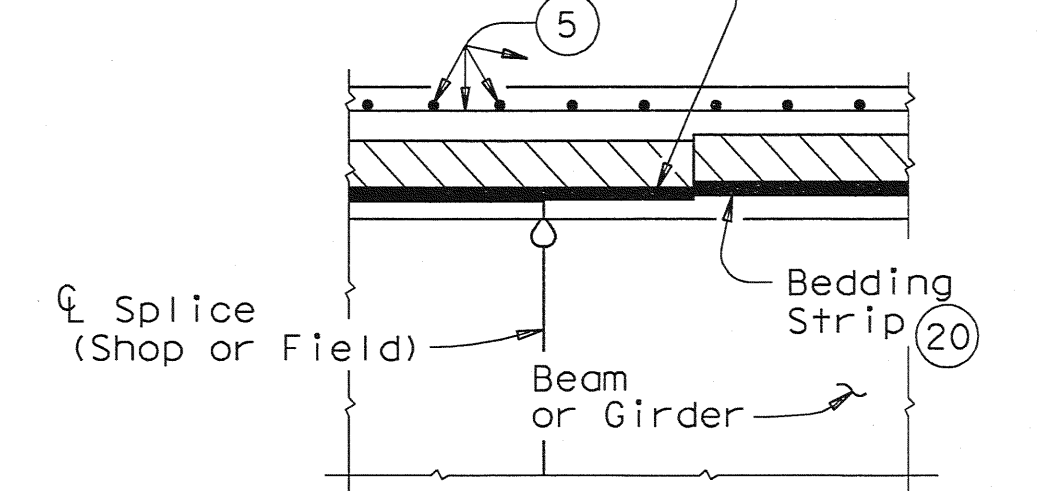


AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

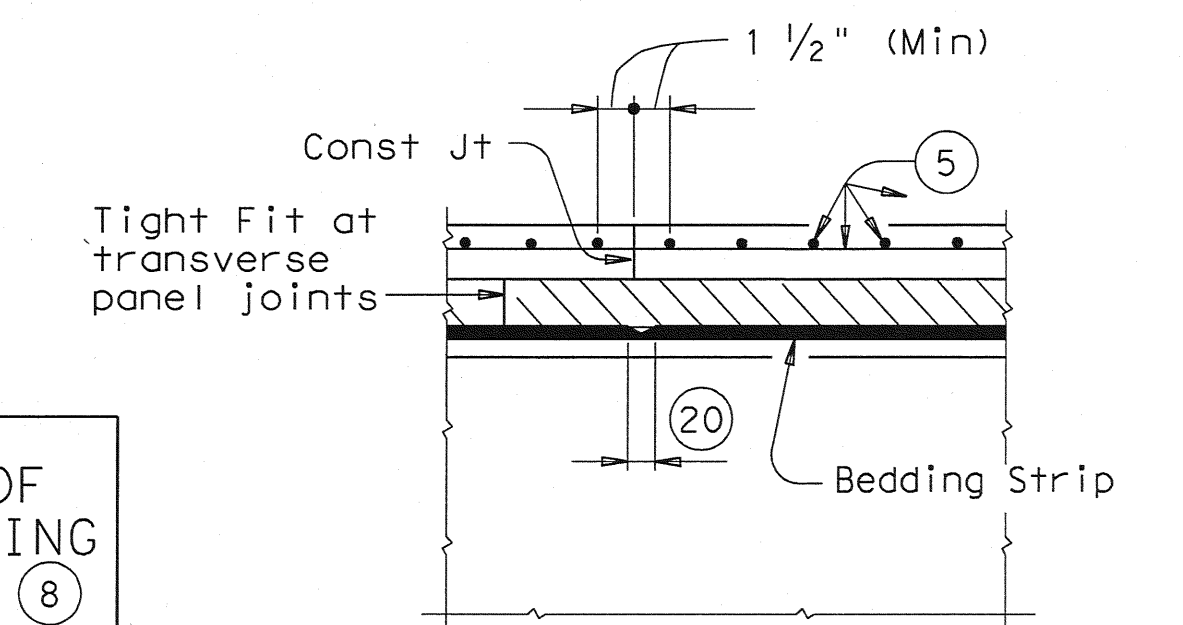
ELEVATIONS AT BEAM ENDS

- 5 See Span Details for top slab reinforcement and clear cover. Longitudinal top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- 8 Max Spacing as listed unless otherwise shown.
- 16 For panel placement at ends of dapped end U-Beams, with Skews under 30°, use 2'-9" ± 1" or with Skews 30° thru 45°, use 3'-3" ± 1".
- 17 Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.
- 18 See appropriate thickened slab end details for reinforcing and limits of thickened slab end.
- 19 When flange thickness differs or flange cover plates are used the Contractor must compensate by using different thickness bedding strips to assure that the tops of Precast Panels are within 1/4" of alignment. See Normal Grading Detail for additional notes.
- 20 Butt adjacent bedding strips together with adhesive. Cut v-notches, approx 1/4" deep, in the top of the bedding strips at 8' o.c..

Contractor to field cut bedding strip to adjust for difference in flange thickness.

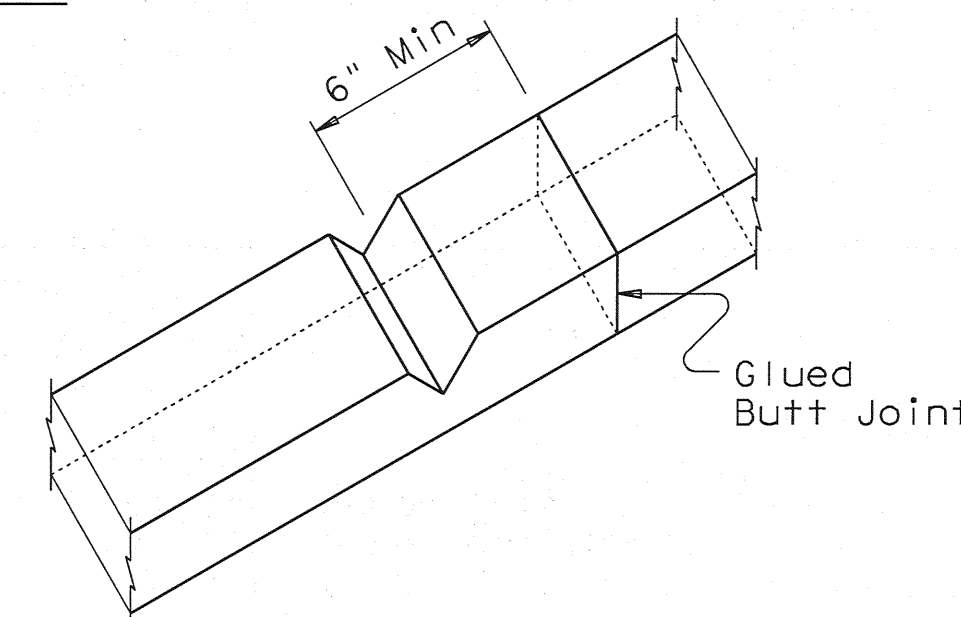


ELEVATION AT SPLICE
(Showing Steel Bms with different flange thickness)



TRANSVERSE PANEL JOINTS AND SLAB CONST JOINTS

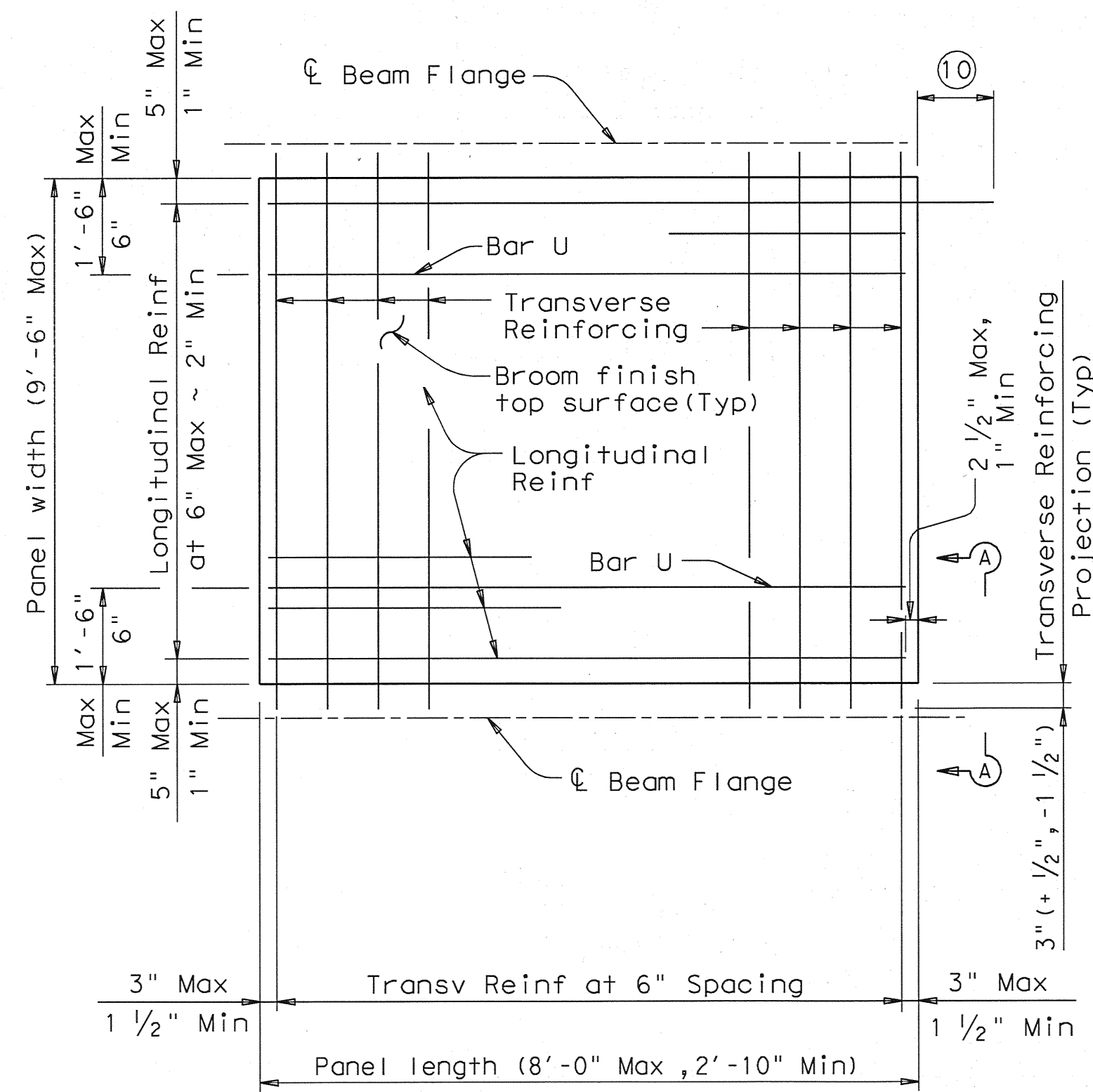
TABLE OF REINFORCING STEEL 8		
BAR	SIZE	Max Spa (in.)
A	#5	~
D	#5	9
E	#5	6
P	#4	18
UP	#4	~
Z	#4	18



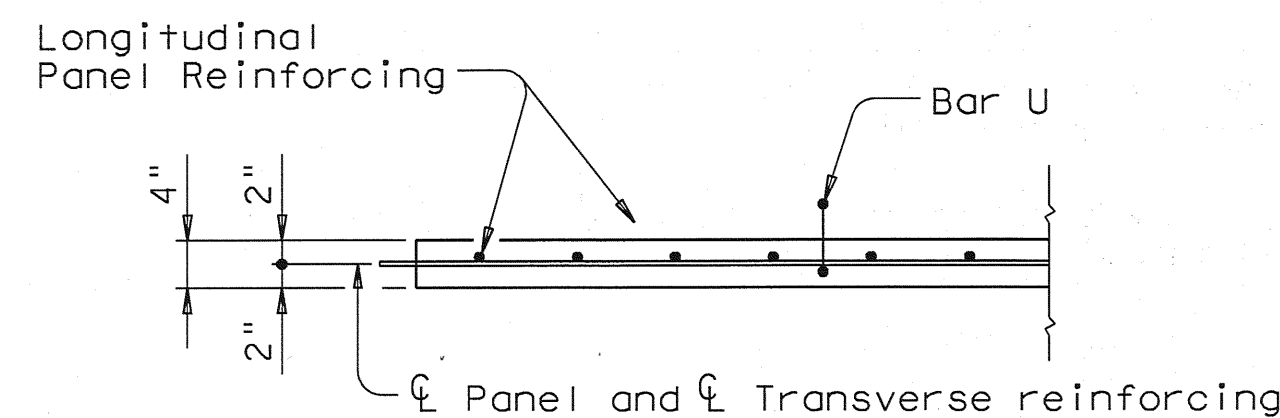
EXAMPLE OF BEDDING STRIPS BUTTED TOGETHER WITH V-NOTCH

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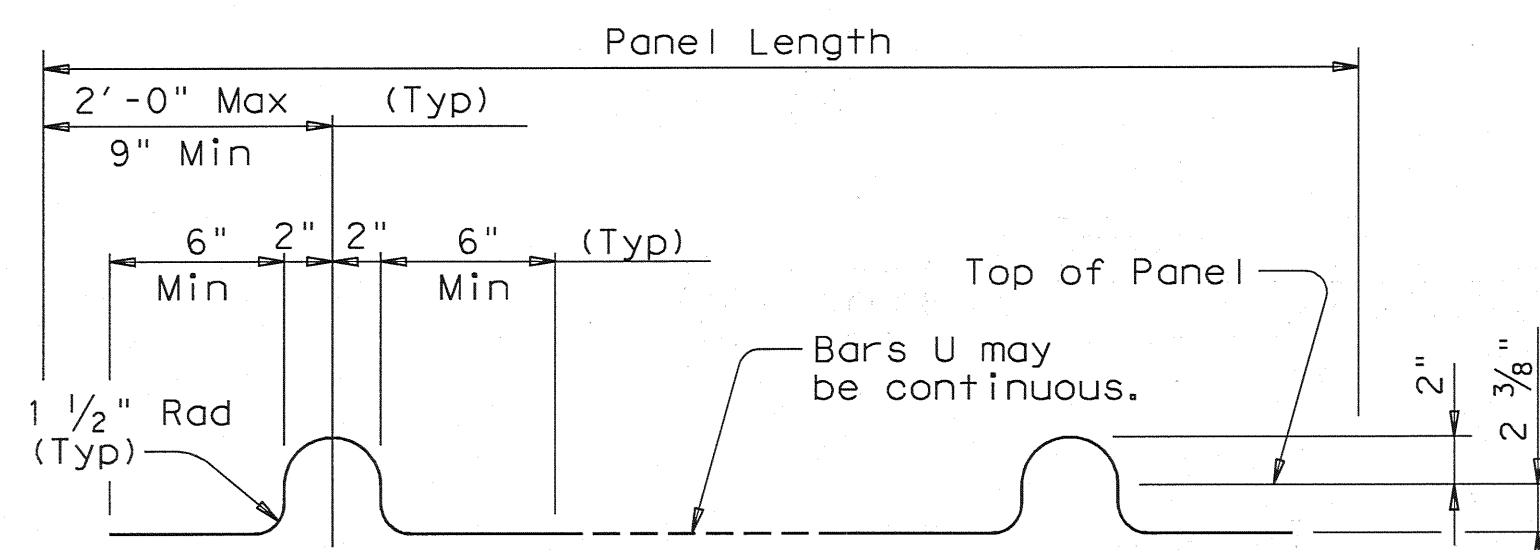
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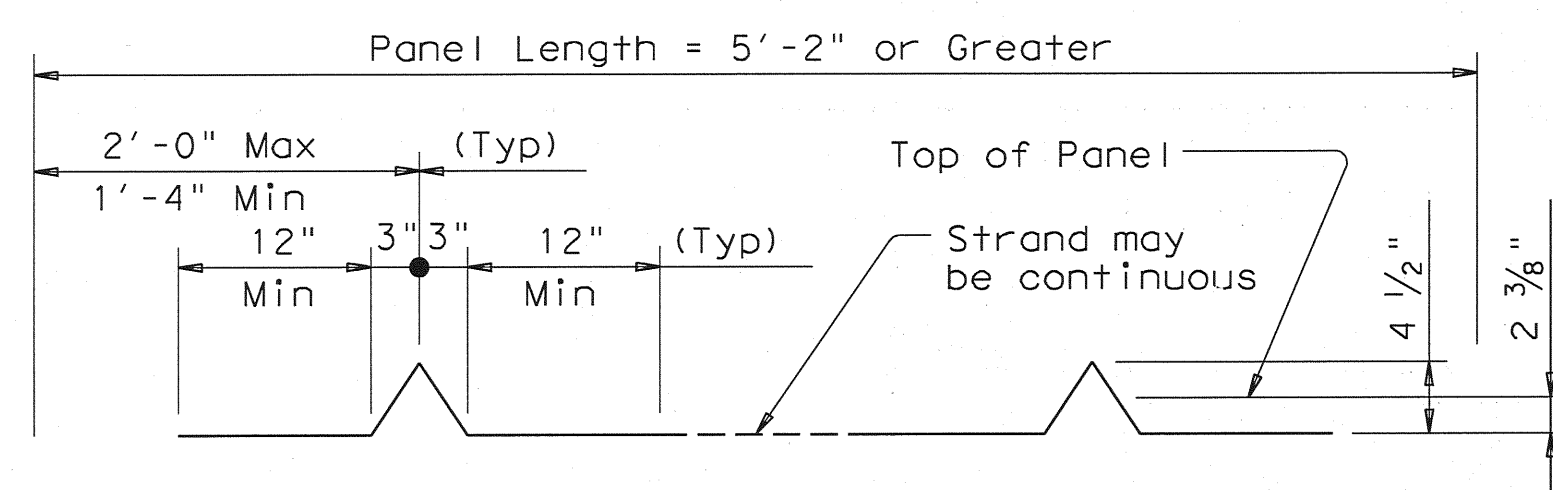
TYPICAL PANEL PLAN



SECTION A-A

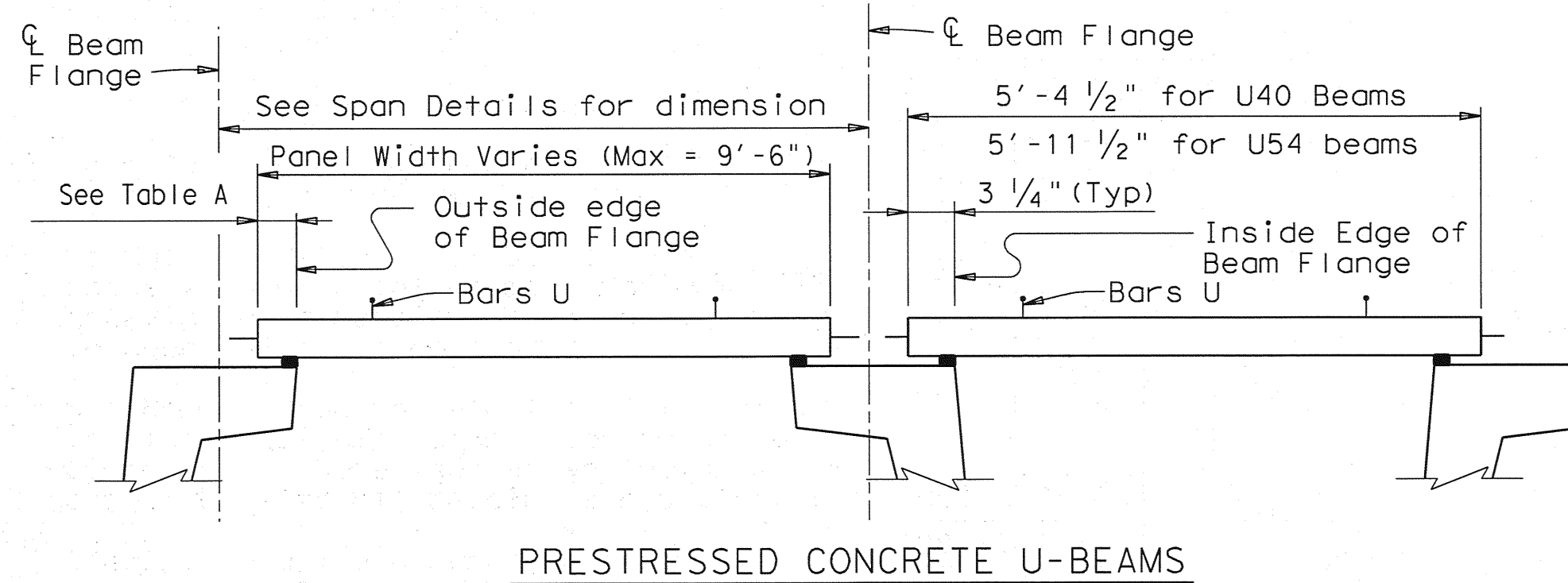
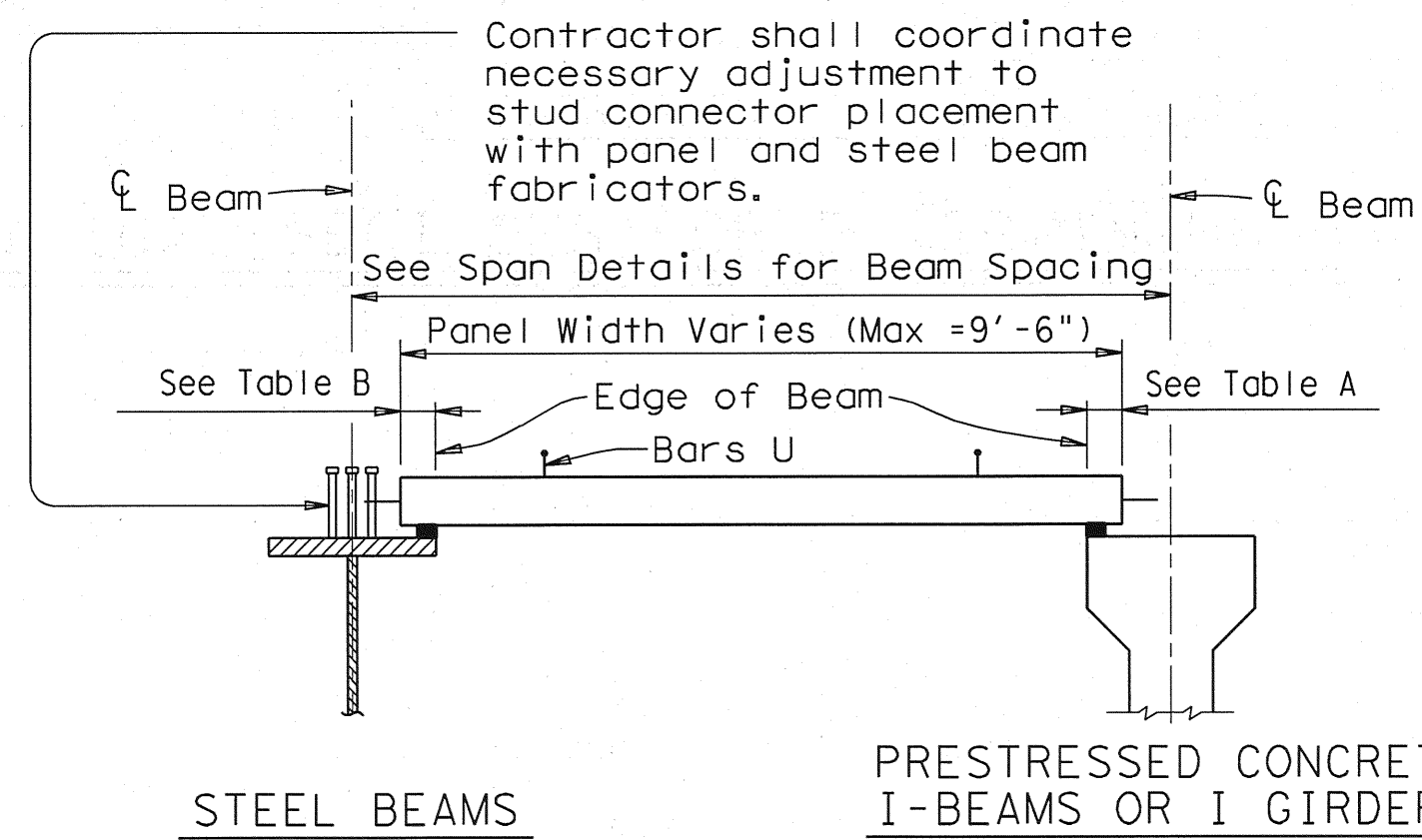


BARS U (#3) (21)



OPTIONAL STRAND FOR BARS U (22)

- (10) At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2", -0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
- (21) Four loops required per panel.
- (22) Four loops required per panel. 3/8" or 1/2" strands may be used.
- (23) Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with flared beams.
- (24) See Normal Grading Detail on Sht 1 of 4 for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
- (25) One Splice allowed per panel.



TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

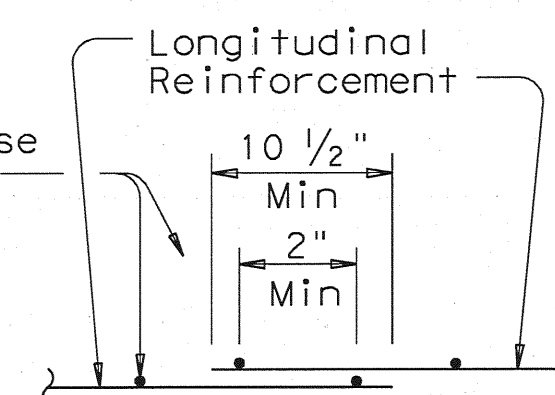
TABLE A (23)(24)

Beam Type	Normal (In.)	Min (In.)	Max (In.)
A	3	2 1/2	3 1/2
B	3	2 1/2	3 1/2
C	4	3	4 1/2
IV	6	4	7 1/2
VI	6 1/2	4 1/2	8 1/2
U40	5 1/2	5 1/2	7
U54	5 1/2	5 1/2	7
Tx28-70	6	4	7 1/2

TABLE B (23)(24)

Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
11" to 12"	2 3/4	2 1/2	2 3/4
Over 12" to 15"	3 1/4	3	3 1/4
Over 15" to 18"	4	3	4 3/4
Over 18"	5	3 1/2	6 1/4

No splice required for wires parallel to strands (transverse panel reinforcement)



WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (25)

FABRICATION NOTES:

All concrete for panels is to be Class H. Use Class H (HPC) concrete for panels if required elsewhere in plans. Release strength f'ci=4000 psi. Minimum 28 day strength f'c=5000 psi.

Remove laitance from top panel surface. A minimum of 90 percent of the top surface area must have the required broom finish.

Shop drawings for the fabrication of panels will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

A panel layout which identifies location of each panel must be developed by the fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

TRANSVERSE PANEL REINFORCEMENT:

For panel widths over 5', use 3/8" or 1/2" Dia (270k) prestressing strands with an initial tension of 16.1 kips per strand.

For panel widths over 3'-6" up to and including 5', use 3/8" or 1/2" Dia (270k) prestressing strands with an initial tension of 16.1 kip per strand. Optionally, #4 Grade 60 reinforcing bars may be used in lieu of prestressed strands.

For panel widths up to 3'-6", use #4 Grade 60 reinforcing bars (prestressed strands are not allowed).

Place transverse panel reinforcement at panel centroid and space at 6" Max.

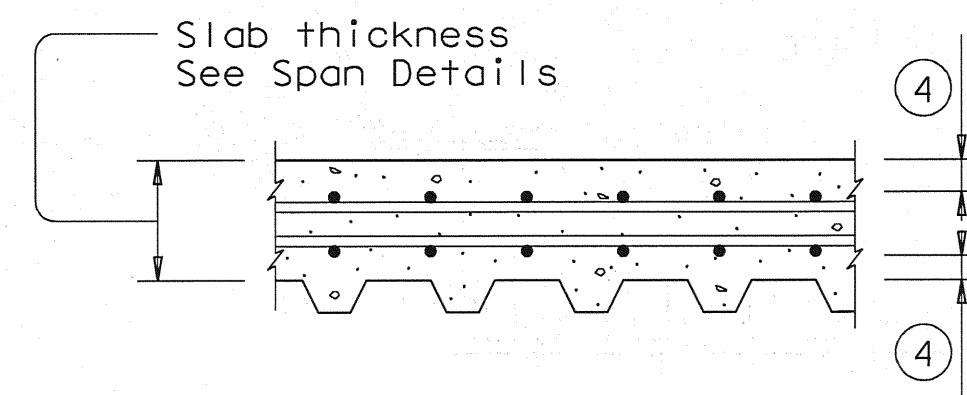
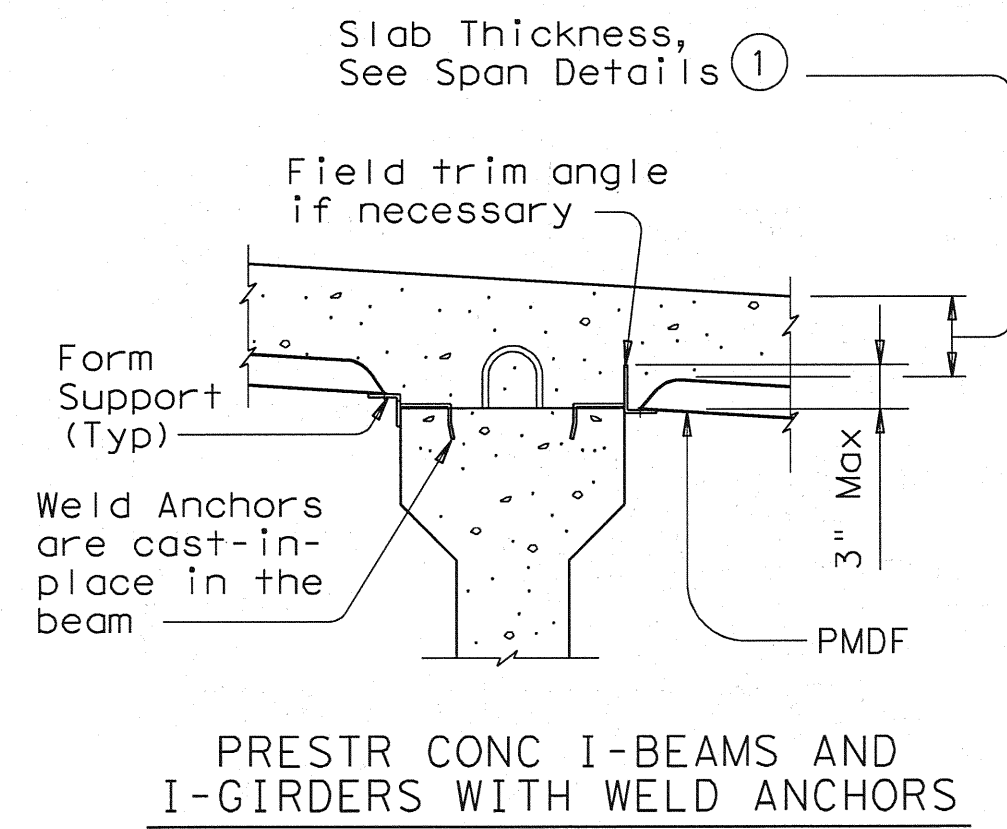
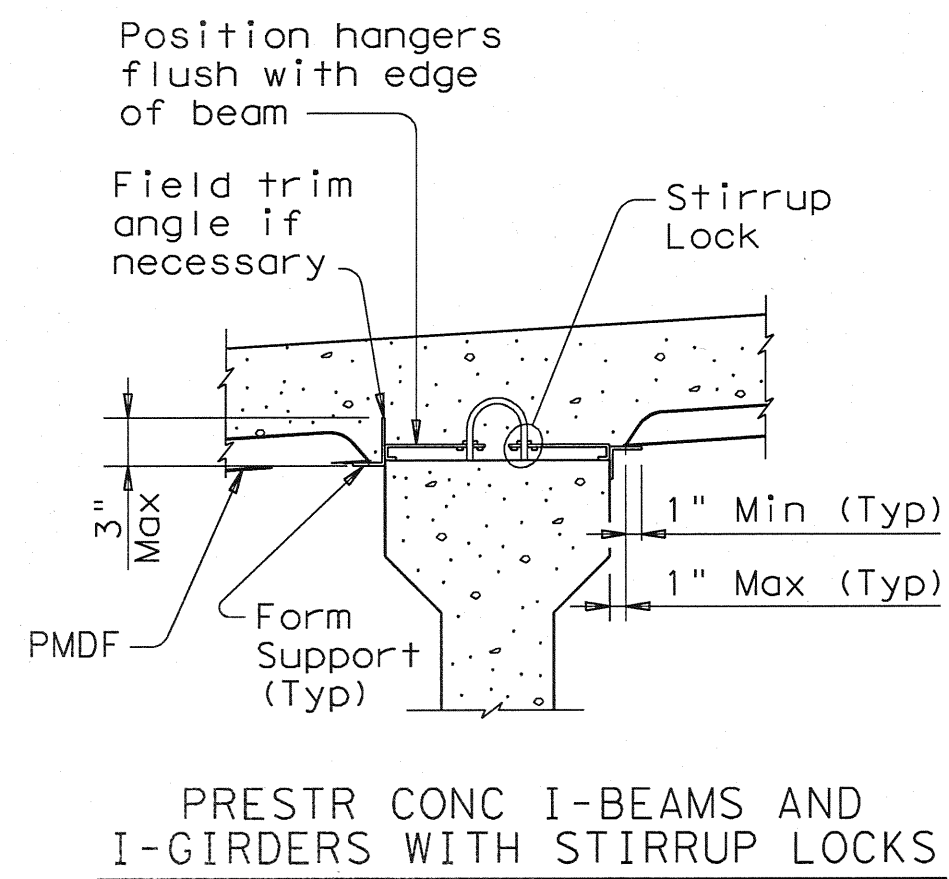
LONGITUDINAL PANEL REINFORCEMENT:

Any of the following options may be used for longitudinal panel reinforcement:

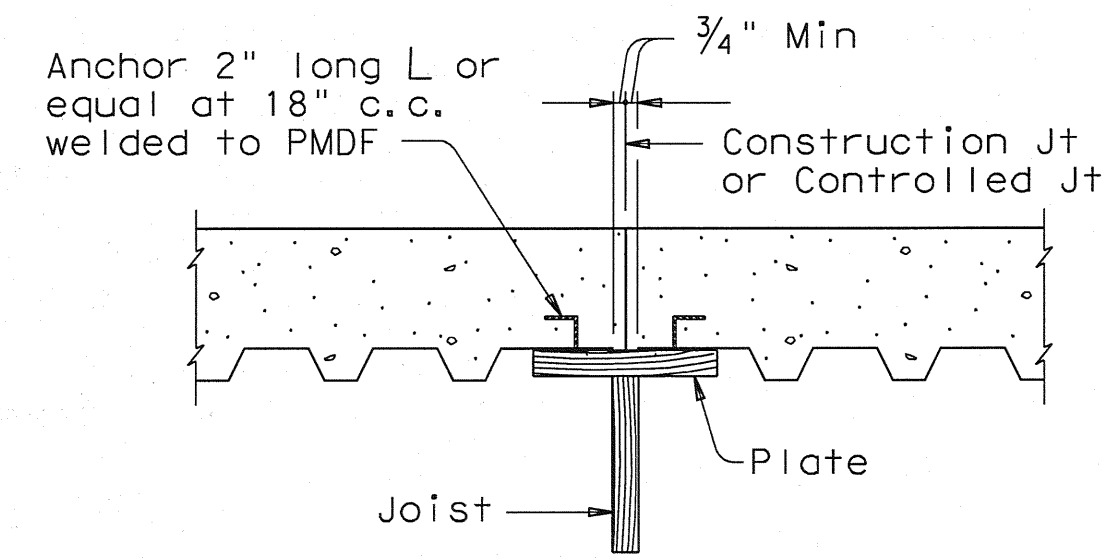
1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.
2. 3/8" Dia prestressing strands at 4 1/2" Max Spacing (unstressed). No splices allowed.
3. 1/2" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.
4. Deformed Welded Wire Reinforcement (WWR) (ASTM A497) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.

No combination of longitudinal reinforcement options in a panel is allowed. Place longitudinal panel reinforcement above transverse panel reinforcement.

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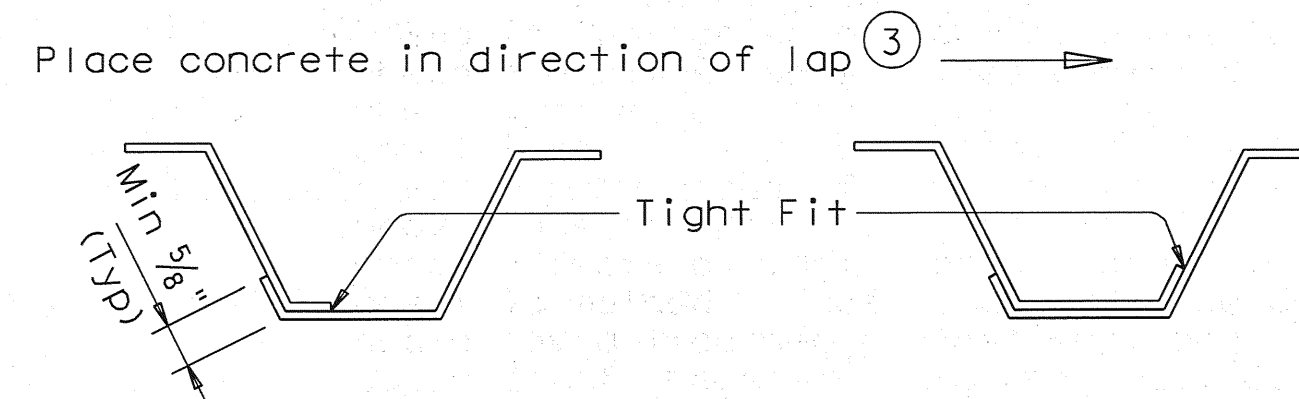
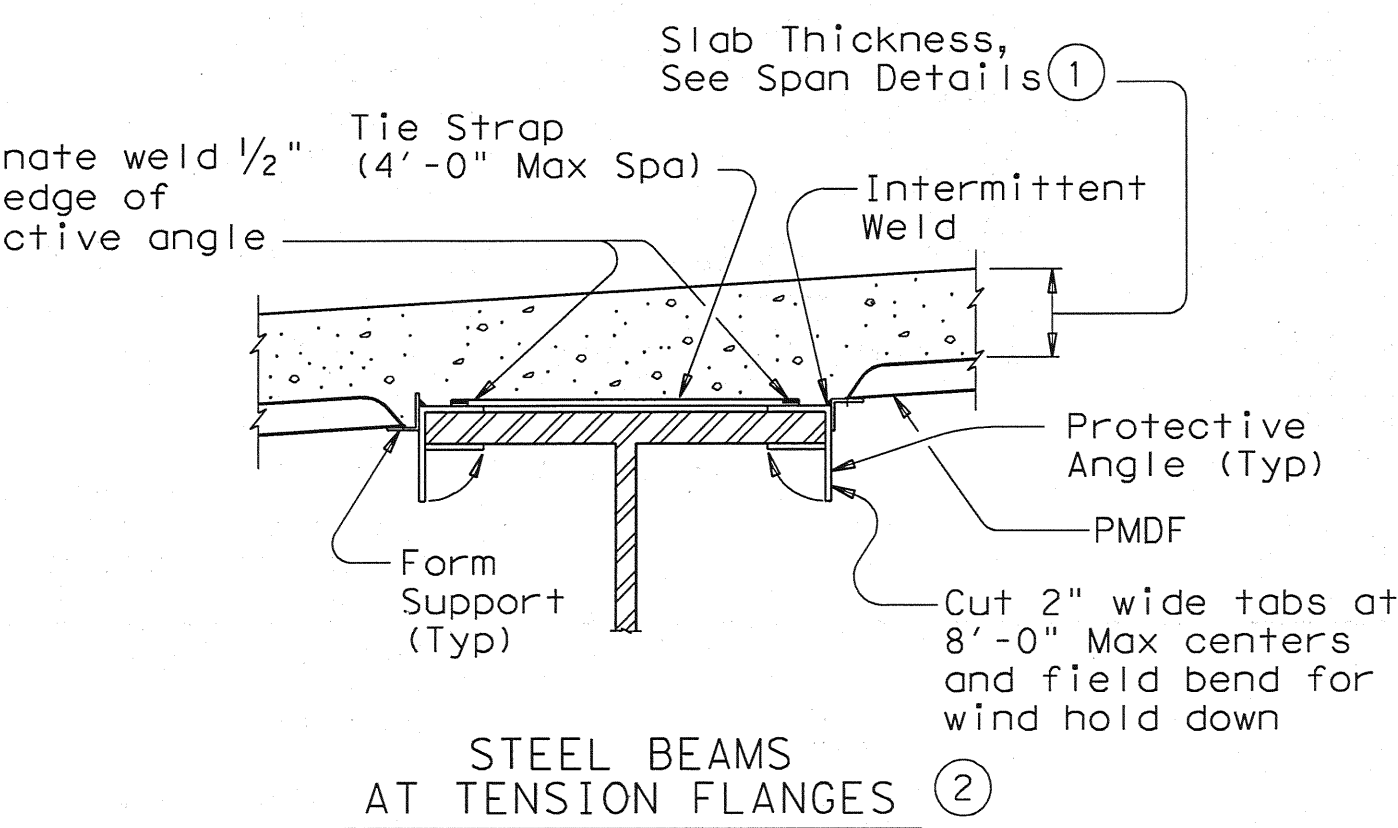
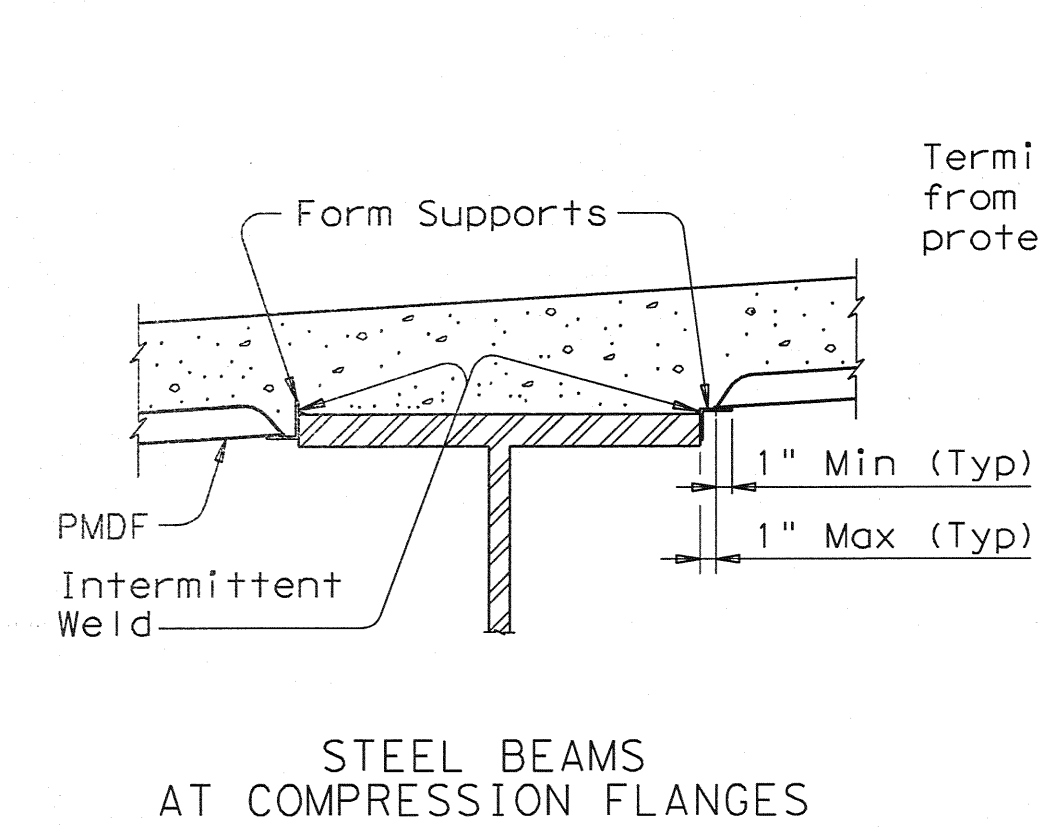
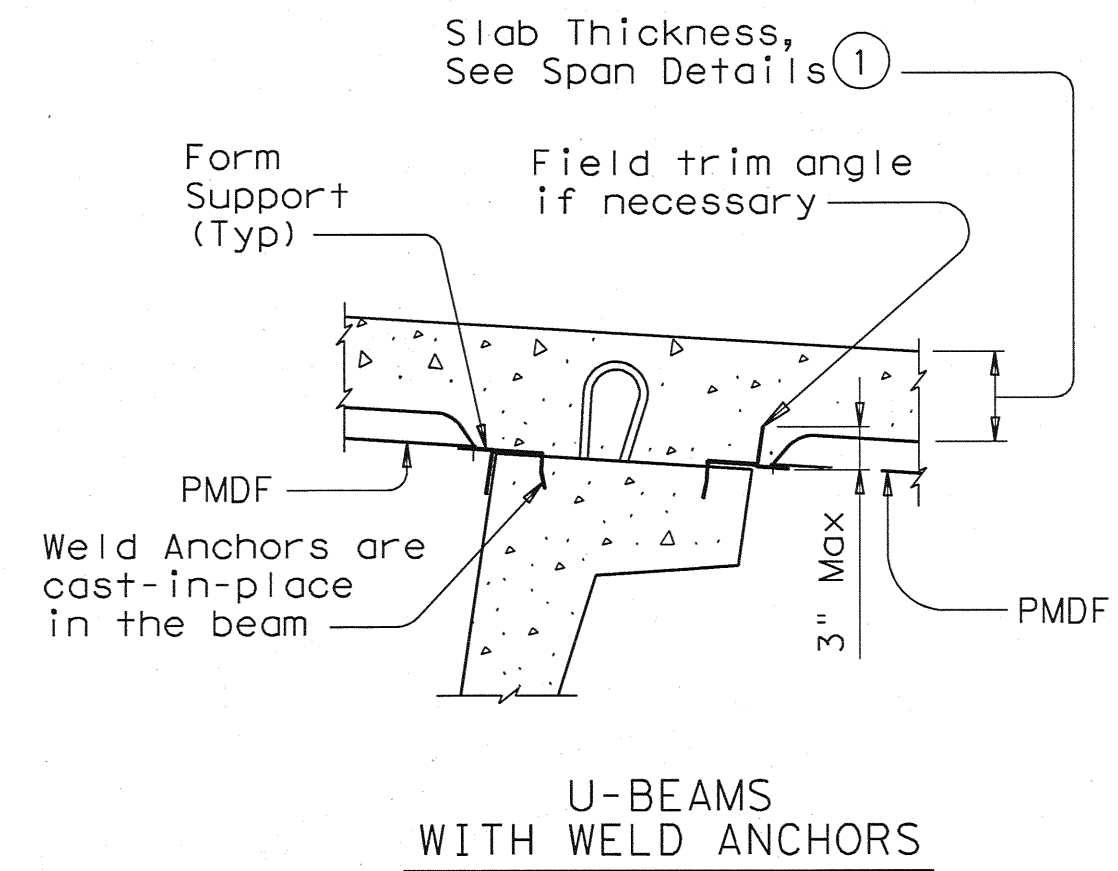
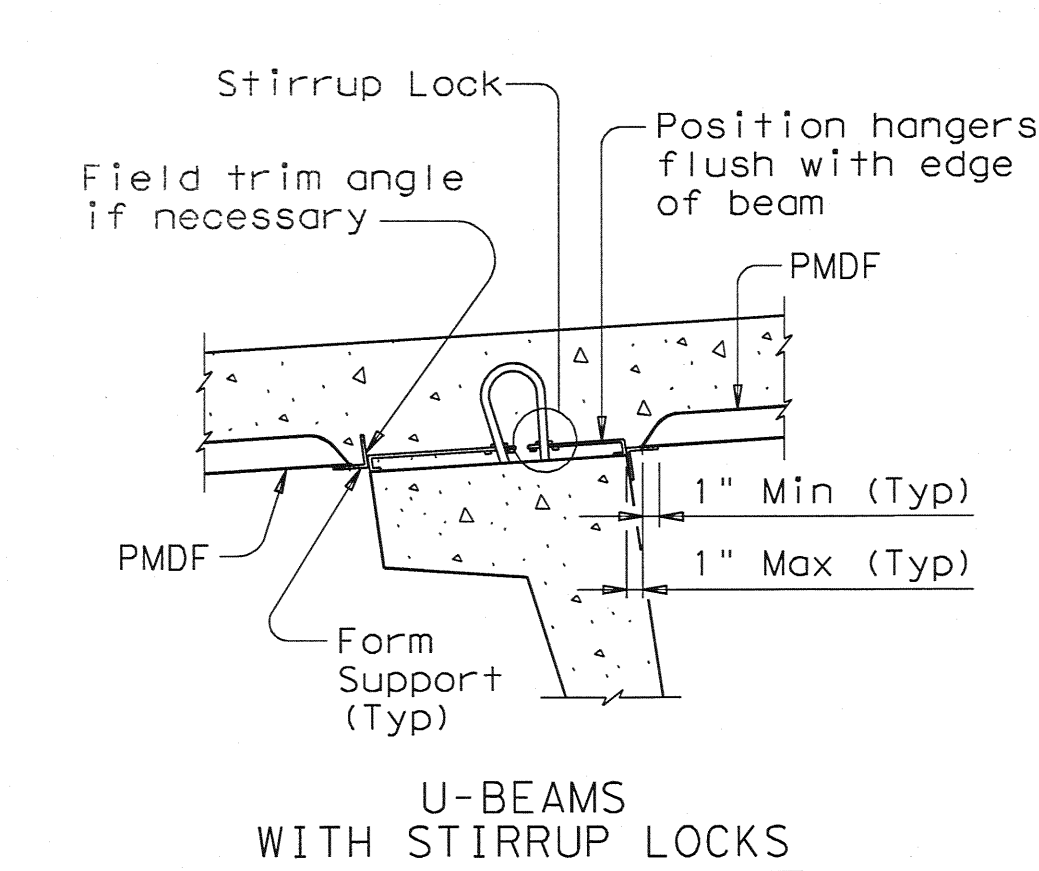
TYP LONGITUDINAL SLAB SECTION



Note: In spans where PMDF forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

SECTION THRU CONSTRUCTION JOINT

FOR PRESTR CONC U-BEAM BRIDGES: Size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5.



SIDE LAP DETAILS

- ① Slab thickness minus $\frac{5}{8}$ " if corrugations match reinforcing bars.
- ② Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.
- ③ The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.
- ④ See Span details for cover requirements.

GENERAL NOTES:

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, Structural Steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage. Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans. The details and notes shown on this standard are to be used as a guide in preparation of the forming plans. All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Reinforced Concrete Slab".

DESIGN NOTES:

As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi. Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

The form design span must not be less than the clear distance between beam flanges, measured parallel to the form flutes, minus 2".

CONSTRUCTION NOTES:

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.

All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.

Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.

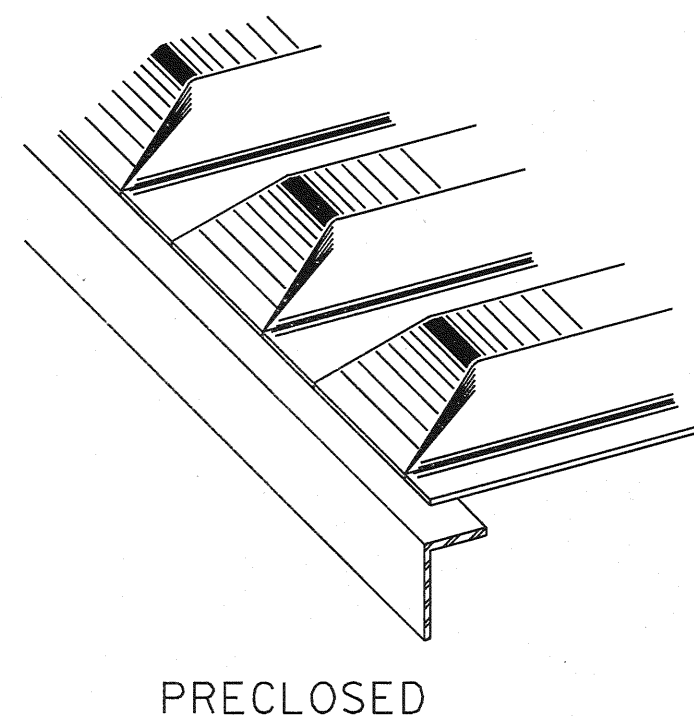
All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.

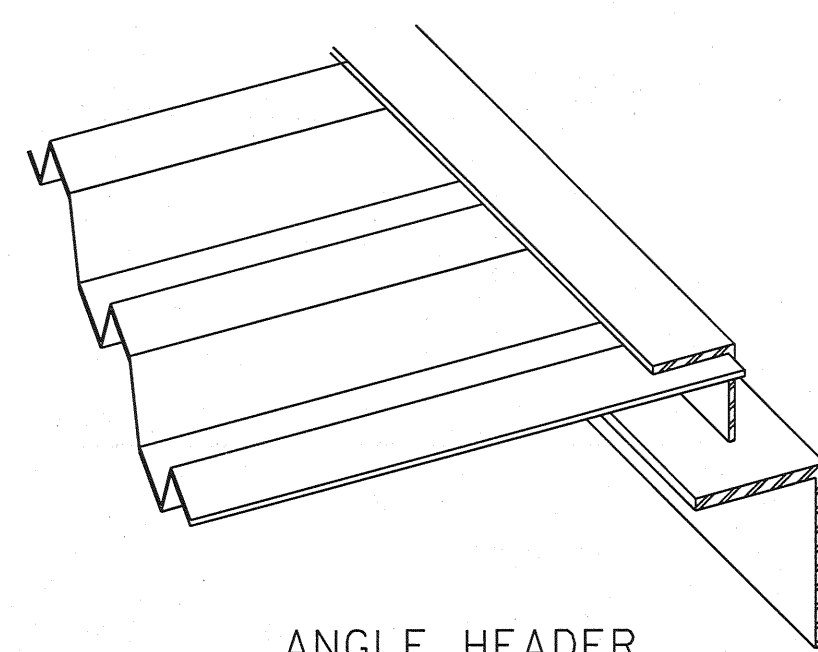
Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

TYPICAL TRANSVERSE SECTIONS



PRECLOSED



ANGLE HEADER

NOTE: This type is to be used for skewed ends only.

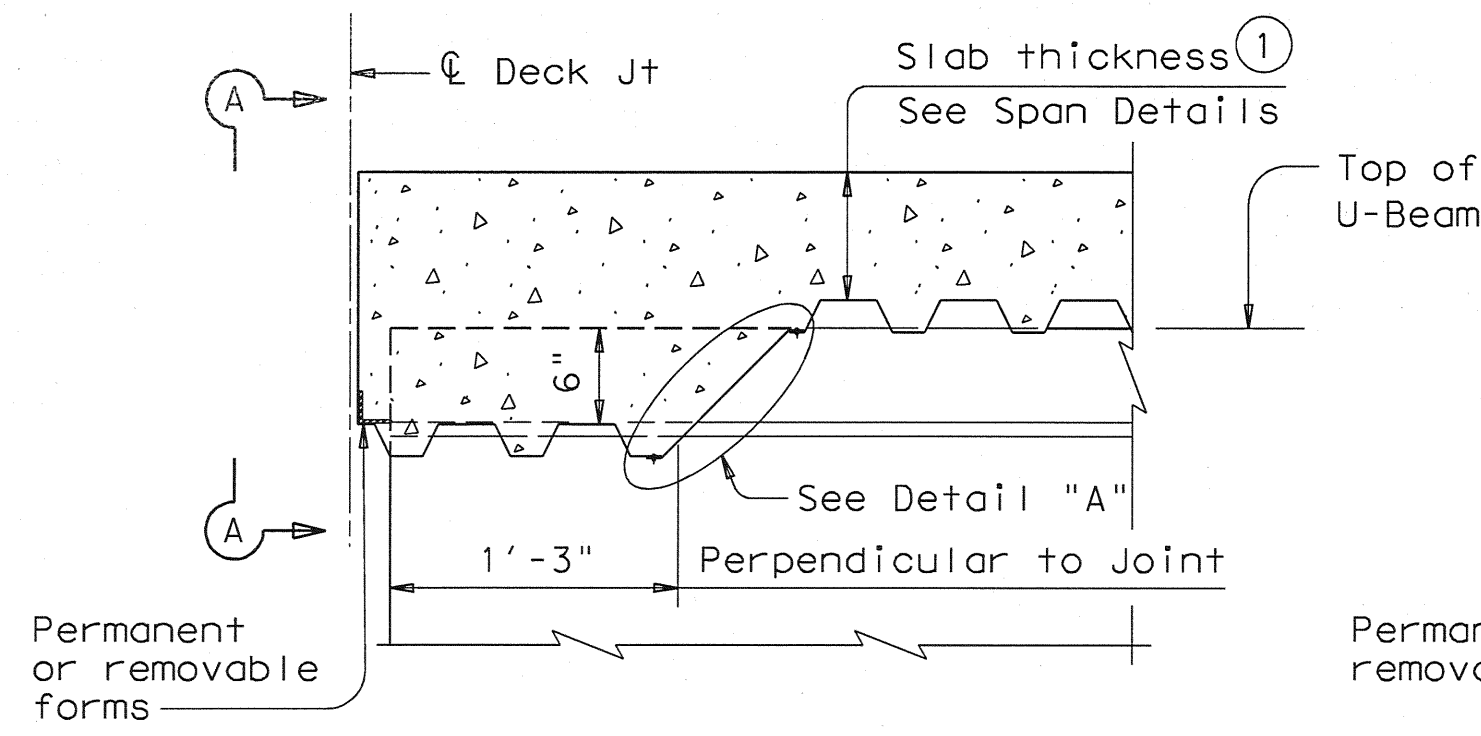
TYPES OF END CLOSURES

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08-2007: Added I-Girders.				HIGHWAY

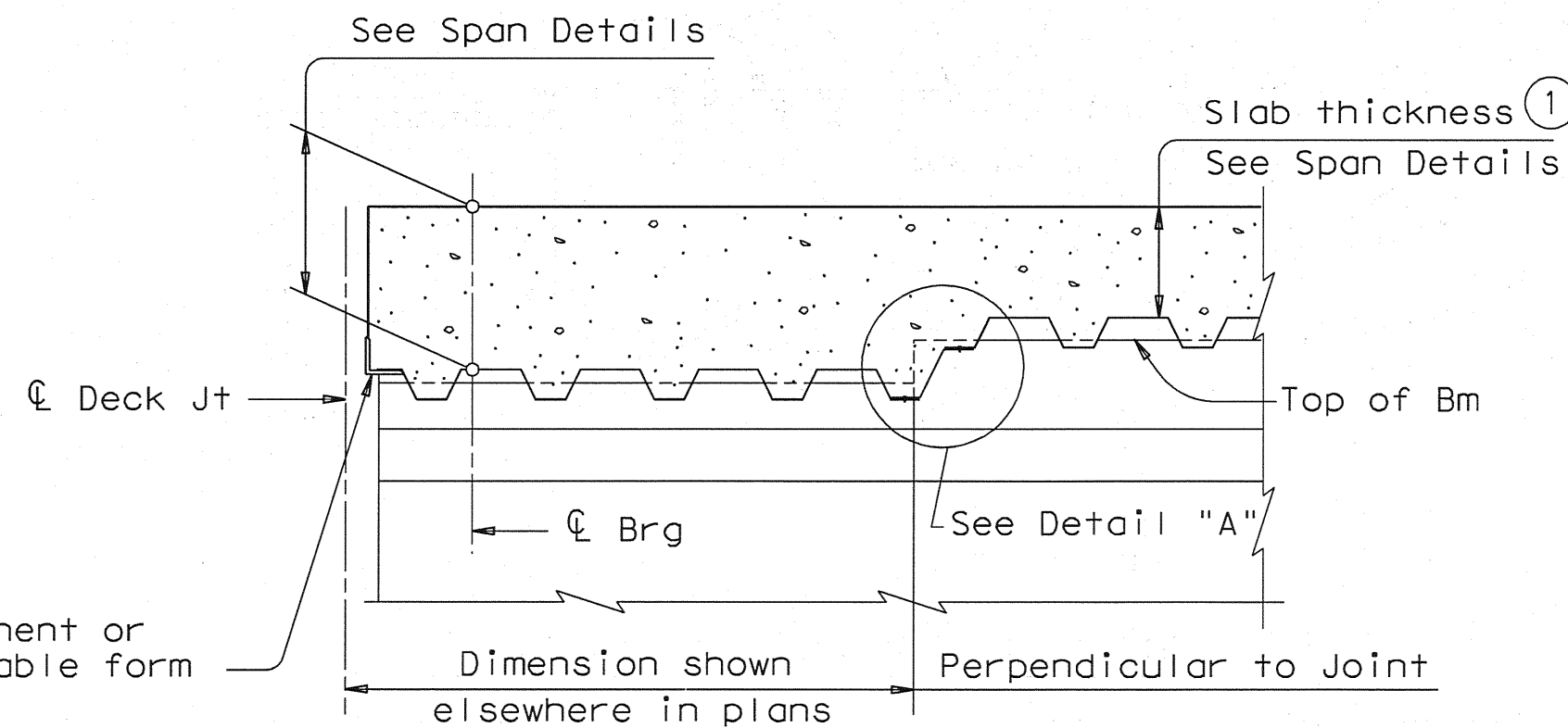
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PATH:

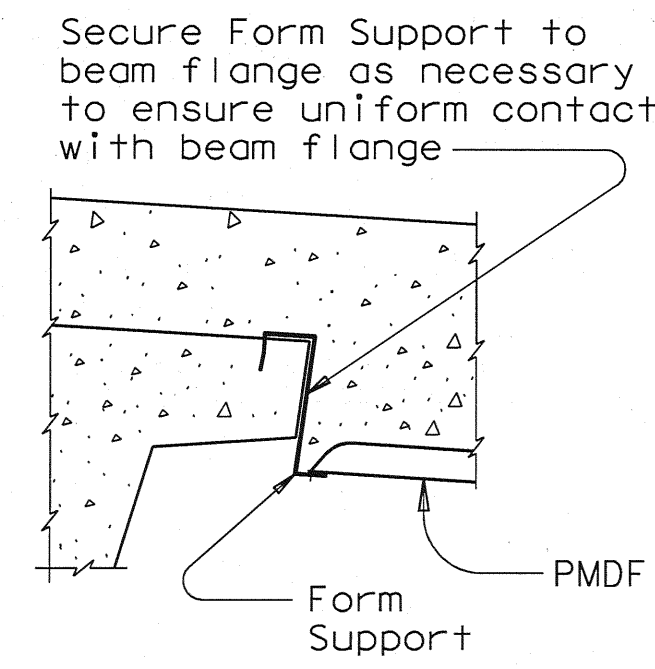
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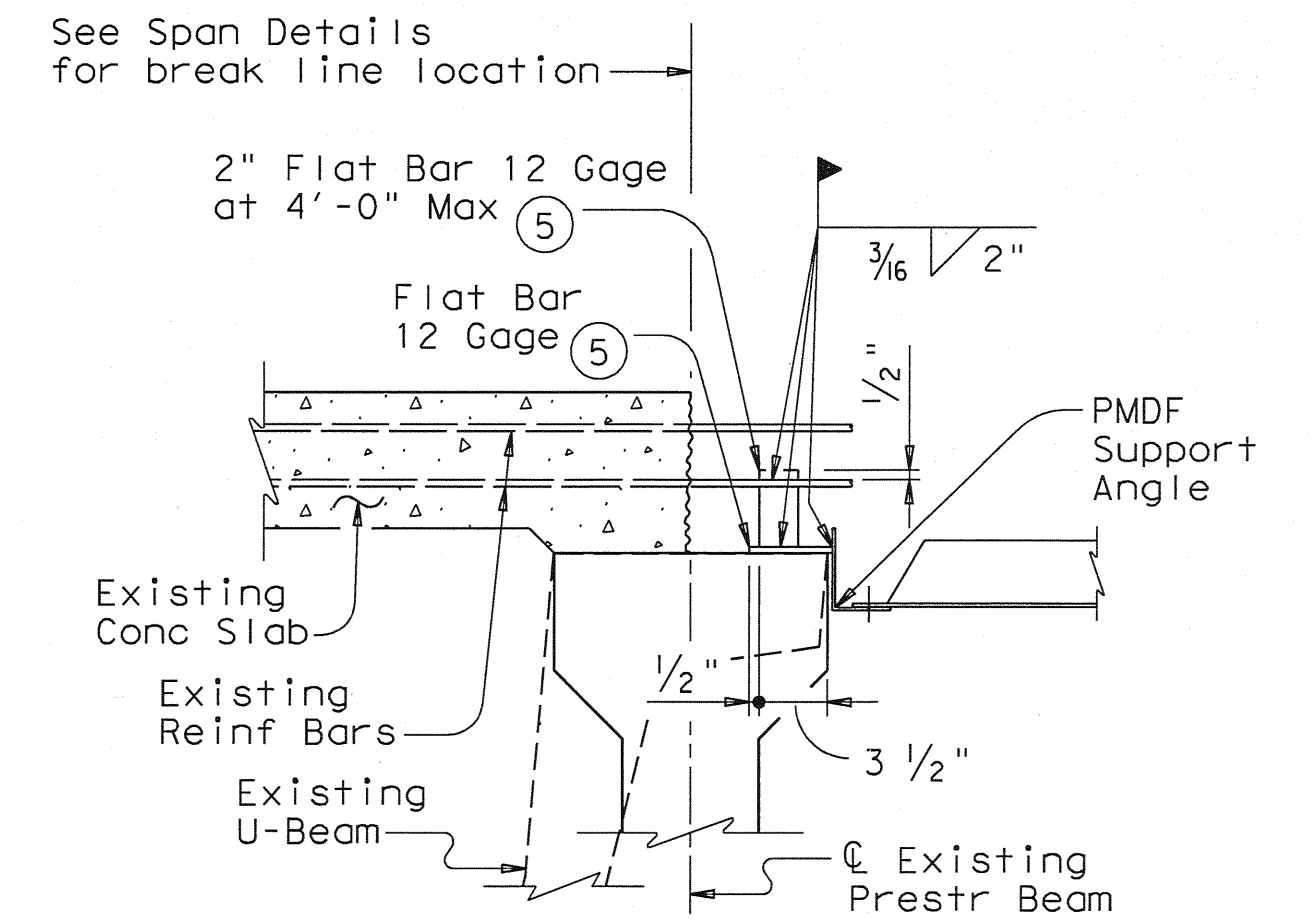
AT THICKENED SLAB END FOR U-BEAMS



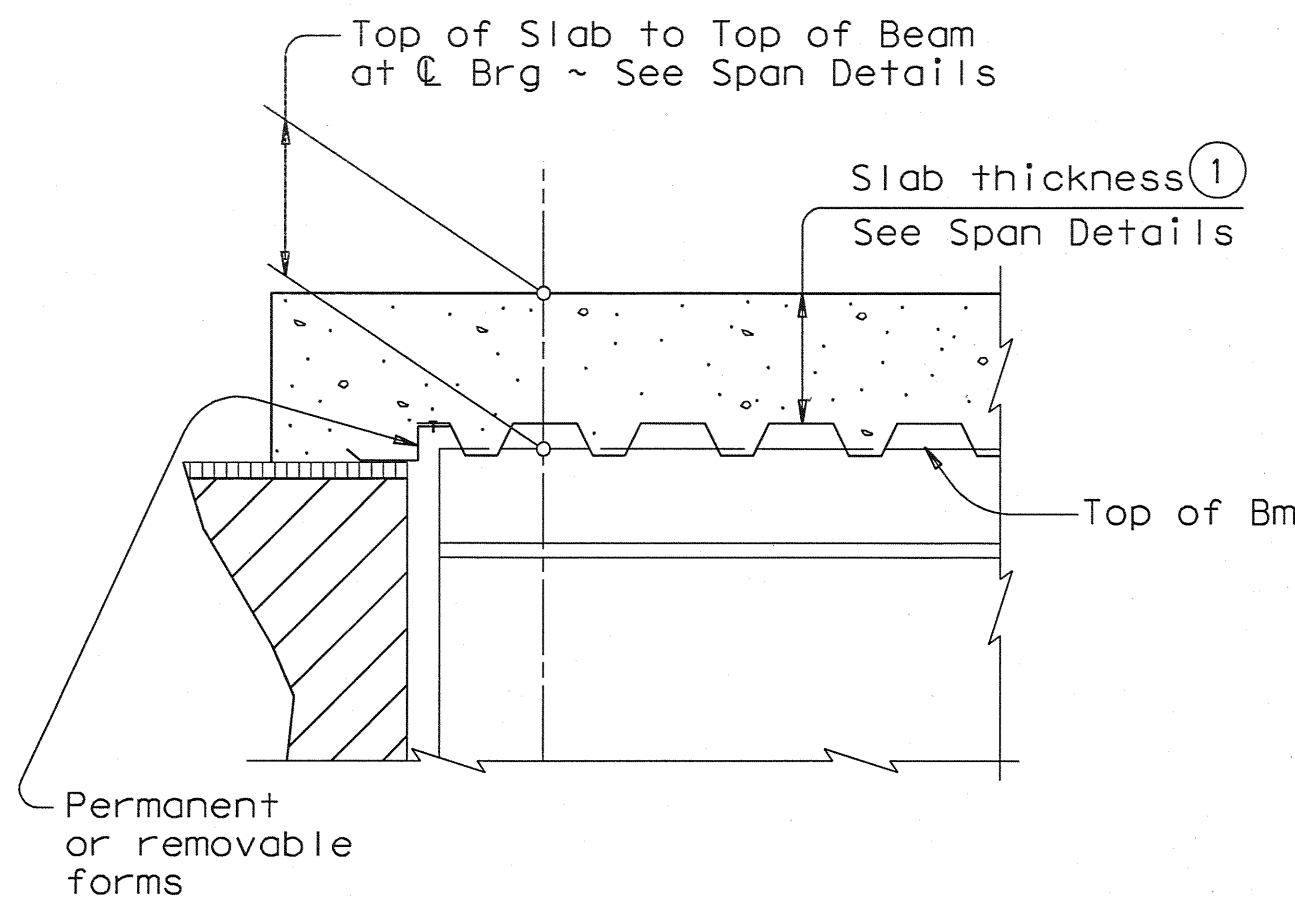
AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS
Showing I-Beam block-out. No block-out for I-Girders or Steel Beams.



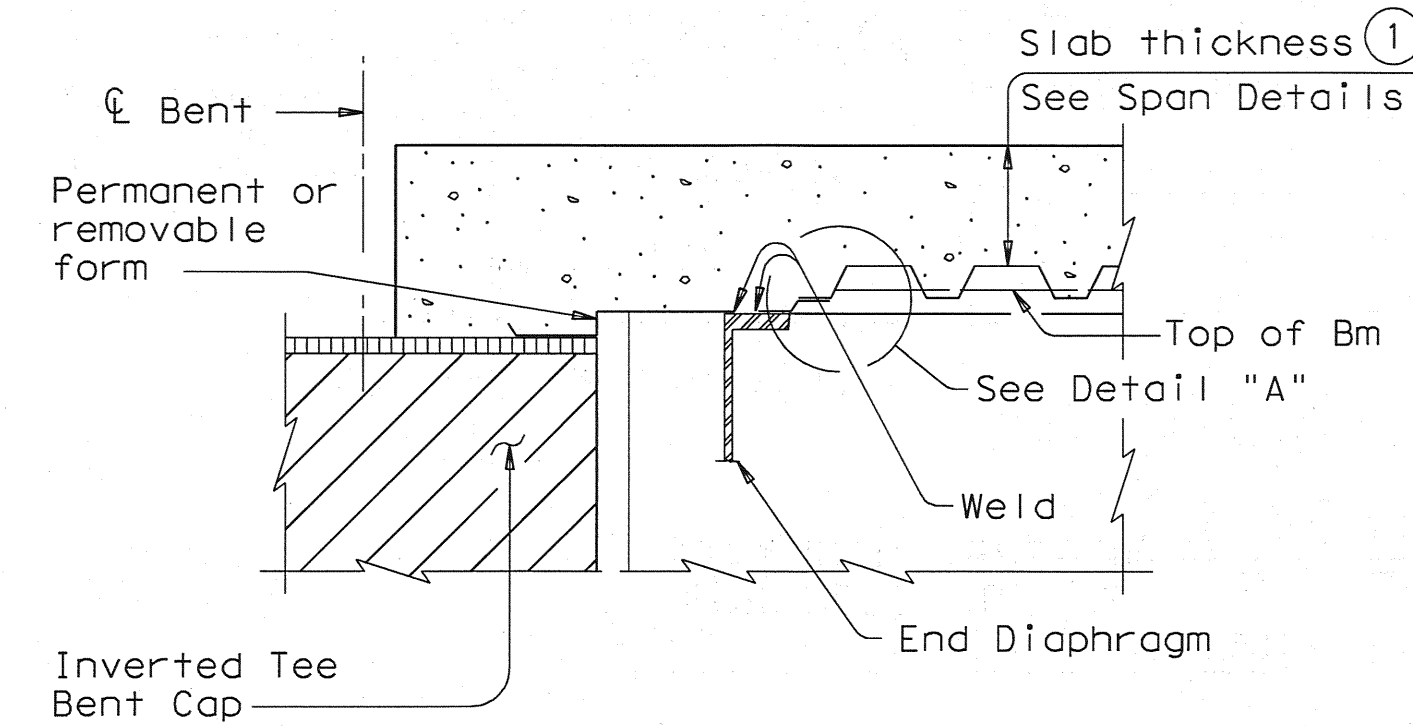
SECTION A-A



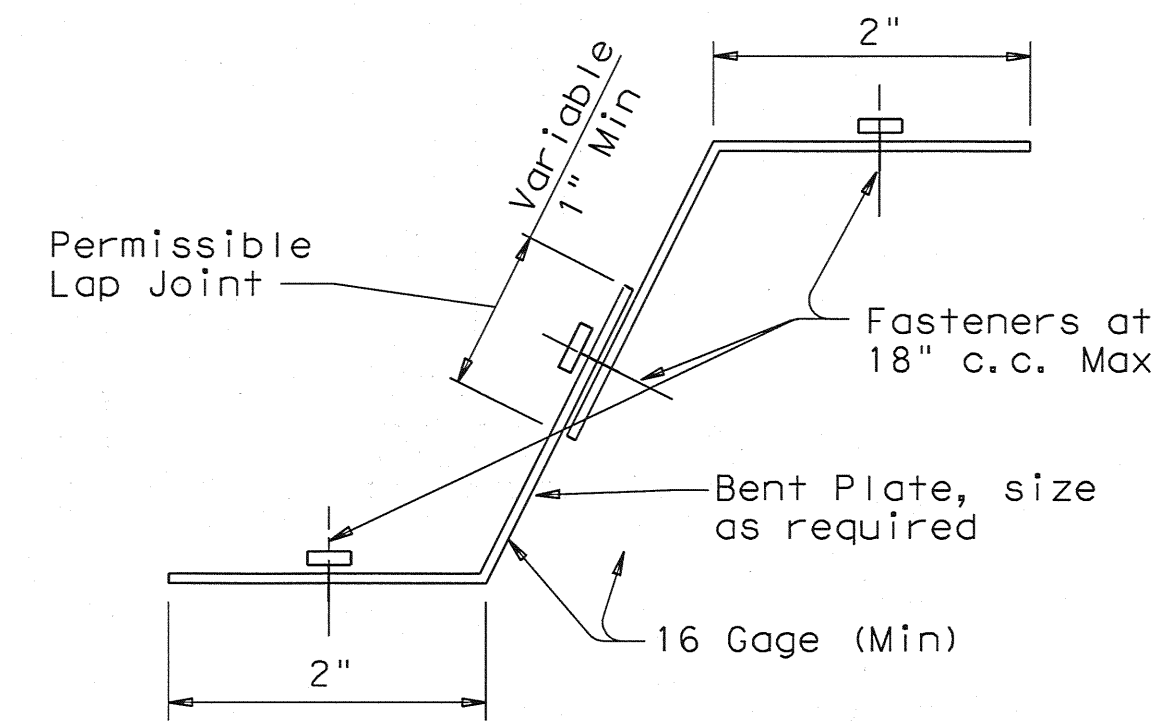
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



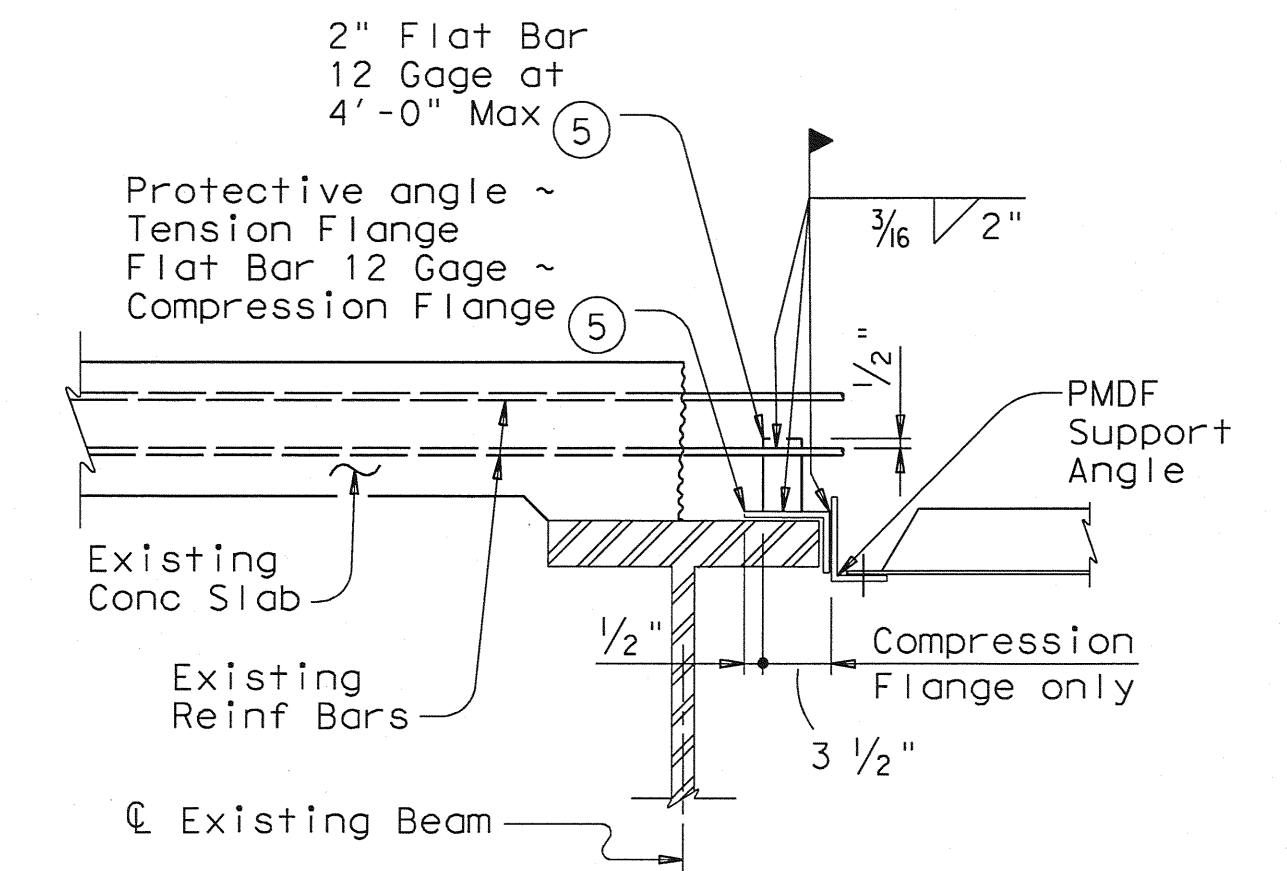
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



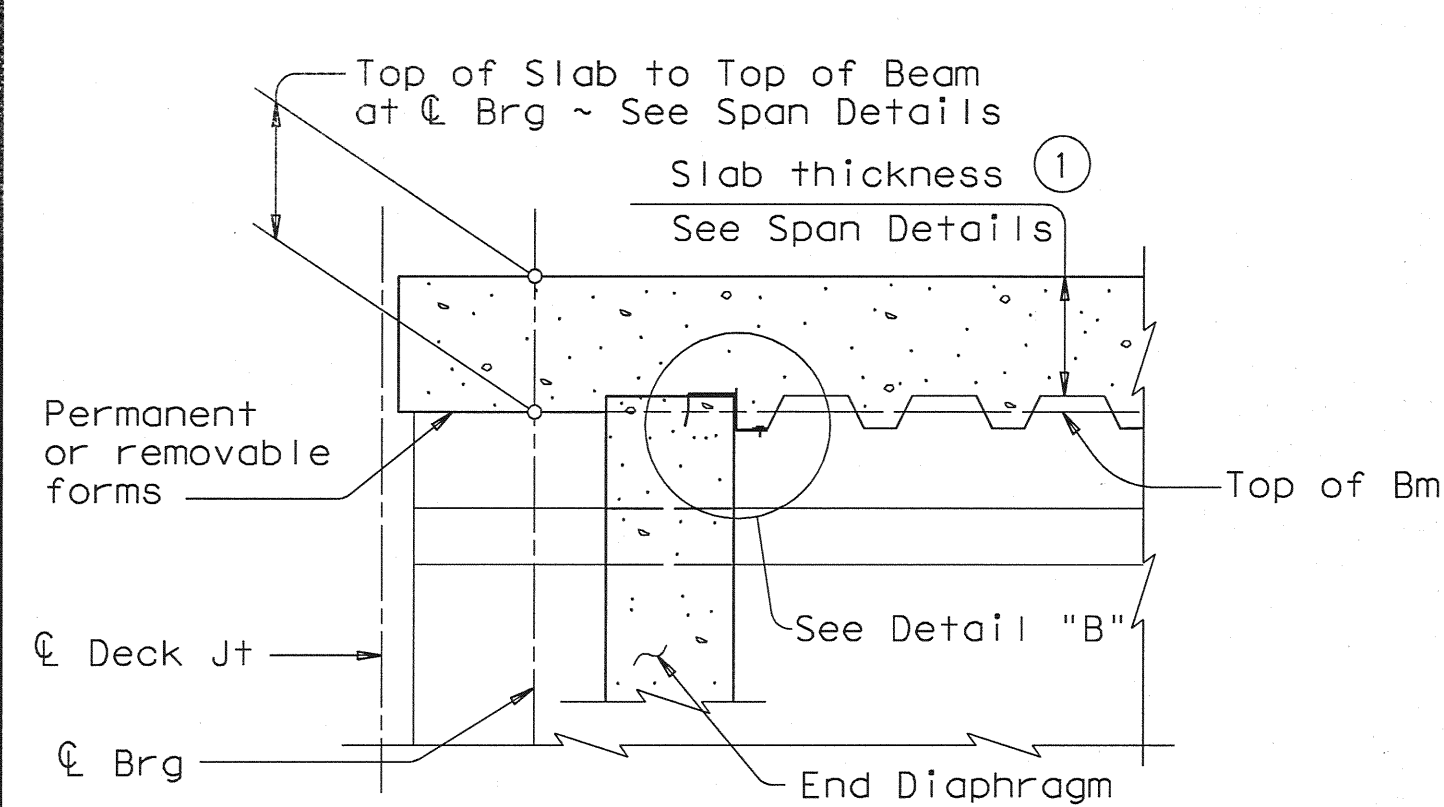
AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



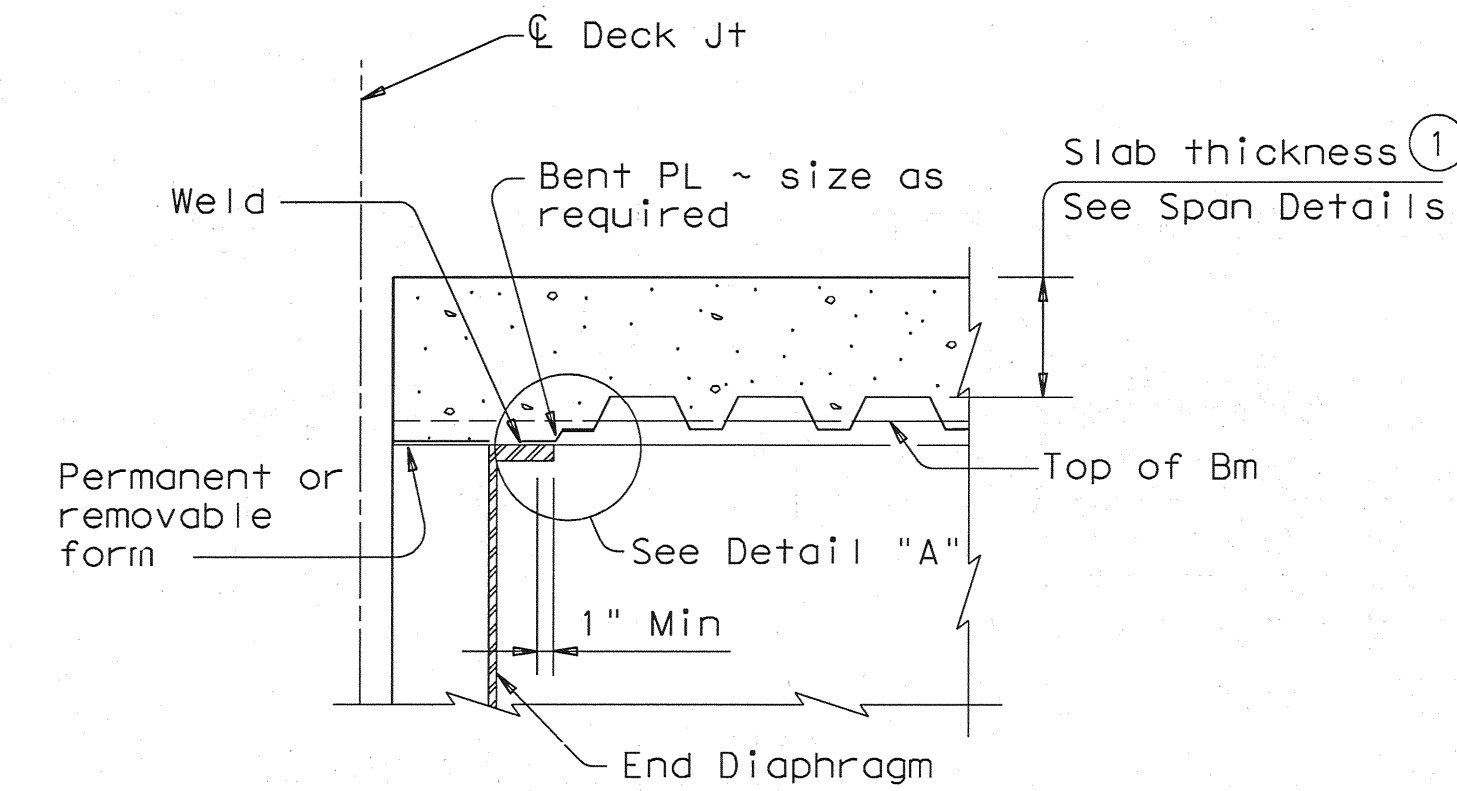
DETAIL "A"



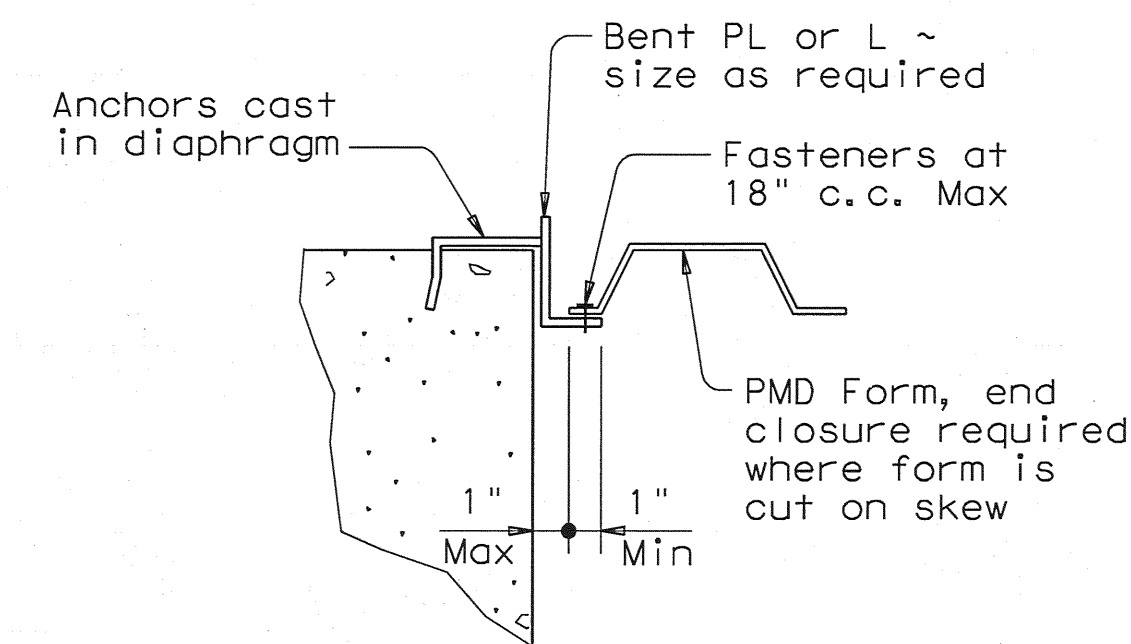
SHOWING STEEL BEAMS



AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

WIDENING DETAILS

DETAILS AT ENDS OF BEAMS

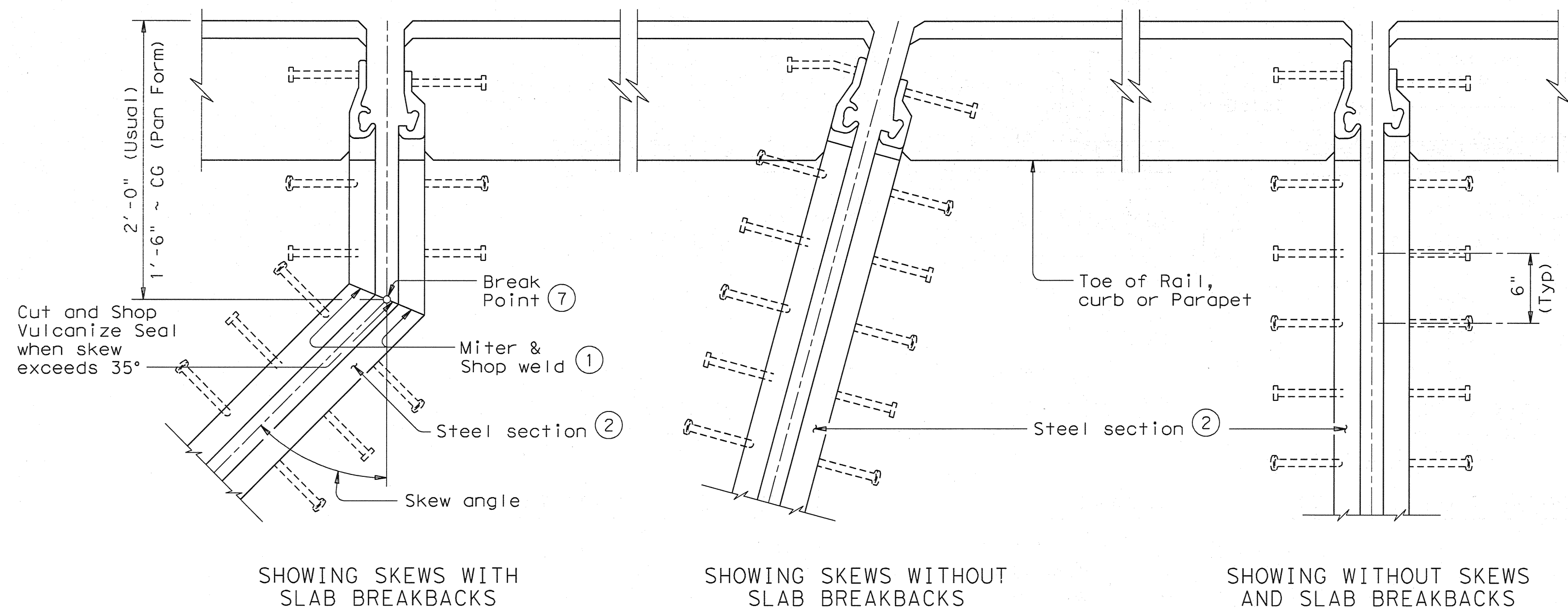
- 1 Slab thickness minus 5/8" if corrugations match reinforcing bars
- 5 Minimum yield stress of 12 Gage bars shall be 40 ksi

PERMANENT METAL
DECK FORMS

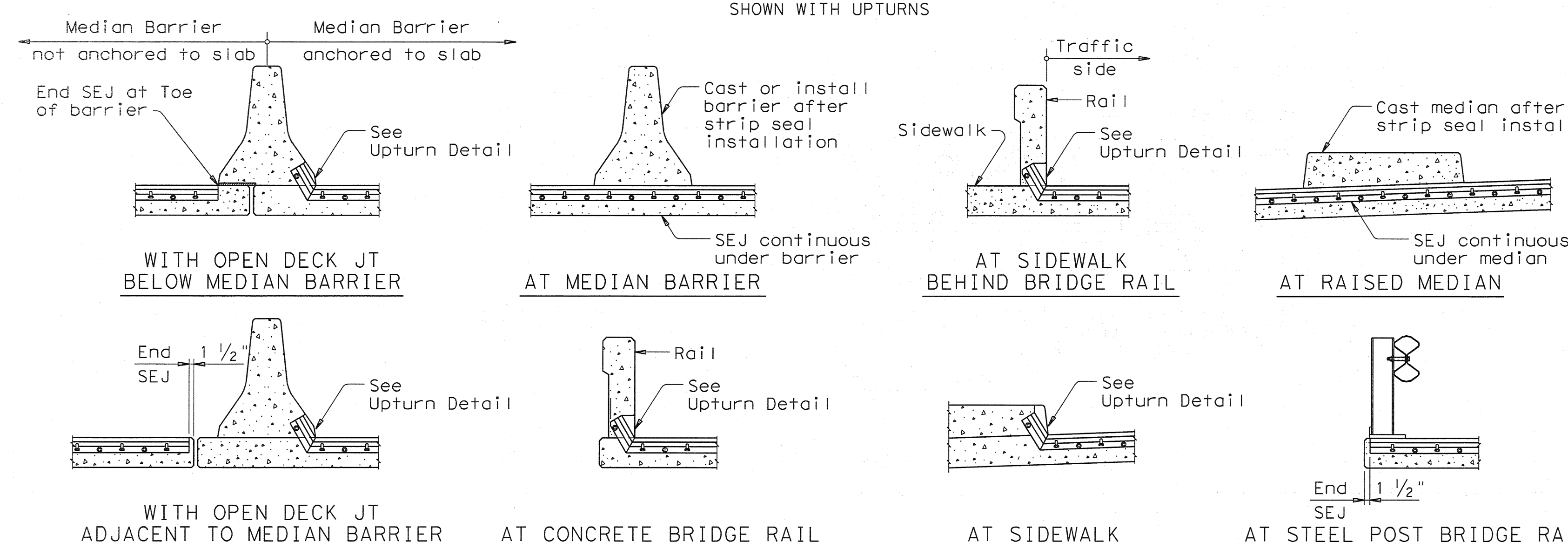
PMDF

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08-2007: Added I-Girders.	COUNTY	CONTROL	SECT	JOB
				HIGHWAY

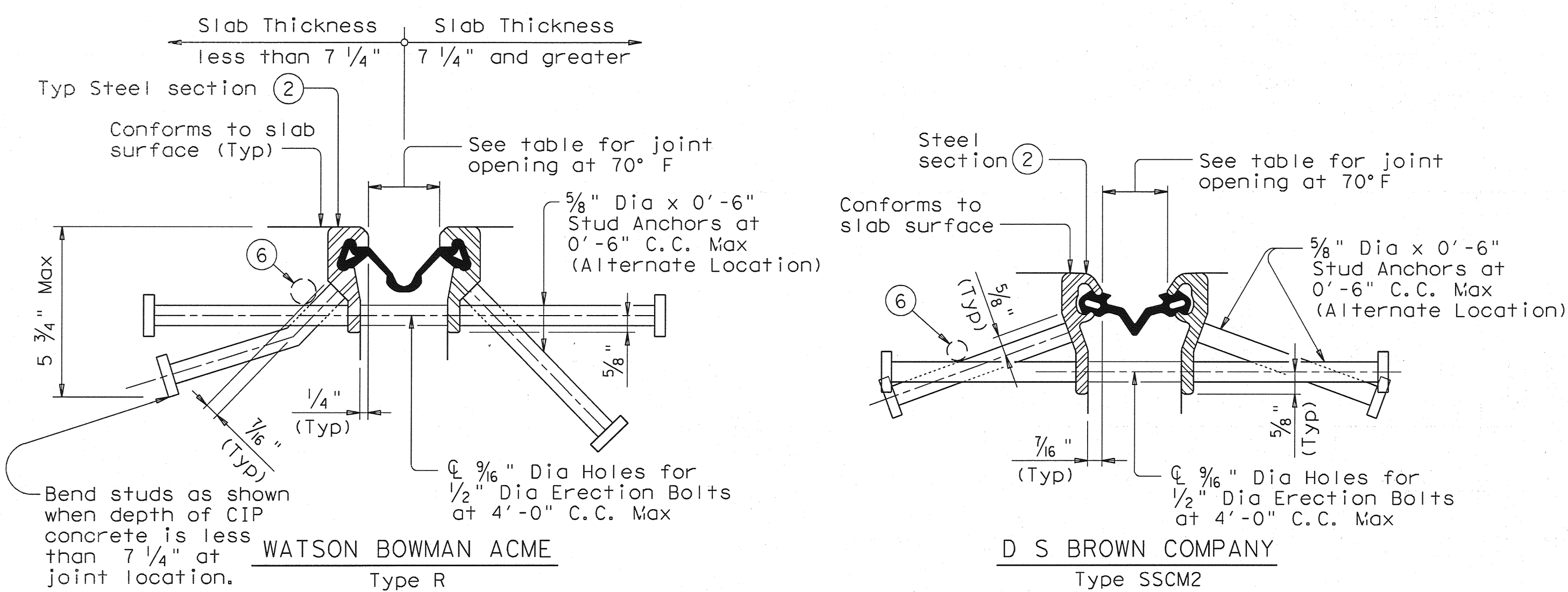
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PLANS OF END CONDITIONS

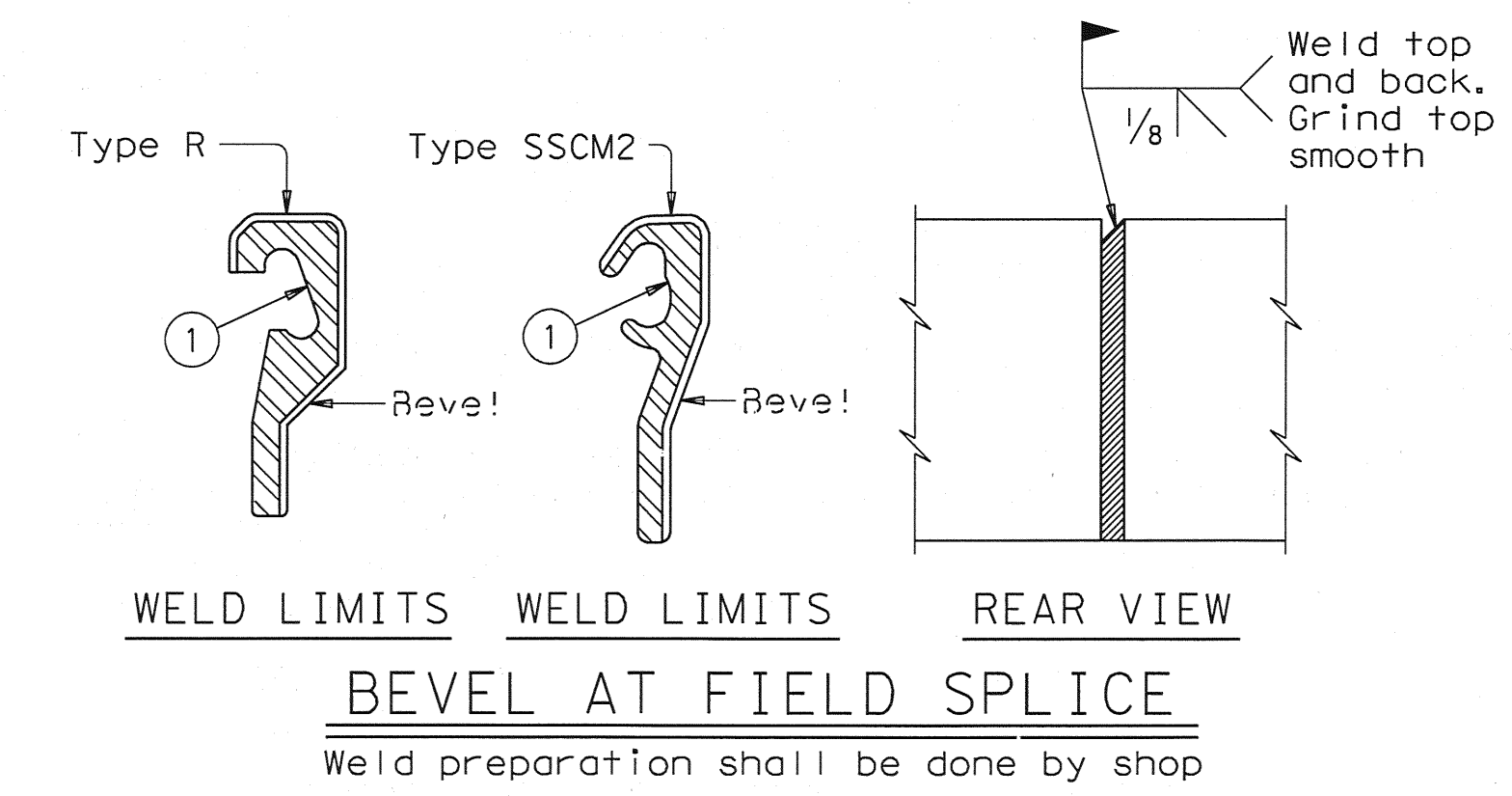


TYPICAL SECTIONS 5



SECTIONS THRU SEALED EXPANSION JOINT

MANUFACTURER		STEEL SECTION 2		NEOPRENE STRIP SEAL	
				4" JOINT	5" JOINT
Seal Type	Joint Opening 3	Seal Type	Joint Opening 3		
D. S. Brown	Type SSCM2	A2R-400	1 3/4"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 3/4"	SE-500	2"



FABRICATION NOTES:
 Corresponding sections of Sealed Exp Jts shall be temporarily shop assembled, checked for fit, and match marked for shipment.
 Erection holes shall be punched so as to line up when Sealed Exp Jts are in their final position.
 Weld studs in accordance with AWS D1.1.
 The neoprene seal shall be continuous and included in the price bid for Sealed Exp Jt.
 Steel sections shall be shipped in convenient lengths of 24'-0" Max and 10'-0" Min unless otherwise necessary for stage construction or widenings. One shop splice will be permitted in each shipping length provided no piece is less than 2'-0" in length and sufficient studs are added to limit the stud to shop or field splice distance to 2" Min and 4" Max.
 Shop and field splices shall be made by butt welding with areas in contact with seal to be ground smooth.
 Paint portions of steel sections not in contact with concrete with the primer specified for System II paint.
 Shop drawings for the fabrication of Sealed Expansion Joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.
 An SEJ Layout which identifies location of each steel section shall be developed. Permanently mark each steel section in accordance with the SEJ Layout.

CONSTRUCTION NOTES:
 The Contractor shall arrange for securing the Sealed Exp Jt in position, and placing to the proper grade and alignment by welding braces to adjacent reinf steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Cost of temporary bracing is to be included in the price bid for Sealed Exp Jt.
 After bracing and welding the steel section, remove the erection bolts and spacers and seal erection holes before placing concrete.
 Seal cavity shall be cleaned and prepared for seal installation as per the manufacturer's suggested installation procedures.

GENERAL NOTES:
 Sealed Exp Jts shall be provided in the size and at locations shown on plans.
 Minimum slab and overhang thickness required for the use of SEJ-A is 6 1/2".

- Remove all burrs which will be in contact with seal prior to making splice.
- Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.
- These openings are also the recommended minimum installation openings.
- Reduce for sidewalk or parapet heights less than 6".
- Other conditions affecting the joint profile should be noted elsewhere.
- Transverse bars in conflict with SEJ studs in either the bridge slab or approach slab shall be moved to rest at the junction of the studs.
- See Span details for location of break point.

Texas Department of Transportation
 Bridge Division

**SEALED EXPANSION JOINT
 TYPE A
 WITHOUT OVERLAY**

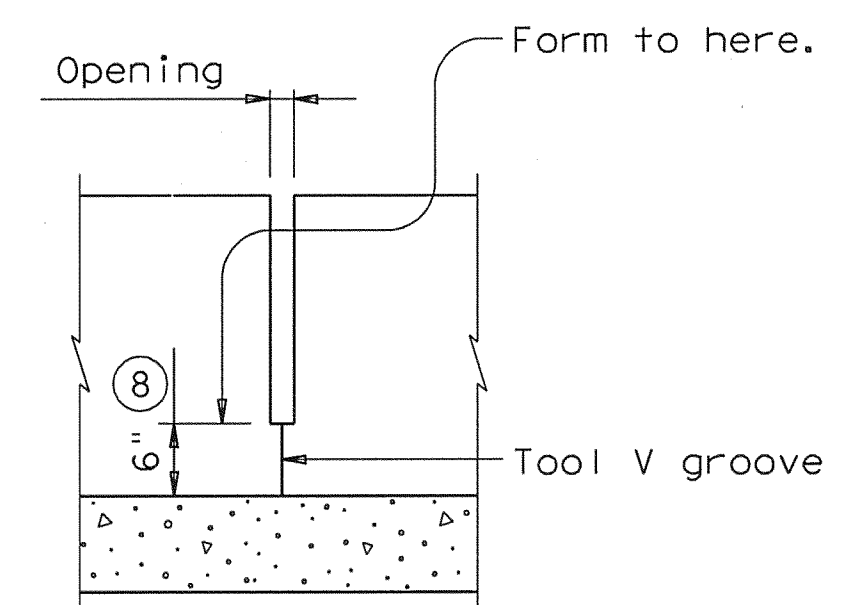
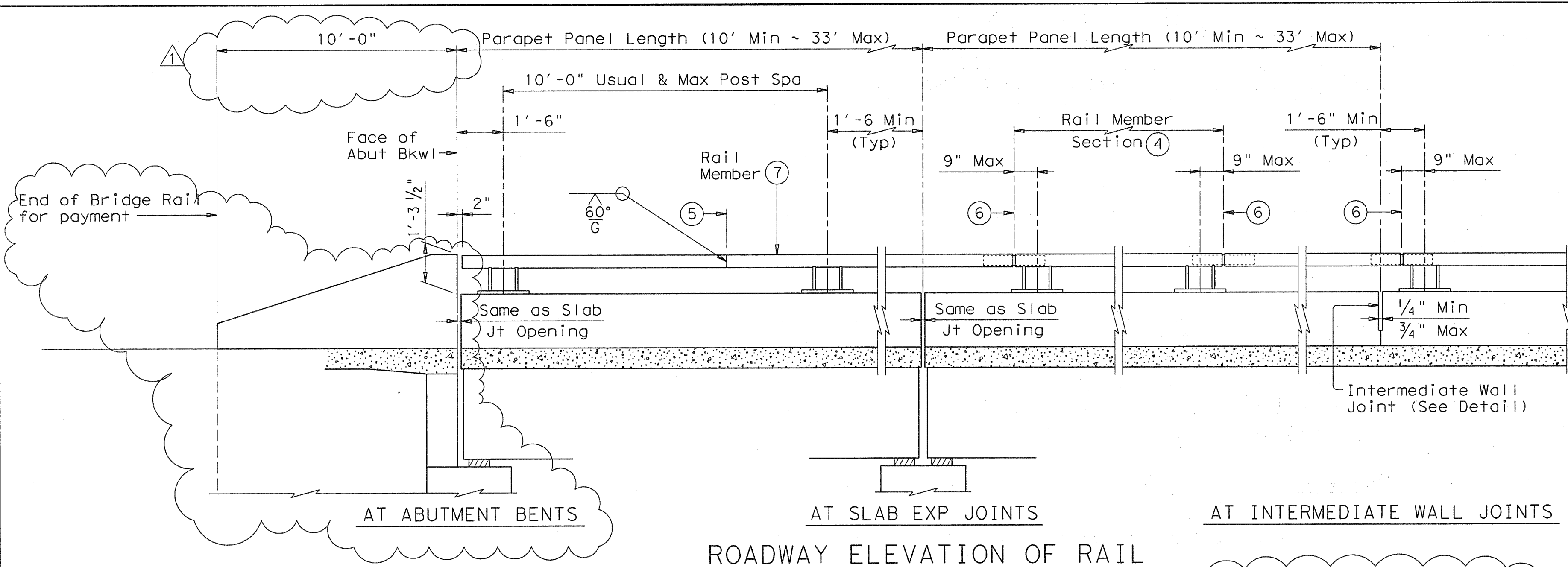
SEJ-A

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COUNTY	CONTROL	SECT	JOB	HIGHWAY

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LEVELS DISPLAYED
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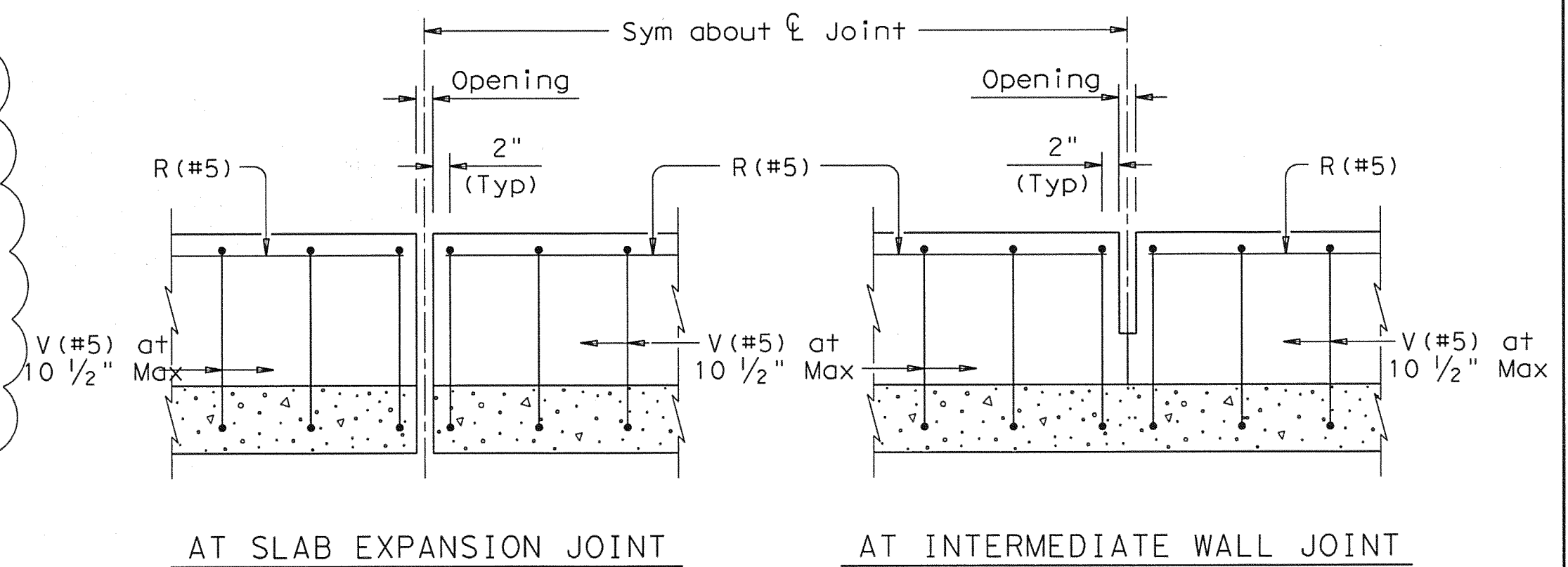
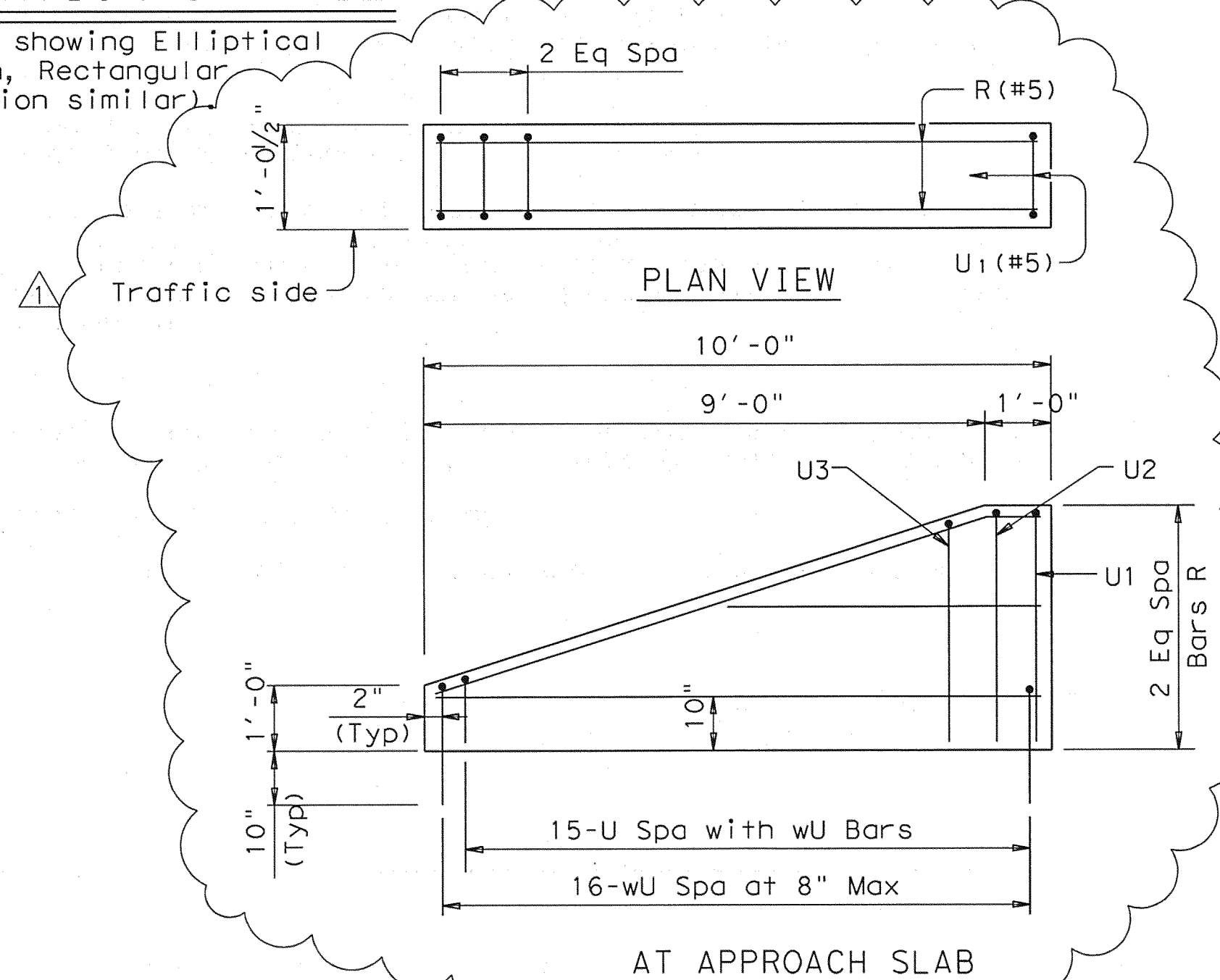


INTERMEDIATE WALL JOINT DETAIL

Note: Provide intermediate wall joints over all slab construction joints, over interior supports on continuous units, and at equal intervals in between as necessary to maintain a 33' maximum length of unbroken wall. Location independent of pipe rail splices.

ROADWAY ELEVATION OF RAIL

(Rail Member showing Elliptical Tube Option, Rectangular Tube Option similar)



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

- ① Showing TL-3 Splice location, TL-2 Splice location is 1'-0".
- ② \mathcal{C} Splice ~ Metal Beam Guard Fence Transitions must be attached to the bridge rail and extended along the embankment unless otherwise shown in the plans.
- ③ Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence".
- ④ Rail member sections must have at least two posts but not more than four.
- ⑤ One shop splice per rail member section is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
- ⑥ \mathcal{C} Exp Jt or Splice Jt as required.
- ⑦ Unless directed otherwise by the Engineer, the fabricator may use the rectangular tube in lieu of the elliptical tube for the rail member.
- ⑧ Increase 2" for structures with overlay.
- ⑨ Bolts must be of sufficient length to extend $\frac{1}{2}$ " to $\frac{3}{4}$ " beyond nut.
- ⑩ Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail.
- ⑪ 4 additional Bars R(#5) 3'-8" in length must be placed inside Bars U(#5) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.

Modifications ESC 04/29/10

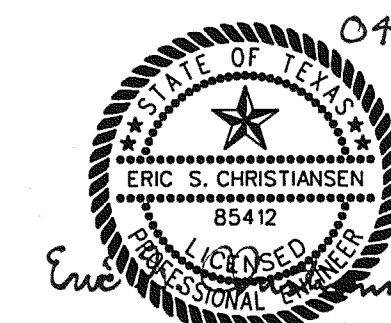
Revised End Rail, Eliminate Connections, and modified material notes.

SHEET 1 OF 3

Texas Department of Transportation
Bridge Division

TRAFFIC RAIL

TYPE T401 (MOD)



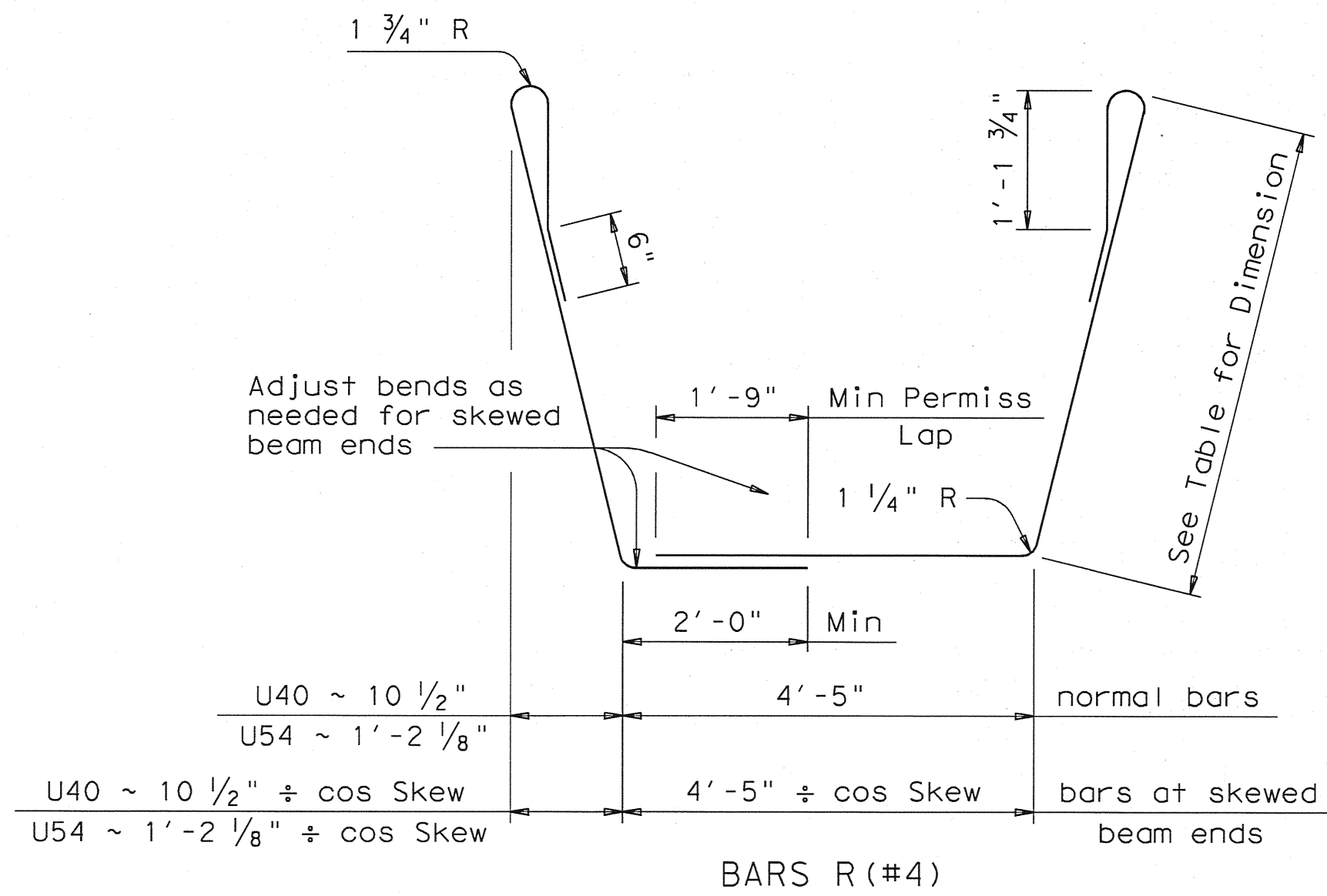
04-29-10

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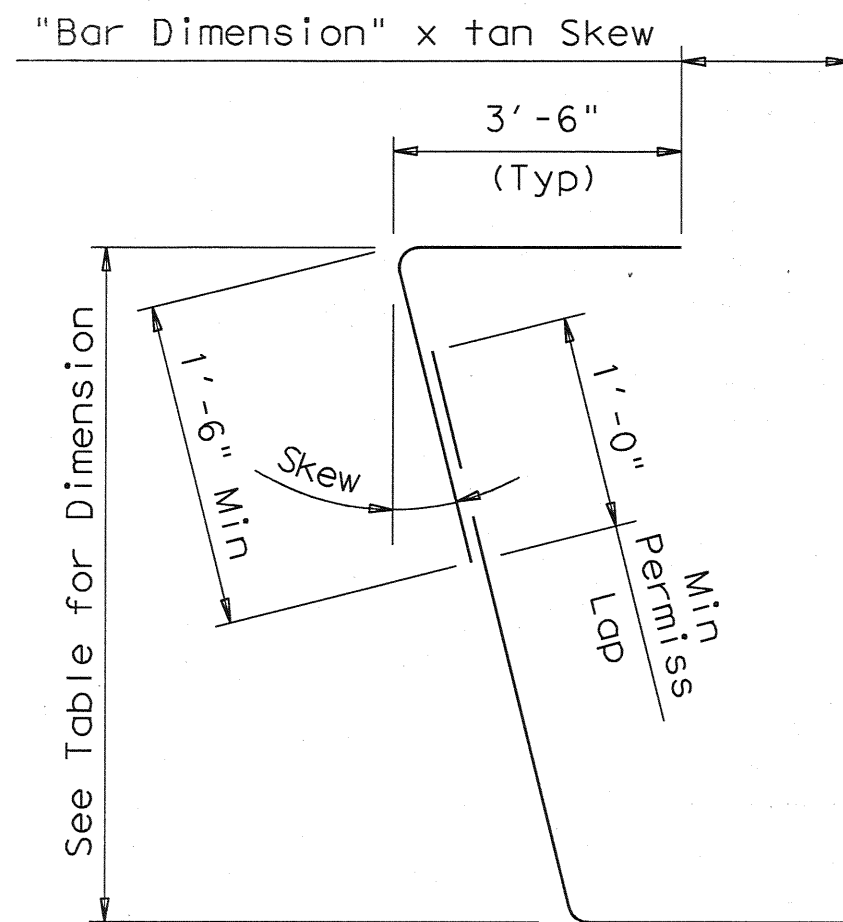
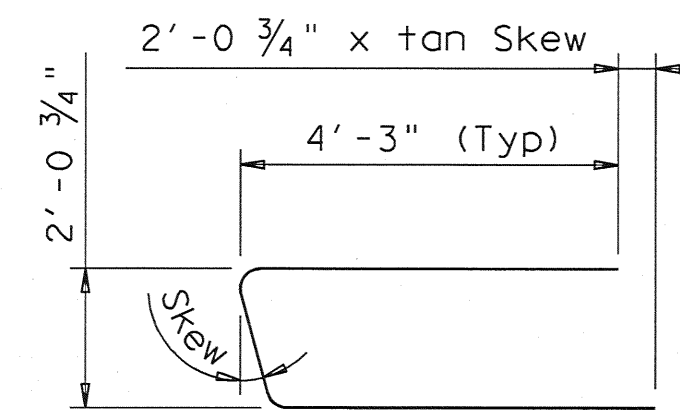
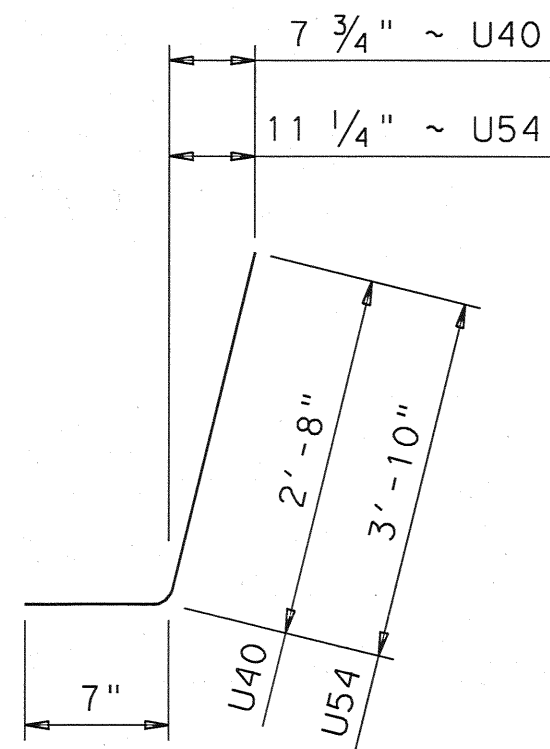
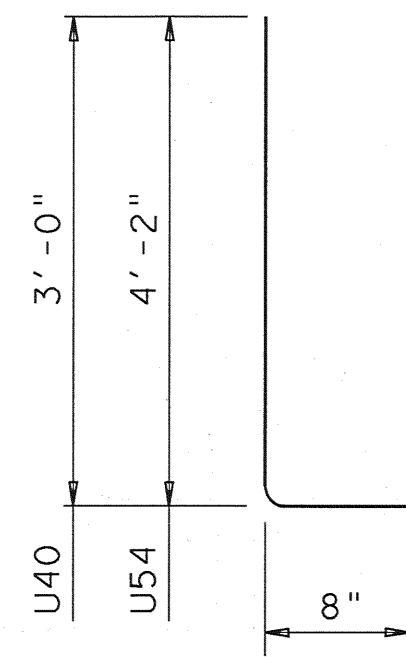
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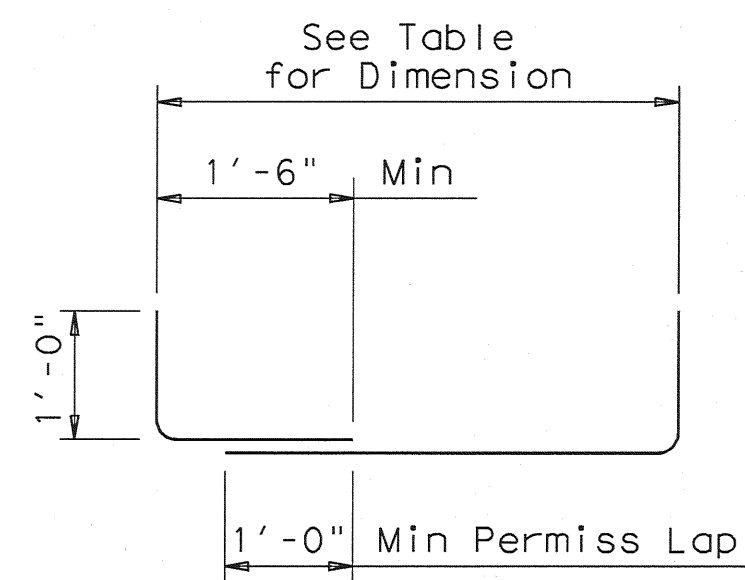
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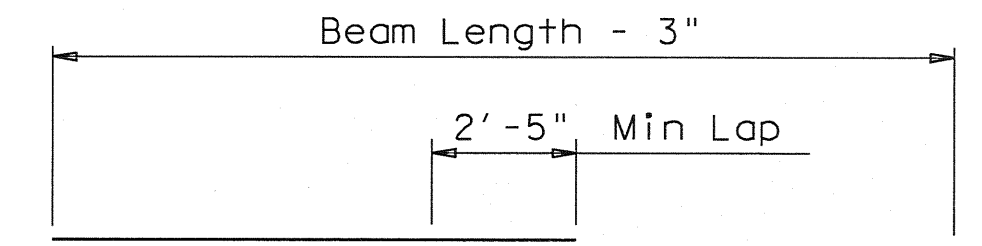
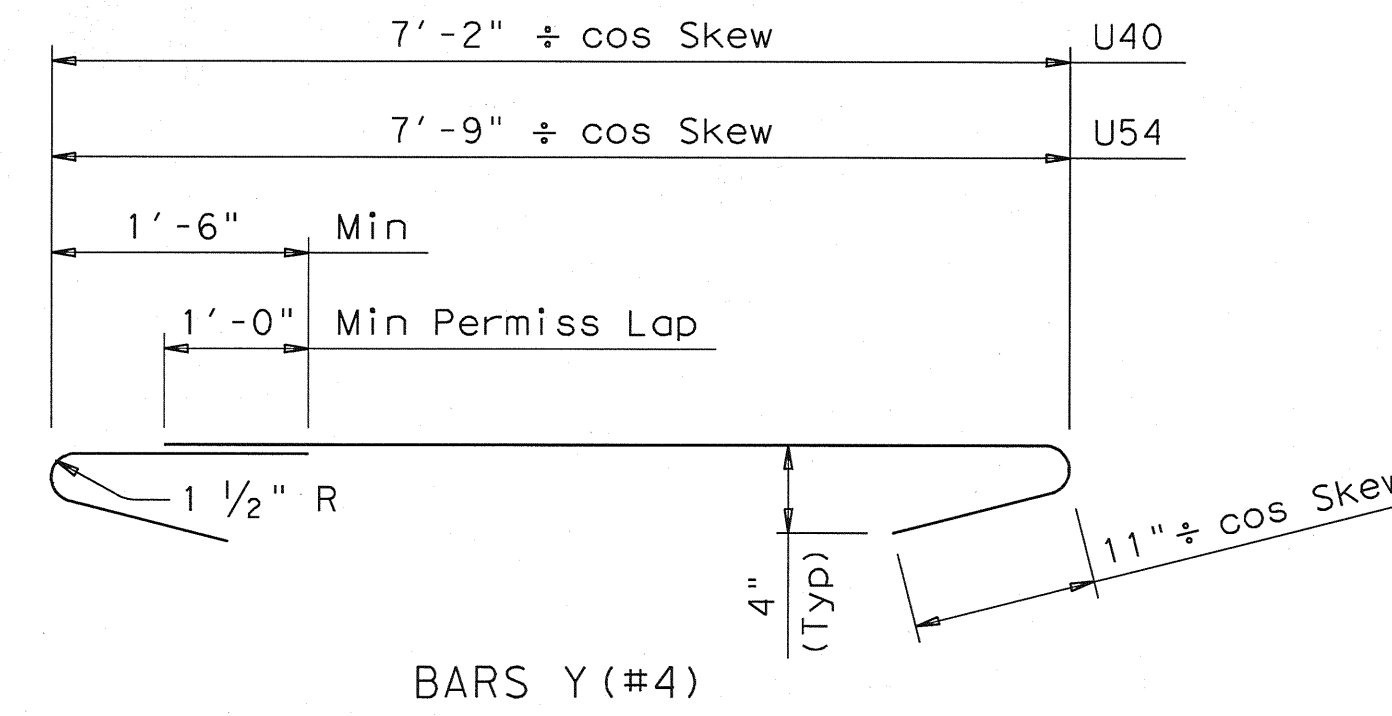
Skew Angle	Beam Type	
	U40	U54
0° thru 15°	3'-9 1/4"	4'-11 1/2"
15° thru 30°	3'-9 1/2"	5'-0"
30° thru 45°	3'-10 1/4"	5'-1"



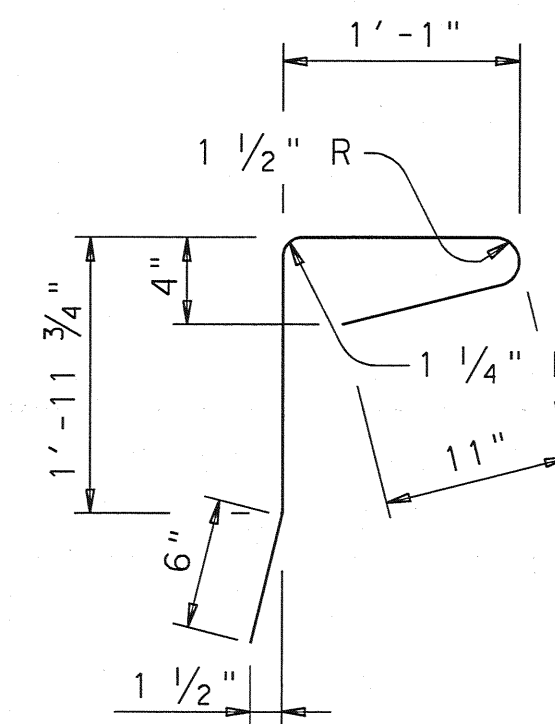
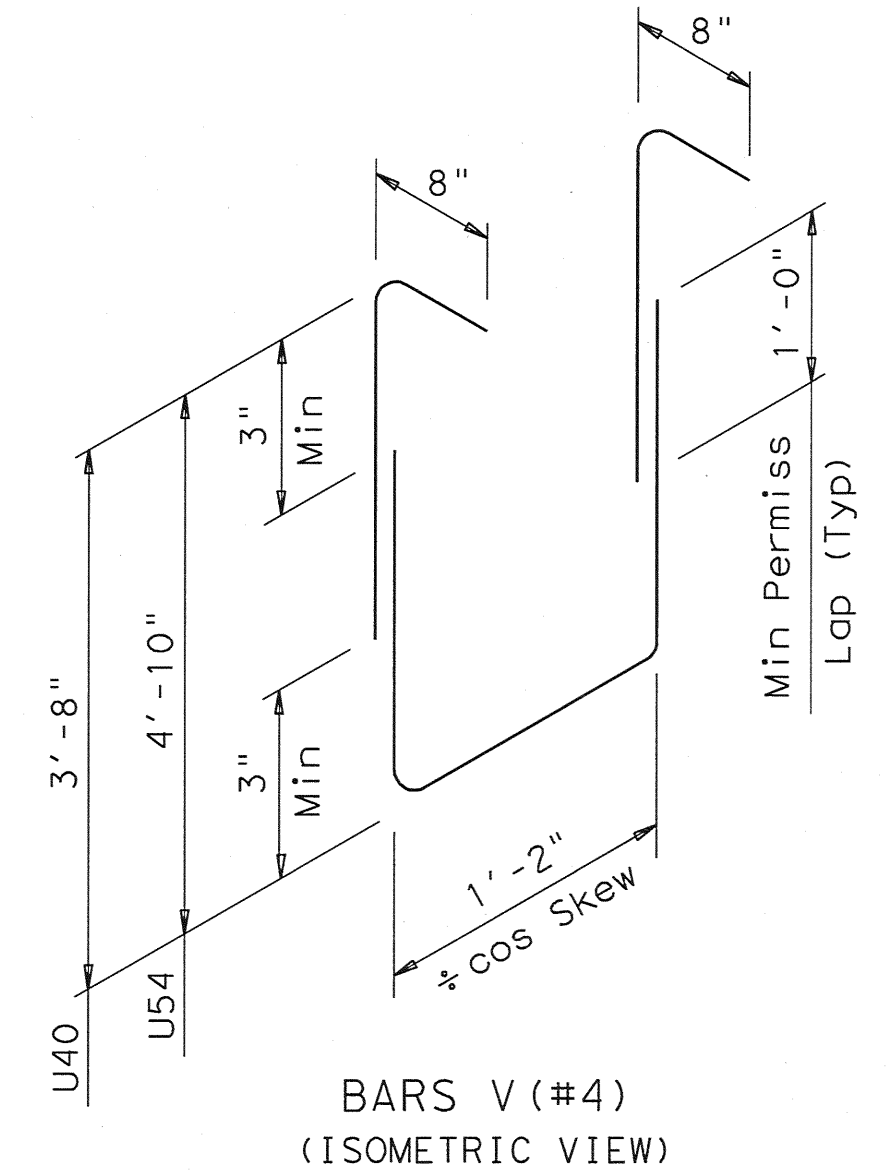
Bar	Beam Type	
	U40	U54
DS1	4'-8"	4'-8"
DS2	4'-11"	5'-0"
DS3	5'-2"	5'-5"
DS4	5'-4 1/4"	5'-9 1/2"
DS5	5'-6 1/2"	6'-1 1/4"



Bar	Beam Type	
	U40	U54
D1	4'-9"	4'-9"
D2	4'-11 1/4"	5'-1"
D3	5'-2"	5'-5 1/2"
D4	5'-4"	5'-10"
D5	5'-6 1/2"	6'-1 1/4"



Bars U may be placed with multiple segments, provided no segment is less than 10 ft in length and 40 ft Min C-C splices.

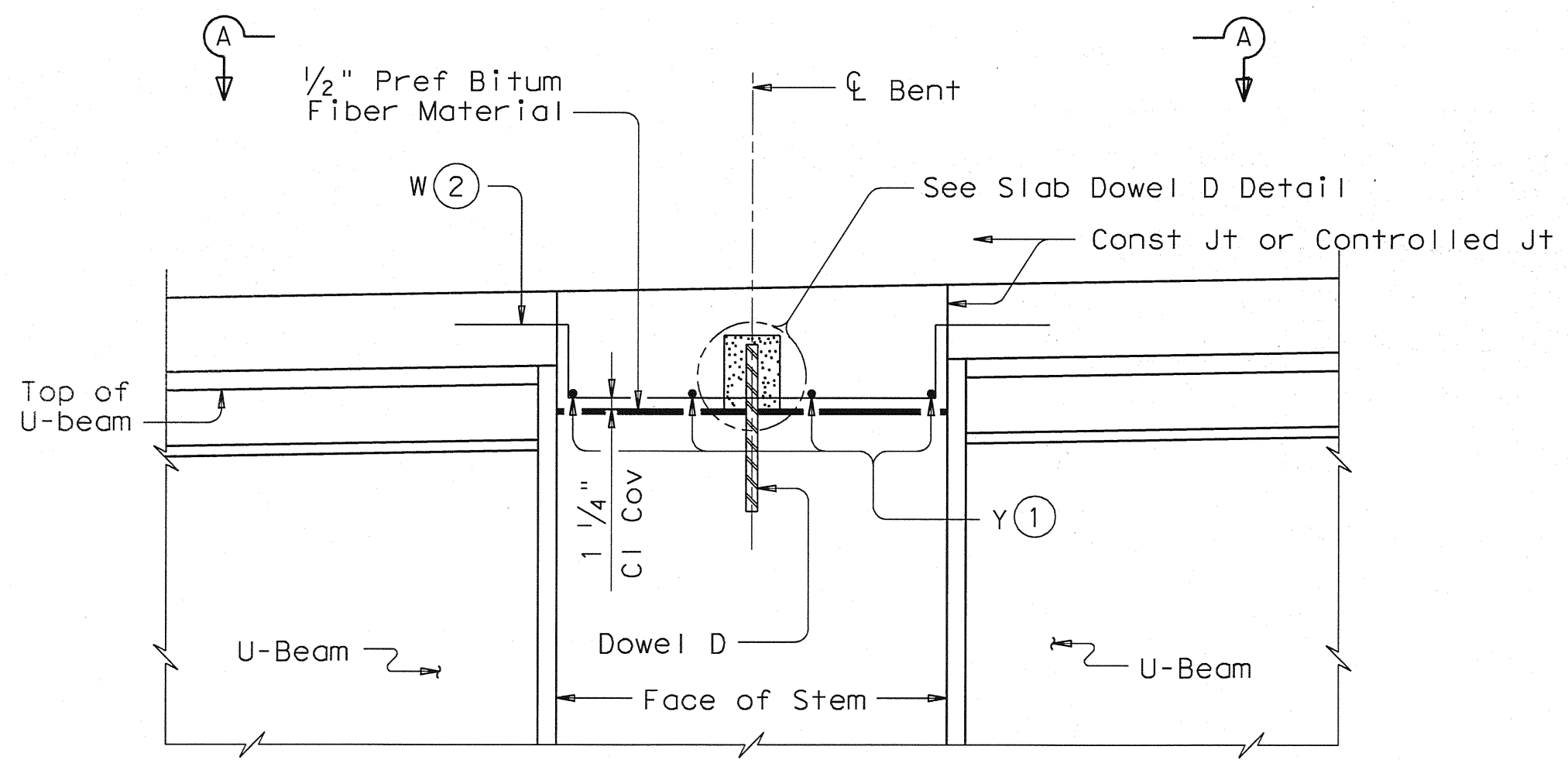


GENERAL NOTES:
 Designed according to AASHTO LRFD Specifications.
 Details are provided for skew angles up to 45 degrees.
 Concrete must be Class H. Use Class H (HPC) if required elsewhere in plans.
 All reinforcing steel must be Grade 60. An equal area of welded wire reinforcement, conforming to ASTM A 497, may be substituted for Bars R, P, X and Y.
 Reinforcing steel dimensions and bend radii are shown to bar centerlines.
 Provide a minimum of 1" clear cover to all reinforcing steel unless shown otherwise.
 Chamfer all acute corners for skews over 20 degrees. Provide 3/4" chamfer or 1 3/8" radius at all corners noted to require a chamfer.
 Horizontal form joints on exterior forms are not permitted.
 Shop drawings can be prepared with horizontal skews rounded to nearest 1/4 degree and beam end vertical batter rounded to the nearest 1/4". These shop drawing tolerances are in addition to the fabrication tolerances listed in Item 424, "Precast Concrete Structures (Fabrication)".

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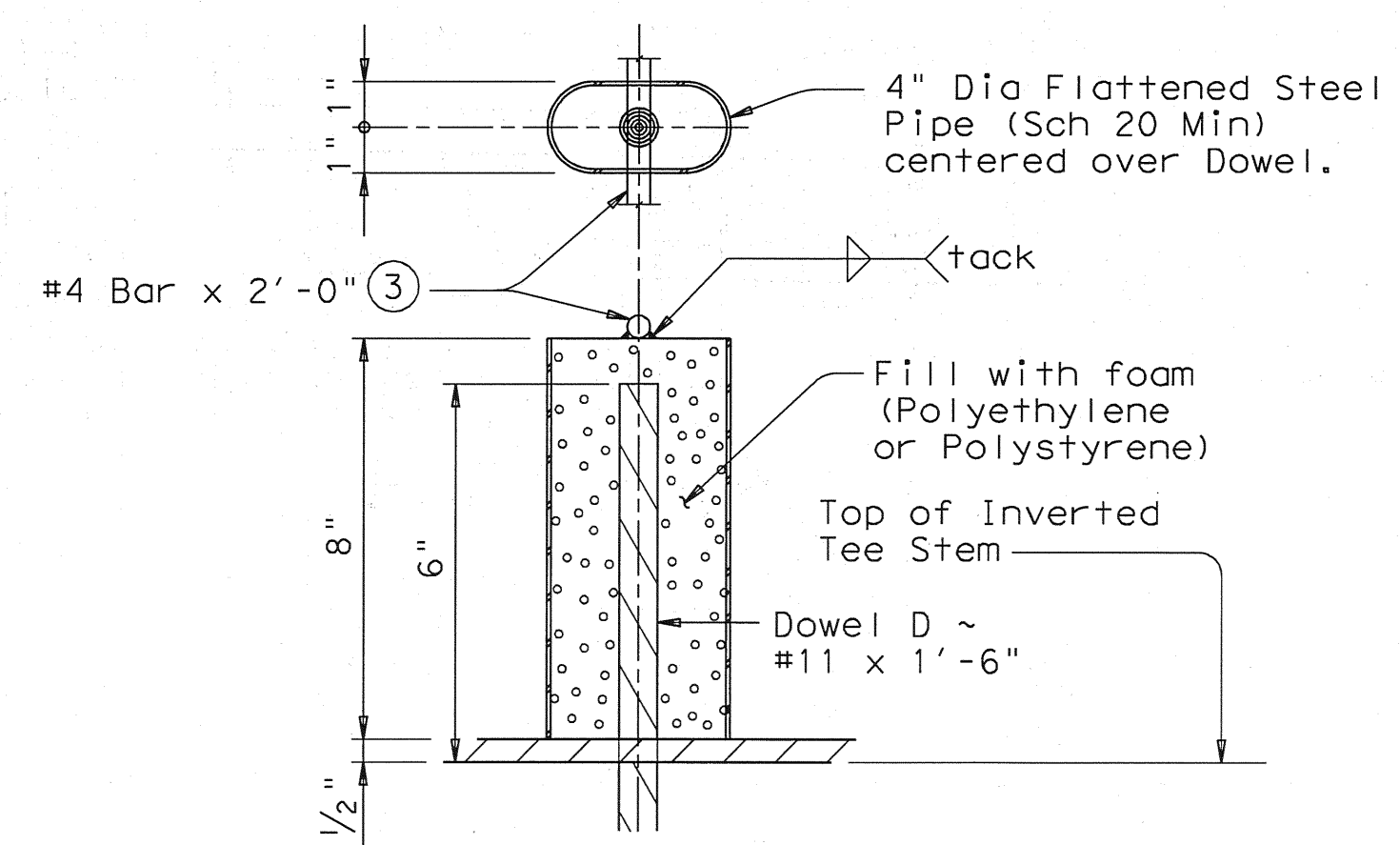
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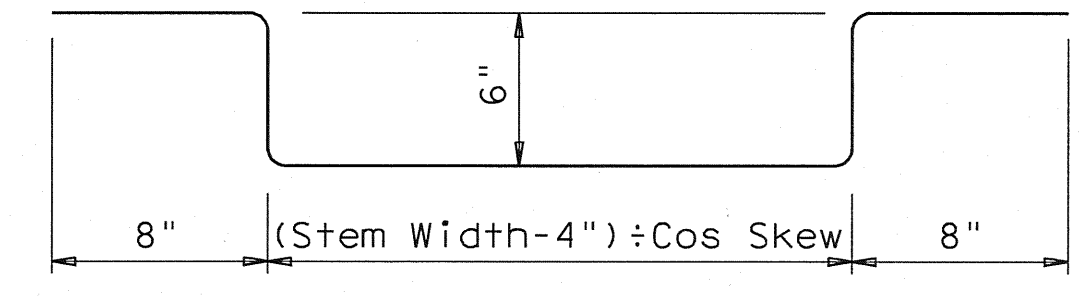
CONTINUOUS SLAB OVER INVERTED TEE BENT

Slab reinforcement not shown for clarity.



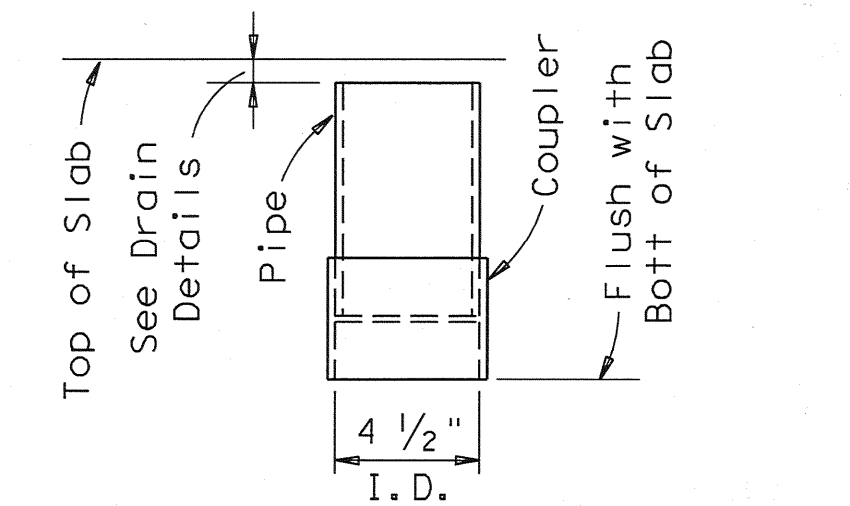
SLAB DOWEL D DETAIL

See Bent Details for number and location.

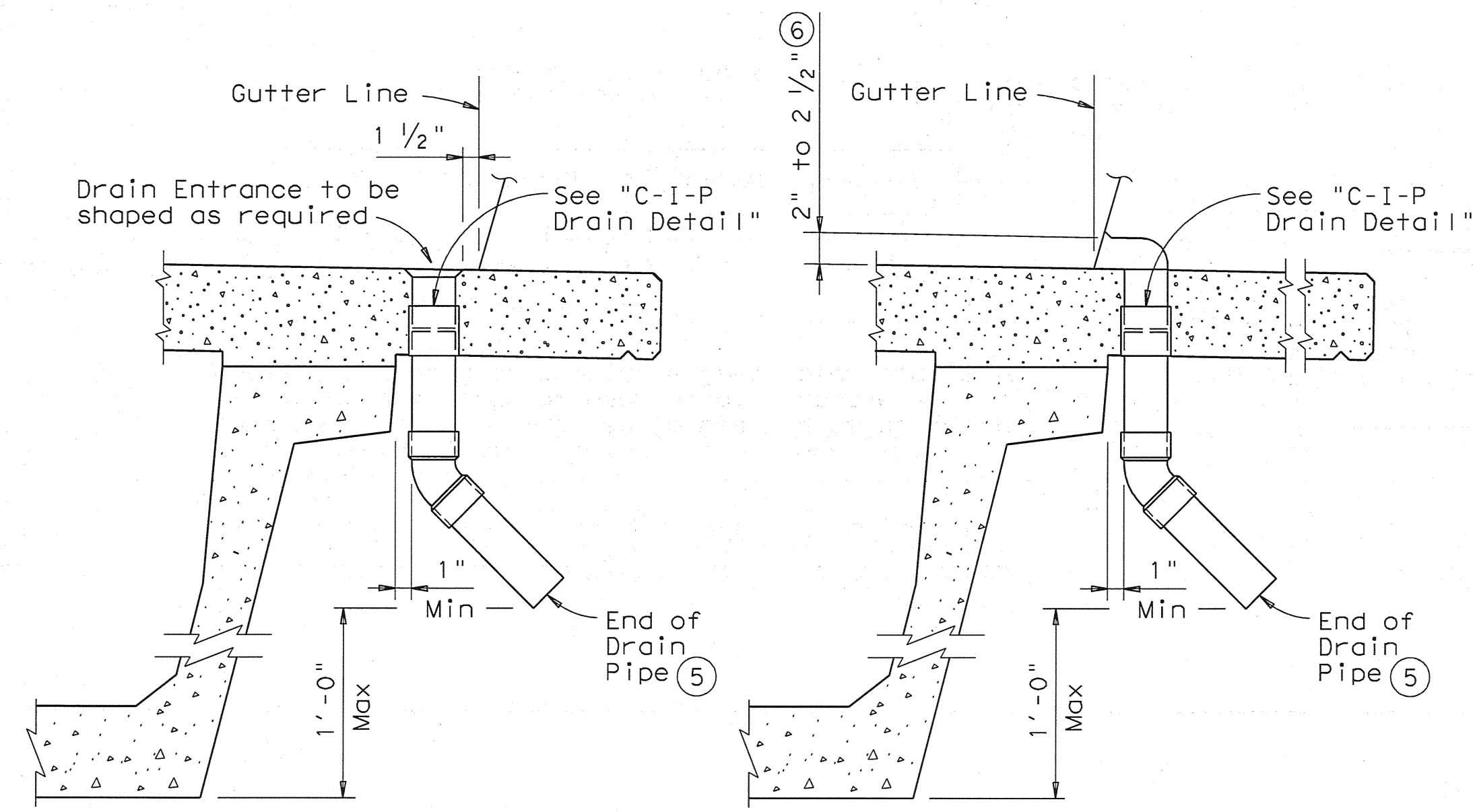


BARS W (#4)

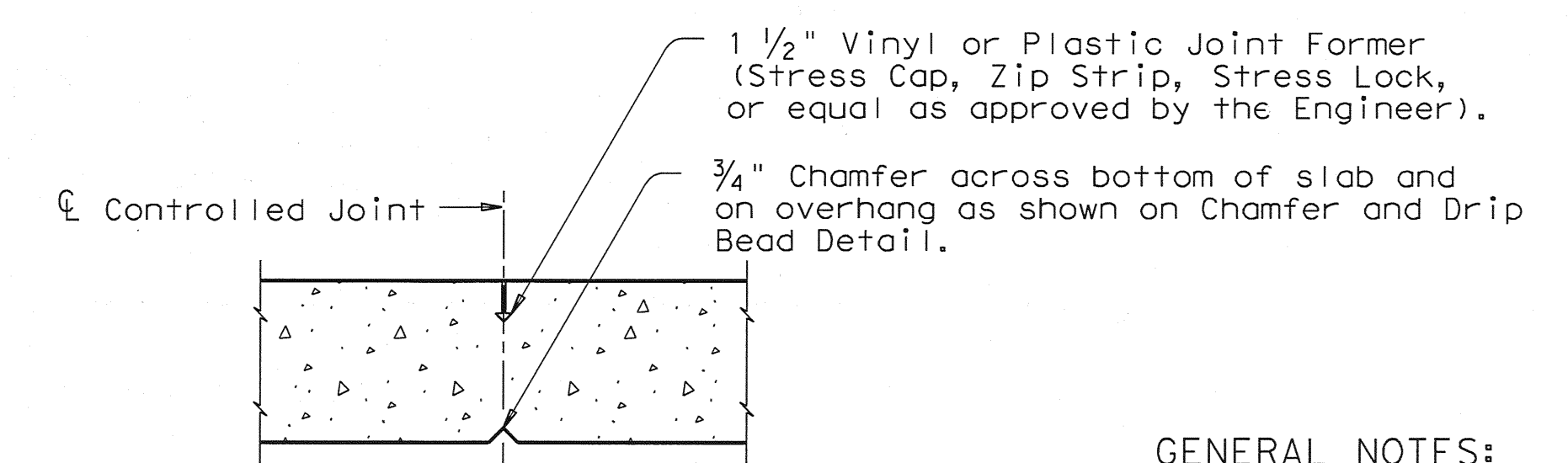
- ① Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.
- ② Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.
- ③ Field bend #4 Bars and tie securely to slab steel.
- ④ Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.
- ⑤ Water must not be discharged onto beams.
- ⑥ Drain Entrance formed in Rail or Sidewalk.
- ⑦ All drain pipe and fittings to be 4" diameter (Sch 40) PVC. See Item 481 "PVC Pipe for Drains" for pipe, connections and solvent welding. Bend reinforcing steel to clear PVC 1". Drain length and location will be as directed by the Engineer. No drains will be permitted over roadways or railways, or within 10'-0" of Bent Caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface finishing material as used for outside beam face. Variations of the above designs, as required for the type of rail used and its location on the structure, may be installed with the approval and direction of the Engineer.
- ⑧ Galvanized sheet steel can be used to form the slab when clear distance between beams is 1'-6" and less. All requirements for permanent metal deck forms shown on standard PMDF apply.
- ⑨ Bottom slab reinforcing for Permissible Slab Forming Detail must match the size and spacing of the top mat of steel as shown on the span details unless otherwise noted, except bottom reinforcing steel must be #5 bars. Transverse bottom slab reinforcing must have 1" end clear to edge of panel when used with PCP option.



C-I-P DRAIN DETAIL ④



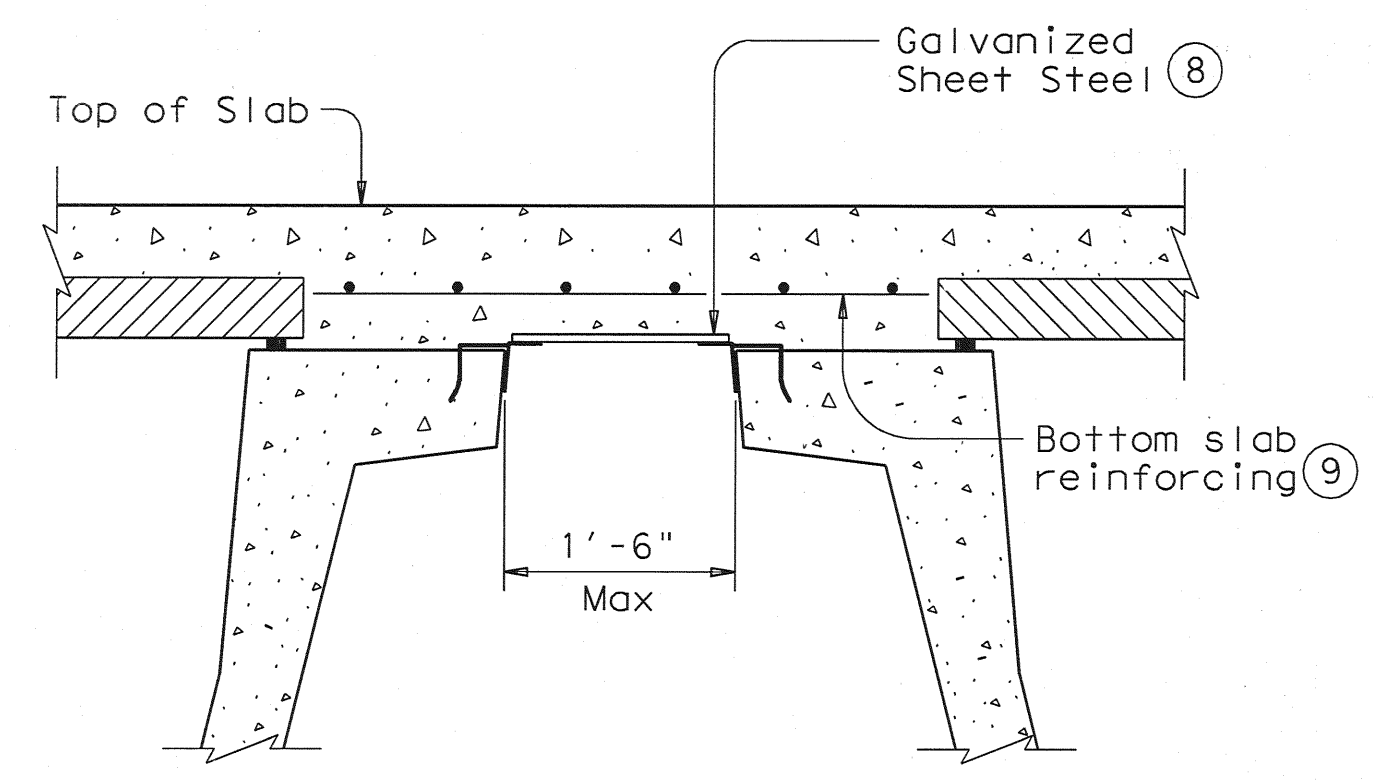
DRAIN DETAILS ⑦



CONTROLLED JOINT DETAIL

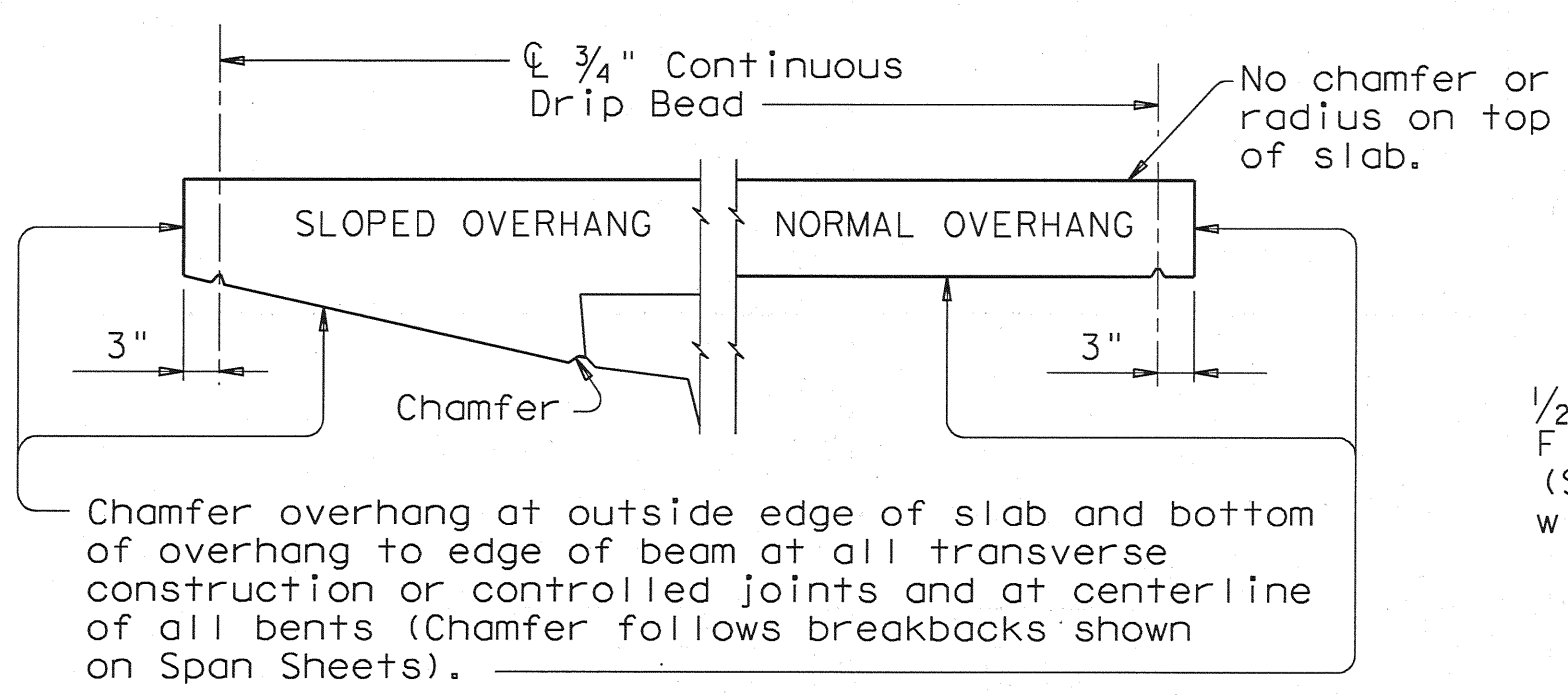
(Saw-cutting is not allowed)

GENERAL NOTES:
 Designed in accordance with AASHTO LRFD Specifications.
 All items (reinforcing steel, drains, joint formers, etc.) shown on this sheet are subsidiary to other bid items.

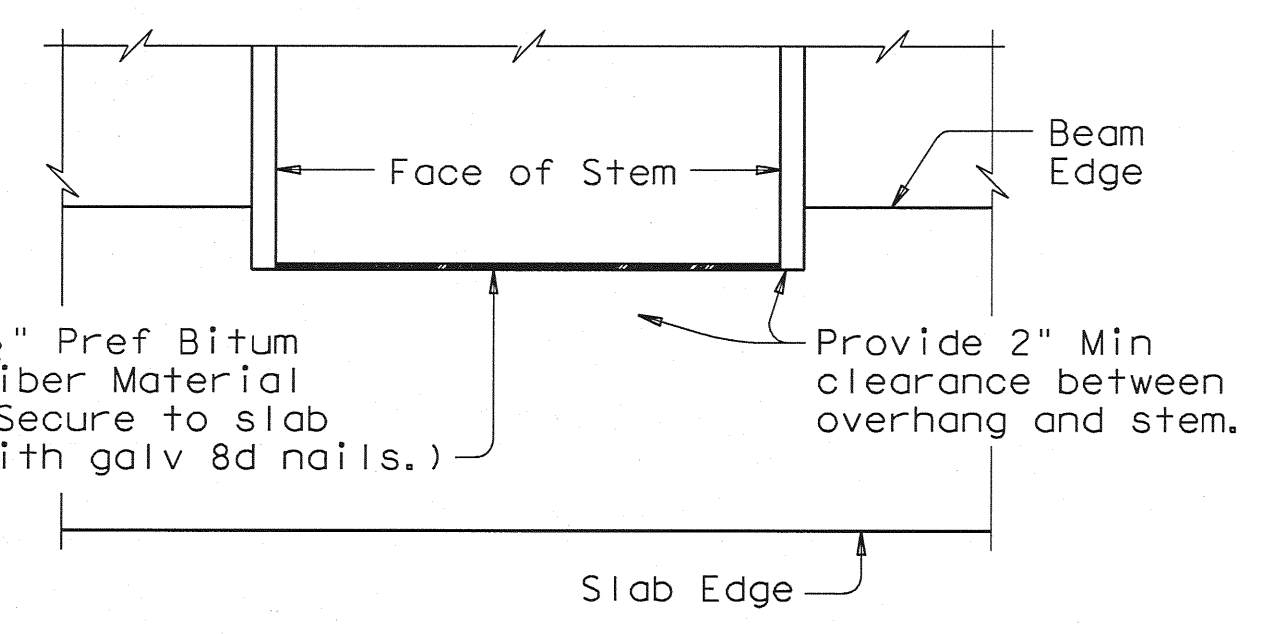


PERMISSIBLE SLAB FORMING DETAIL

See standard PMDF for connection details



CHAMFER AND DRIP BEAD DETAIL



VIEW A-A

Applies to sloped overhang only

MISCELLANEOUS SLAB DETAILS
PRESTR CONC U-BEAM SPANS

UBMS

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