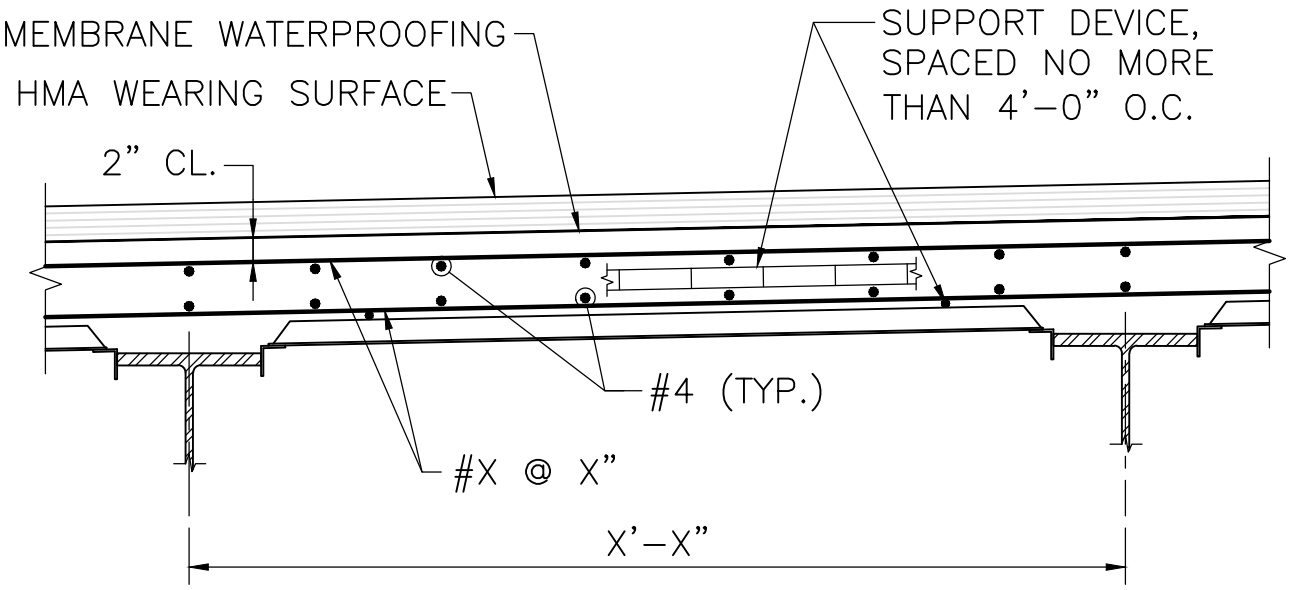


NOTES:

1. ROADWAY DECK SLAB SHALL BE 4000 PSI, $\frac{3}{4}$ IN, 585 HP CEMENT CONCRETE.

2. LONGITUDINAL REINFORCEMENT SHALL BE PLACED PARALLEL TO THE ℄ OF CONSTRUCTION.
   TRANSVERSE (PRIMARY) REINFORCEMENT SHALL BE PLACED PERPENDICULAR TO THE ℄ OF CONSTRUCTION.

3. ALL REINFORCEMENT AND SUPPORT DEVICES SHALL BE COATED.

4. THE FINISHED SURFACE OF BRIDGE DECK SHALL BE SMOOTH AND WITHOUT ANY PROJECTIONS THAT COULD PUNCTURE THE MEMBRANE WATERPROOFING OR DEPRESSIONS THAT COULD RETAIN WATER.
   (Include this note for bridges with HMA wearing surface)

4. BRIDGE DECK SHALL BE GROOVED TRANSVERSELY USING MULTI–BLADED SELF–PROPELLED SAWCUTTING EQUIPMENT.
   (Include this note for bridges with exposed decks)

TYPICAL DECK REINFORCEMENT

SCALE: $\frac{3}{4}$" = 1'–0"

NOTES:

1. *Modify the above drawing as required when exposed deck is used. Show actual beam type used.*
2. *For steel reinforcement and deck slab thickness see design tables on Dwg. No's. 7.1.2 thru 7.1.9 .*
3. *For decks continuous over piers show deck reinforcement at piers in a separate detail.*
4. *For curved girder bridges use the details on Dwg. No. 7.2.3.*

Deck Slab Reinforcement – Steel Stringers

Maximum Beam Spacing	Design Deck Thickness	Transverse (Primary) Reinforcement		Longitudinal Reinforcement	
		Bottom	Top	Bottom	Top
5' - 0"	8.0"	#4 @ 6.0 in	#4 @ 6.0 in	#4 @ 7.5 in	#4 @ 7.5 in
5' - 6"	8.0"	#4 @ 6.0 in	#4 @ 6.0 in	#4 @ 7.5 in	#4 @ 7.5 in
6' - 0"	8.0"	#4 @ 6.0 in	#4 @ 6.0 in	#4 @ 7.5 in	#4 @ 7.5 in
6' - 6"	8.0"	#4 @ 6.0 in	#4 @ 6.0 in	#4 @ 7.5 in	#4 @ 7.5 in
7' - 0"	8.0"	#5 @ 7.0 in	#5 @ 7.0 in	#4 @ 6.5 in	#4 @ 6.5 in
7' - 6"	8.0"	#5 @ 7.0 in	#5 @ 7.0 in	#4 @ 6.5 in	#4 @ 6.5 in
8' - 0"	8.0"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
8' - 6"	8.0"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
9' - 0"	8.0"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
9' - 6"	8.0"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
10' - 0"	8.5"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
10' - 6"	9.0"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
11' - 0"	9.0"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
11' - 6"	9.5"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
12' - 0"	10.0"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
12' - 6"	10.5"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
13' - 0"	11.0"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 5.5 in	#4 @ 5.5 in
13' - 6"	11.5"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 5.5 in	#4 @ 5.5 in
14' - 0"	12.0"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 5.0 in	#4 @ 5.0 in
14' - 6"	12.5"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 5.0 in	#4 @ 5.0 in
15' - 0"	13.0"	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 5.0 in	#4 @ 5.0 in

NOTES:

1. *For design assumptions see Dwg. No. 7.1.4.*
2. *See Part I, Article 3.5.2 for other relevant information.*

Deck Slab Reinforcement – Precast Concrete NEBT Beams, and 36" and 48" Precast Concrete Box Beams

Maximum Beam Spacing	Design Deck Thickness	Transverse (Primary) Reinforcement		Longitudinal Reinforcement	
		Bottom	Top	Bottom	Top
5' - 0 "	8.0 "	#4 @ 6.0 in	#4 @ 6.0 in	#4 @ 7.5 in	#4 @ 7.5 in
5' - 6 "	8.0 "	#4 @ 6.0 in	#4 @ 6.0 in	#4 @ 7.5 in	#4 @ 7.5 in
6' - 0 "	8.0 "	#4 @ 6.0 in	#4 @ 6.0 in	#4 @ 7.5 in	#4 @ 7.5 in
6' - 6 "	8.0 "	#4 @ 6.0 in	#4 @ 6.0 in	#4 @ 7.5 in	#4 @ 7.5 in
7' - 0 "	8.0 "	#4 @ 6.0 in	#4 @ 6.0 in	#4 @ 7.5 in	#4 @ 7.5 in
7' - 6 "	8.0 "	#5 @ 7.0 in	#5 @ 7.0 in	#4 @ 6.5 in	#4 @ 6.5 in
8' - 0 "	8.0 "	#5 @ 7.0 in	#5 @ 7.0 in	#4 @ 6.5 in	#4 @ 6.5 in
8' - 6 "	8.0 "	#5 @ 7.0 in	#5 @ 7.0 in	#4 @ 6.5 in	#4 @ 6.5 in
9' - 0 "	8.0 "	#5 @ 7.0 in	#5 @ 7.0 in	#4 @ 6.5 in	#4 @ 6.5 in
9' - 6 "	8.0 "	#5 @ 7.0 in	#5 @ 7.0 in	#4 @ 6.5 in	#4 @ 6.5 in
10' - 0 "	8.0 "	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
10' - 6 "	8.0 "	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
11' - 0 "	8.0 "	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
11' - 6 "	8.5 "	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
12' - 0 "	8.5 "	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
12' - 6 "	8.5 "	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
13' - 0 "	9.0 "	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
13' - 6 "	9.0 "	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
14' - 0 "	9.5 "	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
14' - 6 "	10.0 "	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in
15' - 0 "	10.5 "	#5 @ 6.0 in	#5 @ 6.0 in	#4 @ 6.0 in	#4 @ 6.0 in

NOTES:

1. For design assumptions see Dwg. No. 7.1.4.
2. See Part I, Article 3.5.2 for other relevant information.

DESIGN ASSUMPTIONS:

1. *Live Load moments are from AASHTO, LRFD, Table A4–1.*
2. *The weight of 3" thick wearing surface is included in design calculations.*
3. *AASHTO, LRFD, Article 9.7.2.4 states that the ratio of the deck slab's effective length to the design depth should not exceed 18. The deck reinforcement tables limit this ratio to 15. Please refer to LRFD, C9.7.2.4 for more information.*
4. *Concrete Strength f'_c = 4 ksi;*
   Reinforcing Steel Yield Strength f_y = 60 ksi.
5. *The design sections for Negative Moments were taken at the locations as per AASHTO LRFD Article 4.6.2.1.6. These locations are as follows:*
   - *4" from the beam centerline for steel girders, assuming the width of the top flange is 16".*
   - *at the face of precast prestressed box beams.*
   - *at 15" from the beam centerline for NEBT beams.*
6. *Top (temperature and shrinkage) and bottom (distribution) longitudinal reinforcement has been calculated based on AASHTO, LRFD, Articles 5.10.8 and 9.7.3.2, respectively. In addition, the quantity of steel was checked against the recommended minimum amounts identified in a study* initiated by the Indiana Department of Transportation (INDOT). This study recommends additional reinforcement above current practice to control transverse crack widths in concrete decks. Based on this document, the total amount of longitudinal reinforcing steel required shall not be less than:*

$$A_s = \frac{6\sqrt{f_c'}}{f_y} A_g$$

where:

A_g = *gross area of section,* in^2

A_s = *total area of longitudinal reinforcement in cross–section,* in^2

7. *In addition to the strength and service limit state requirements as per AASHTO LRFD, the amount of the primary (transverse) deck reinforcement (top and bottom) was also checked against the above recommended minimum amount of reinforcing steel to minimize potential longitudinal deck cracking.*
8. *The transverse (primary) reinforcement bar spacing coincides with the pitch provided (6" and 7") in the most widely available S.I.P. forms.*

** – Frosch, R.J., Blackman, D.T., and Radabaugh, R.D., "Investigation of Bridge Deck Cracking in Various Bridge Superstructure Systems", Joint Transportation Research Program, FHWA/IN/JTRP–2002/2.5, 160 pp.*

Additional Deck Overhang Reinforcement

CT-TL2 Barrier

Maximum Beam Spacing	Steel Stringers		Prestressed Concrete Beams	
	Additional Overhang Reinforcement	Bar Extension (L_{ext})	Additional Overhang Reinforcement	Bar Extension (L_{ext})
5' - 0"	#5 @ 6.0 in	2' - 6"	#5 @ 6.0 in	3' - 6"
5' - 6"	#5 @ 6.0 in	2' - 6"	#5 @ 6.0 in	3' - 6"
6' - 0"	#5 @ 6.0 in	2' - 3"	#5 @ 6.0 in	3' - 6"
6' - 6"	#5 @ 6.0 in	2' - 3"	#5 @ 6.0 in	3' - 6"
7' - 0"	#5 @ 7.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
7' - 6"	#5 @ 7.0 in	2' - 0"	#5 @ 7.0 in	3' - 6"
8' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 7.0 in	3' - 6"
8' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 7.0 in	3' - 6"
9' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 7.0 in	3' - 6"
9' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 7.0 in	3' - 6"
10' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
10' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
11' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
11' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
12' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
12' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
13' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
13' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
14' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
14' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
15' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"

NOTES:

1. For design assumptions see Dwg. No. 7.1.10.
2. See Part I, Article 3.5.2 for other relevant information.
3. See Chapter 9 for placement of the Additional Deck Overhang Reinforcement.

Additional Deck Overhang Reinforcement

S3-TL4 Railing

Maximum Beam Spacing	Steel Stringers		Prestressed Concrete Beams	
	Additional Overhang Reinforcement	Bar Extension (L_{ext})	Additional Overhang Reinforcement	Bar Extension (L_{ext})
5' - 0"	#6 @ 6.0 in	2' - 9"	#5 @ 6.0 in	3' - 6"
5' - 6"	#6 @ 6.0 in	2' - 9"	#5 @ 6.0 in	3' - 6"
6' - 0"	#6 @ 6.0 in	2' - 9"	#5 @ 6.0 in	3' - 6"
6' - 6"	#6 @ 6.0 in	2' - 9"	#5 @ 6.0 in	3' - 6"
7' - 0"	#6 @ 7.0 in	2' - 9"	#5 @ 6.0 in	3' - 6"
7' - 6"	#6 @ 7.0 in	2' - 9"	#6 @ 7.0 in	3' - 6"
8' - 0"	#6 @ 6.0 in	2' - 9"	#6 @ 7.0 in	3' - 6"
8' - 6"	#6 @ 6.0 in	2' - 9"	#6 @ 7.0 in	3' - 6"
9' - 0"	#5 @ 6.0 in	2' - 0"	#6 @ 7.0 in	3' - 6"
9' - 6"	#5 @ 6.0 in	2' - 0"	#6 @ 7.0 in	3' - 6"
10' - 0"	#5 @ 6.0 in	2' - 0"	#6 @ 6.0 in	3' - 6"
10' - 6"	#5 @ 6.0 in	2' - 0"	#6 @ 6.0 in	4' - 3"
11' - 0"	#5 @ 6.0 in	2' - 0"	#6 @ 6.0 in	4' - 3"
11' - 6"	#5 @ 6.0 in	2' - 0"	#6 @ 6.0 in	4' - 3"
12' - 0"	#5 @ 6.0 in	2' - 0"	#6 @ 6.0 in	4' - 3"
12' - 6"	#5 @ 6.0 in	2' - 0"	#6 @ 6.0 in	3' - 6"
13' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
13' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
14' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
14' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
15' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"

NOTES:

1. For design assumptions see Dwg. No. 7.1.10.
2. See Part I, Article 3.5.2 for other relevant information.
3. See Chapter 9 for placement of the Additional Deck Overhang Reinforcement.

Additional Deck Overhang Reinforcement

CP-PL2 Barrier

Maximum Beam Spacing	Steel Stringers		Prestressed Concrete Beams	
	Additional Overhang Reinforcement	Bar Extension (L_{ext})	Additional Overhang Reinforcement	Bar Extension (L_{ext})
5' - 0"	#5 @ 6.0 in	2' - 9"	#5 @ 6.0 in	3' - 6"
5' - 6"	#5 @ 6.0 in	2' - 9"	#5 @ 6.0 in	3' - 6"
6' - 0"	#5 @ 6.0 in	2' - 6"	#5 @ 6.0 in	3' - 6"
6' - 6"	#5 @ 6.0 in	2' - 6"	#5 @ 6.0 in	3' - 6"
7' - 0"	#5 @ 7.0 in	2' - 3"	#5 @ 6.0 in	3' - 6"
7' - 6"	#5 @ 7.0 in	2' - 3"	#5 @ 7.0 in	3' - 6"
8' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 7.0 in	3' - 6"
8' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 7.0 in	3' - 6"
9' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 7.0 in	3' - 6"
9' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 7.0 in	3' - 6"
10' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
10' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
11' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
11' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
12' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
12' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
13' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
13' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
14' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
14' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
15' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"

NOTES:

1. For design assumptions see Dwg. No. 7.1.10.
2. See Part I, Article 3.5.2 for other relevant information.
3. See Chapter 9 for placement of the Additional Deck Overhang Reinforcement.

Additional Deck Overhang Reinforcement

CF-PL2 Barrier

Maximum Beam Spacing	Steel Stringers		Prestressed Concrete Beams	
	Additional Overhang Reinforcement	Bar Extension (L_{ext})	Additional Overhang Reinforcement	Bar Extension (L_{ext})
5' - 0"	#6 @ 6.0 in	3' - 6"	#6 @ 6.0 in	4' - 0"
5' - 6"	#6 @ 6.0 in	3' - 9"	#6 @ 6.0 in	4' - 0"
6' - 0"	#6 @ 6.0 in	3' - 9"	#5 @ 6.0 in	3' - 9"
6' - 6"	#6 @ 6.0 in	3' - 9"	#5 @ 6.0 in	3' - 9"
7' - 0"	#6 @ 7.0 in	3' - 6"	#5 @ 6.0 in	3' - 9"
7' - 6"	#6 @ 7.0 in	3' - 6"	#5 @ 7.0 in	3' - 9"
8' - 0"	#5 @ 6.0 in	3' - 3"	#5 @ 7.0 in	3' - 9"
8' - 6"	#5 @ 6.0 in	3' - 3"	#5 @ 7.0 in	3' - 9"
9' - 0"	#5 @ 6.0 in	3' - 3"	#5 @ 7.0 in	3' - 9"
9' - 6"	#5 @ 6.0 in	3' - 3"	#5 @ 7.0 in	3' - 9"
10' - 0"	#5 @ 6.0 in	3' - 0"	#5 @ 6.0 in	3' - 9"
10' - 6"	#5 @ 6.0 in	3' - 0"	#5 @ 6.0 in	3' - 9"
11' - 0"	#5 @ 6.0 in	3' - 0"	#5 @ 6.0 in	3' - 9"
11' - 6"	#5 @ 6.0 in	2' - 9"	#5 @ 6.0 in	3' - 9"
12' - 0"	#5 @ 6.0 in	2' - 6"	#5 @ 6.0 in	3' - 6"
12' - 6"	#5 @ 6.0 in	2' - 3"	#5 @ 6.0 in	3' - 6"
13' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
13' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
14' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
14' - 6"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"
15' - 0"	#5 @ 6.0 in	2' - 0"	#5 @ 6.0 in	3' - 6"

NOTES:

1. For design assumptions see Dwg. No. 7.1.10.
2. See Part I, Article 3.5.2 for other relevant information.
3. See Chapter 9 for placement of the Additional Deck Overhang Reinforcement.

Additional Deck Overhang Reinforcement

CF-PL3 Barrier

Maximum Beam Spacing	Steel Stringers		Prestressed Concrete Beams	
	Additional Overhang Reinforcement	Bar Extension (L_{ext})	Additional Overhang Reinforcement	Bar Extension (L_{ext})
5' - 0"	#7 @ 6.0 in	4' - 0"	#6 @ 6.0 in	4' - 3"
5' - 6"	#7 @ 6.0 in	4' - 6"	#6 @ 6.0 in	4' - 3"
6' - 0"	#7 @ 6.0 in	4' - 6"	#6 @ 6.0 in	4' - 6"
6' - 6"	#7 @ 6.0 in	4' - 6"	#6 @ 6.0 in	4' - 6"
7' - 0"	#7 @ 7.0 in	4' - 6"	#6 @ 6.0 in	4' - 9"
7' - 6"	#7 @ 7.0 in	4' - 6"	#6 @ 7.0 in	4' - 9"
8' - 0"	#7 @ 6.0 in	4' - 6"	#6 @ 7.0 in	5' - 0"
8' - 6"	#7 @ 6.0 in	4' - 6"	#6 @ 7.0 in	5' - 0"
9' - 0"	#7 @ 6.0 in	4' - 6"	#6 @ 7.0 in	5' - 6"
9' - 6"	#7 @ 6.0 in	4' - 9"	#6 @ 7.0 in	5' - 6"
10' - 0"	#7 @ 6.0 in	4' - 9"	#6 @ 6.0 in	5' - 6"
10' - 6"	#6 @ 6.0 in	4' - 6"	#6 @ 6.0 in	5' - 6"
11' - 0"	#6 @ 6.0 in	4' - 6"	#6 @ 6.0 in	5' - 6"
11' - 6"	#6 @ 6.0 in	4' - 3"	#6 @ 6.0 in	5' - 6"
12' - 0"	#6 @ 6.0 in	4' - 0"	#5 @ 6.0 in	5' - 6"
12' - 6"	#6 @ 6.0 in	3' - 9"	#5 @ 6.0 in	5' - 6"
13' - 0"	#6 @ 6.0 in	3' - 6"	#5 @ 6.0 in	5' - 3"
13' - 6"	#6 @ 6.0 in	3' - 6"	#5 @ 6.0 in	5' - 3"
14' - 0"	#6 @ 6.0 in	3' - 0"	#5 @ 6.0 in	5' - 0"
14' - 6"	#6 @ 6.0 in	3' - 0"	#5 @ 6.0 in	5' - 0"
15' - 0"	#6 @ 6.0 in	2' - 9"	#5 @ 6.0 in	5' - 0"

NOTES:

1. For design assumptions see Dwg. No. 7.1.10.
2. See Part I, Article 3.5.2 for other relevant information.
3. See Chapter 9 for placement of the Additional Deck Overhang Reinforcement.

DESIGN ASSUMPTIONS:

1. *The required overhang reinforcement demand was checked based on the requirements of Appendix A13 of the AASHTO LRFD Bridge Design Specifications. Three (3) design cases as described in Article A13.4.1 were considered.*

2. *The flexural resistance of the concrete barriers (CF–PL2, CF–PL3, CP–PL2, and CT–TL2) at their base was used as the overhang design collision moment as per AASHTO–LRFD Article A13.4.2. The flexural resistance of the post was used to compute the design collision moment for post–and–beam (S3–TL4) railing.*

3. *The required reinforcement was computed based on the maximum overhang length, which was defined for each barrier/railing type as follows:*

   3'–0" – for steel stringer superstructures, measured from the centerline of the fascia stringer to the edge of deck;
   2'–6" – for prestressed concrete box superstructures, measured from the outside face of the fascia beam to the edge of deck;
   2'–0" – for NEBT beam superstructures, measured from the outside edge of the top flange of the fascia beam to the edge of deck.

4. *The wheel load of the HL–93 design truck was assumed to be located 1 ft away from the face of the barrier/railing as per on AASHTO–LRFD Article 3.6.1.3. and it was distributed over the width of the equivalent strip of a deck as per AASHTO–LRFD Article 4.6.2.1.3.*

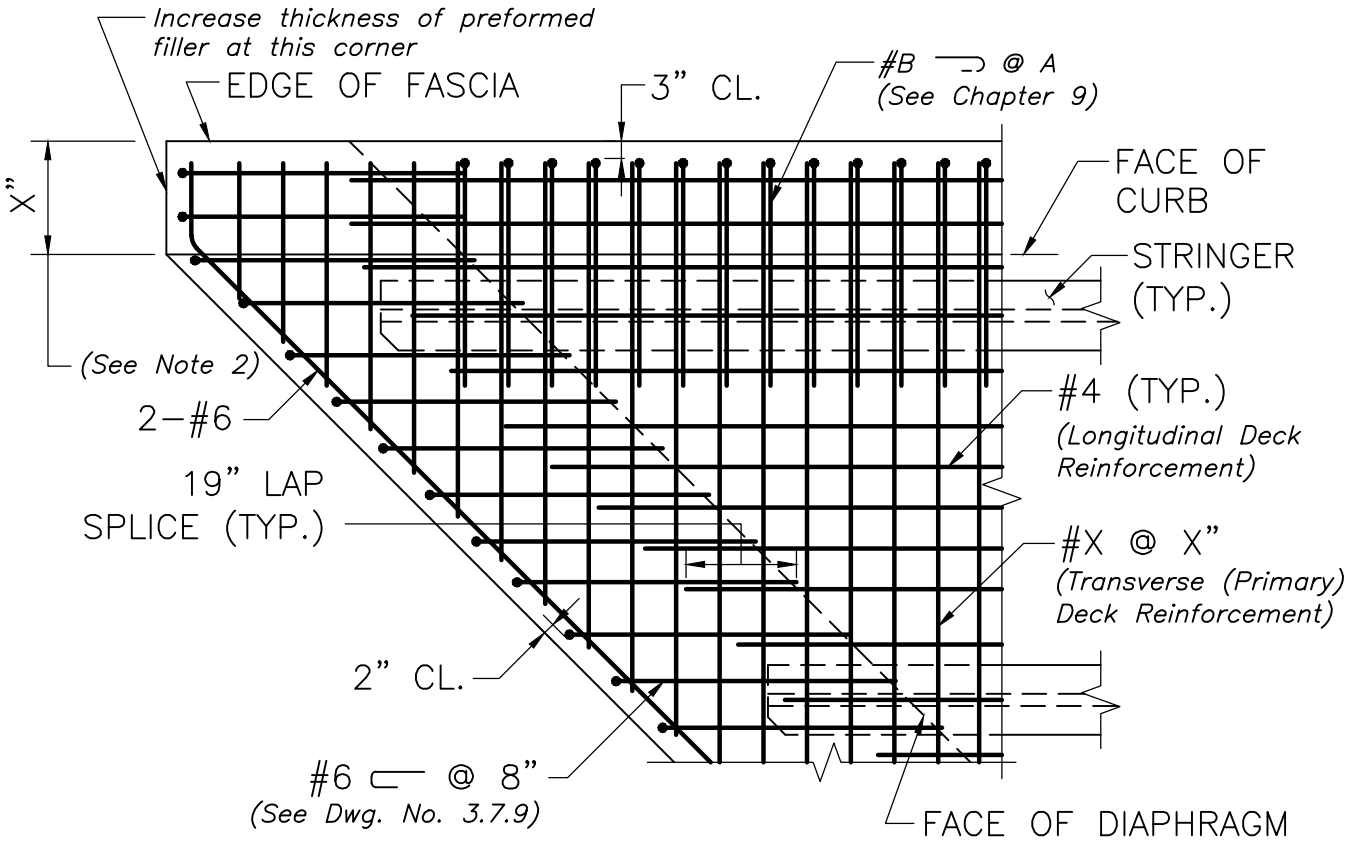
5. *The top flange of the steel stringers was assumed to be 16" wide.*

6. *The thickness of the overhang for decks supported by the steel stringers was assumed to be equal to the regular deck thickness plus $1\frac{1}{2}$". For deck supported by the prestressed concrete box beams and NEBT's, the overhang thickness was taken as the regular deck thickness plus $2\frac{1}{2}$".*

7. *The clear cover of the additional deck reinforcement at the top of the deck was assumed to be equal to 2 inches as for the regular deck top reinforcement.*

8. *Concrete Strength:*
   CIP deck and overhangs: $f'_c = 4$ ksi;
   CIP barriers: $f'_c = 5$ ksi;

Reinforcing Steel Yield Strength: $f_y = 60$ ksi.

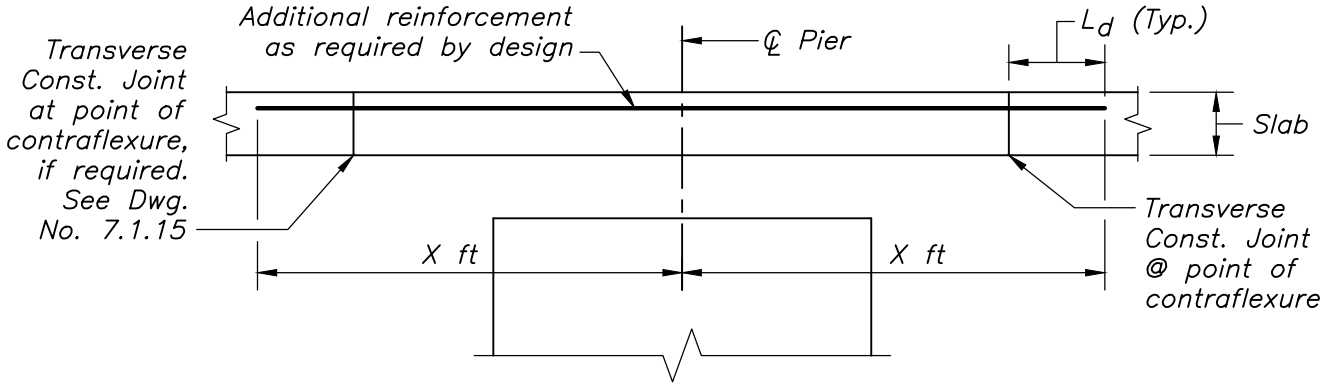


PLAN AT ACUTE CORNER

SCALE: $\frac{3}{8}$" = 1'–0"

NOTES:

1. Provide detail shown above, modified as required, on bridges with skew angles greater than 35°.
2. Width of barrier or 2'–0" at sidewalk.

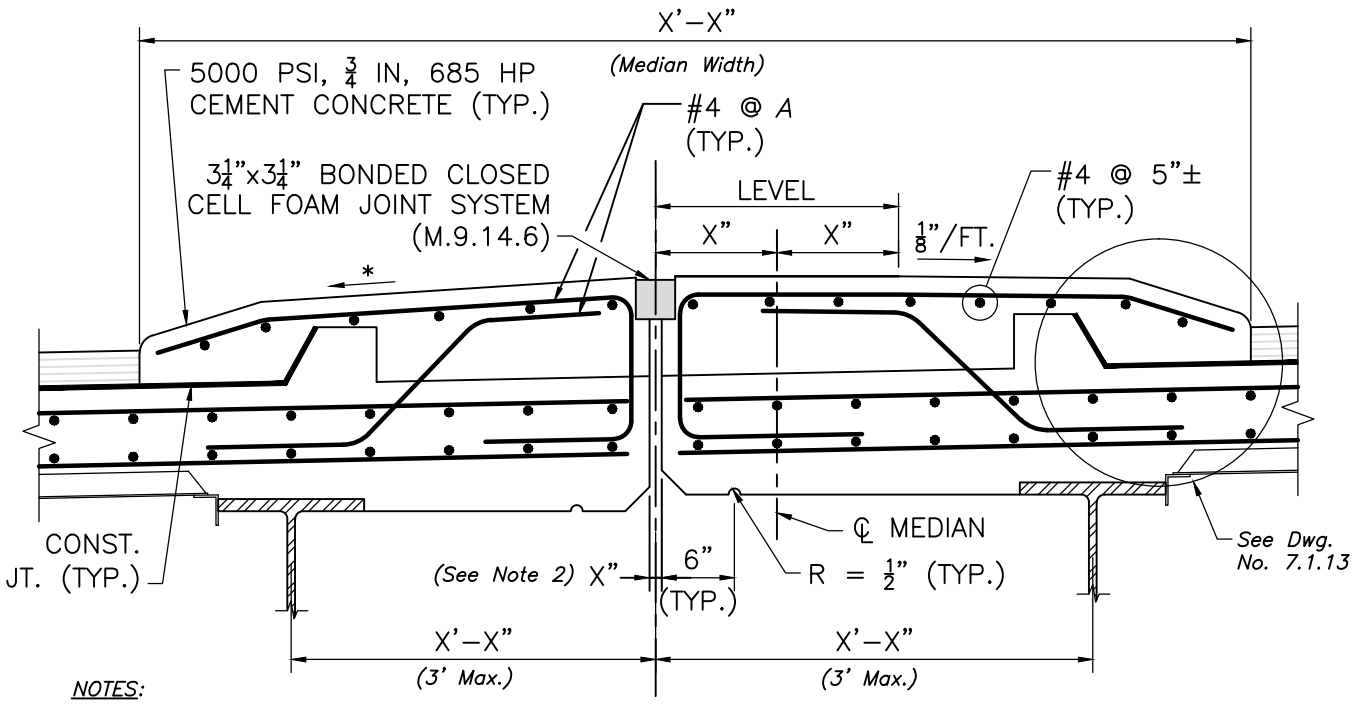


SECTION AT PIER

NOT TO SCALE

NOTE:

Deck slabs of Continuous Spans over piers shall have additional reinforcement placed in the top of the slab. Details shall be shown on the Construction Drawings. If bars larger than #5 are used for this reinforcement, the Designer shall check the clearance between the reinforcing mats.



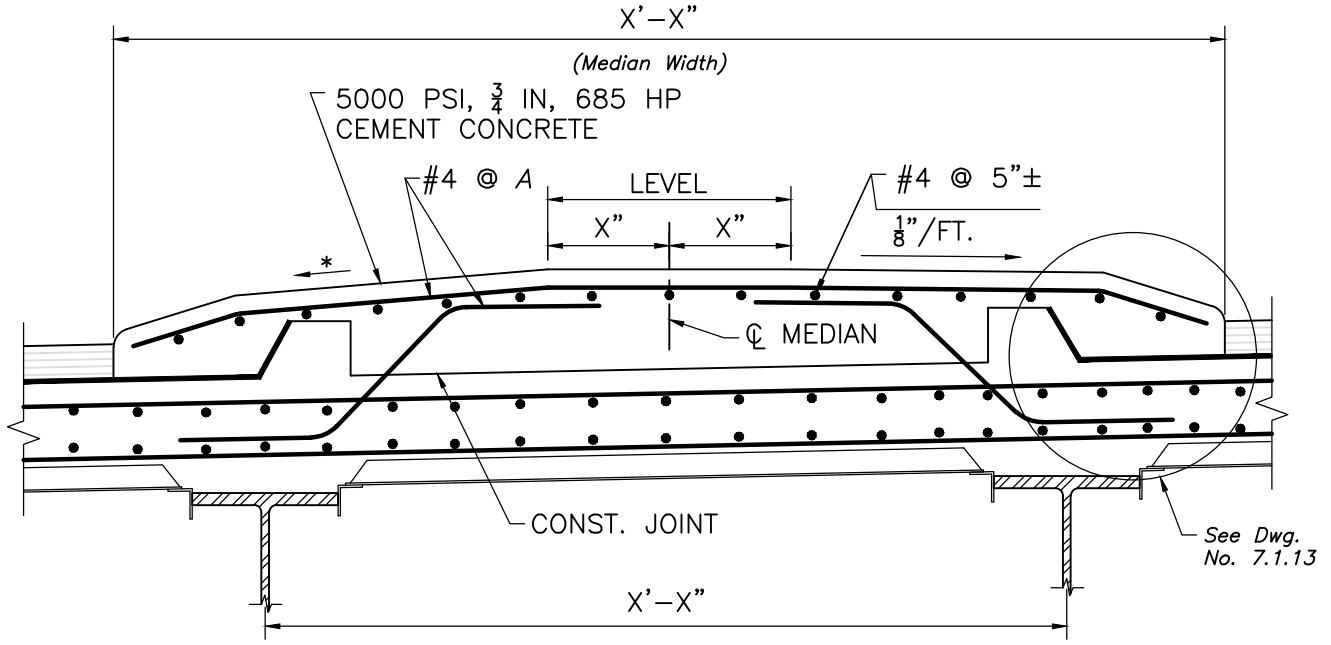
NOTES:

1. Bearings shall be designed to provide for transverse movement.
2. Dimension X" is equal to the Amount of Thermal Expansion + 1").

* ⅛"/FT. MIN., SLOPE TO SUIT

WITH LONGITUDINAL JOINT

(To be used only where total width of bridge exceeds 72'±)



WITHOUT LONGITUDINAL JOINT

* ⅛"/FT. MIN., SLOPE TO SUIT

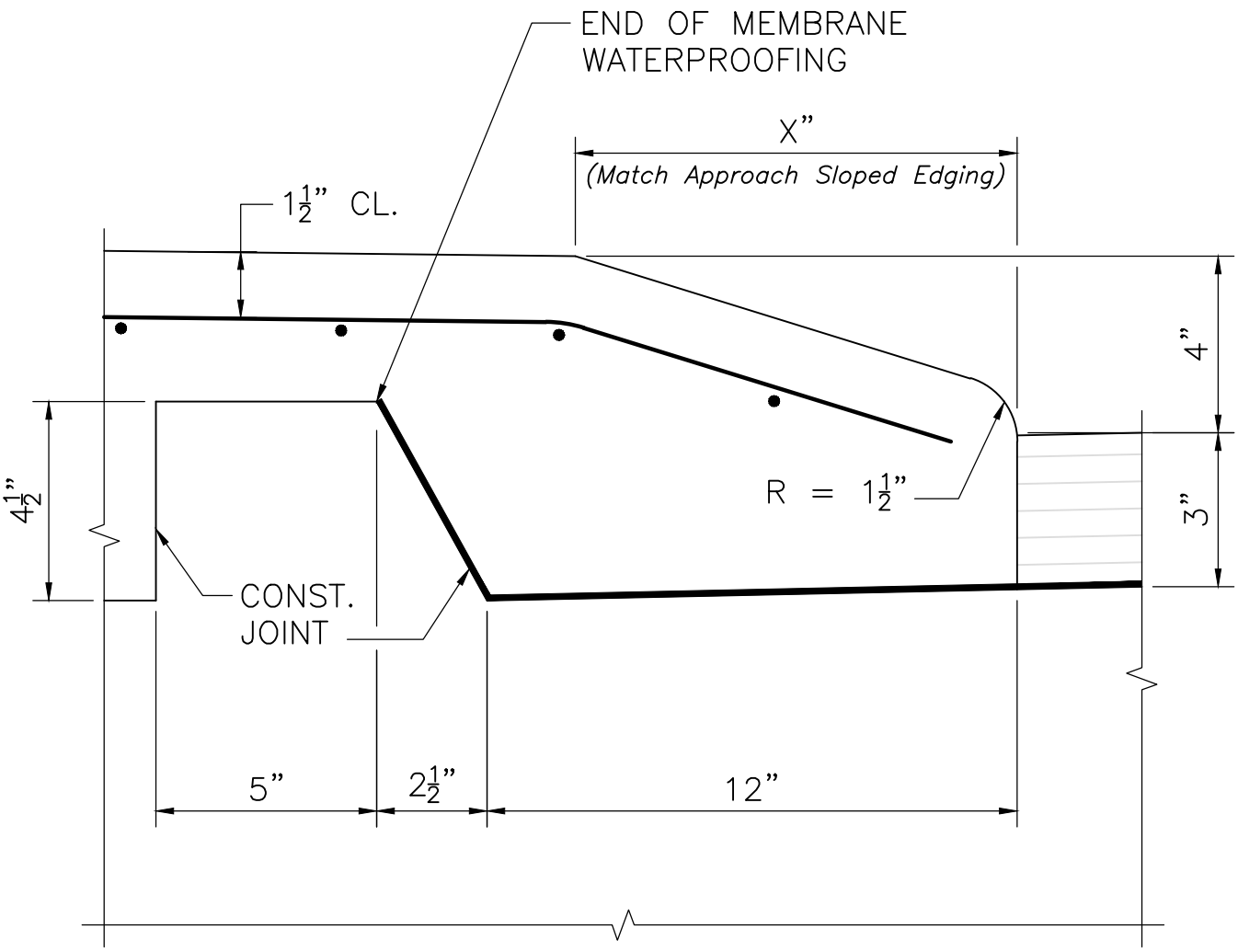
MEDIAN DETAILS

SCALE: 1" = 1'–0"

NOTES:

1. A = same spacing as deck slab reinforcement.
2. If a median rail or barrier is required, consult Director of Bridges and Structures for appropriate Crash Tested System. Omit level surface on bridges without median rail or barrier.
3. Details for separated precast beams are similar.

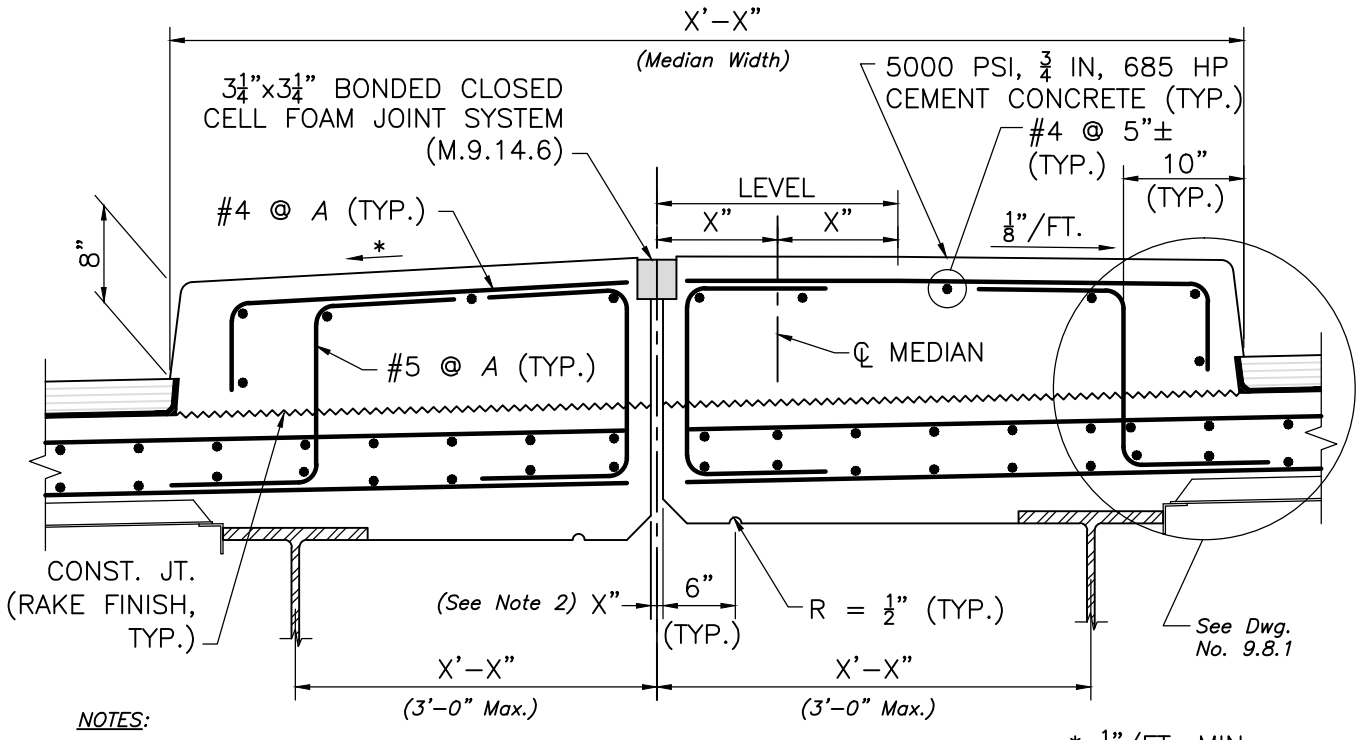
MassDOT Highway Division LRFD BRIDGE MANUAL, PART II	MEDIAN DETAILS WITHOUT APPROACH CURB GENERAL DECK DETAILS	DATE OF ISSUE JUNE 2013 DRAWING NUMBER **7.1.12**



MEDIAN CURB DETAIL

SCALE: 3" = 1'–0"

MassDOT Highway Division LRFD BRIDGE MANUAL, PART II	MEDIAN CURB DETAIL WITHOUT APPROACH CURB GENERAL DECK DETAILS	DATE OF ISSUE JUNE 2013 DRAWING NUMBER **7.1.13**



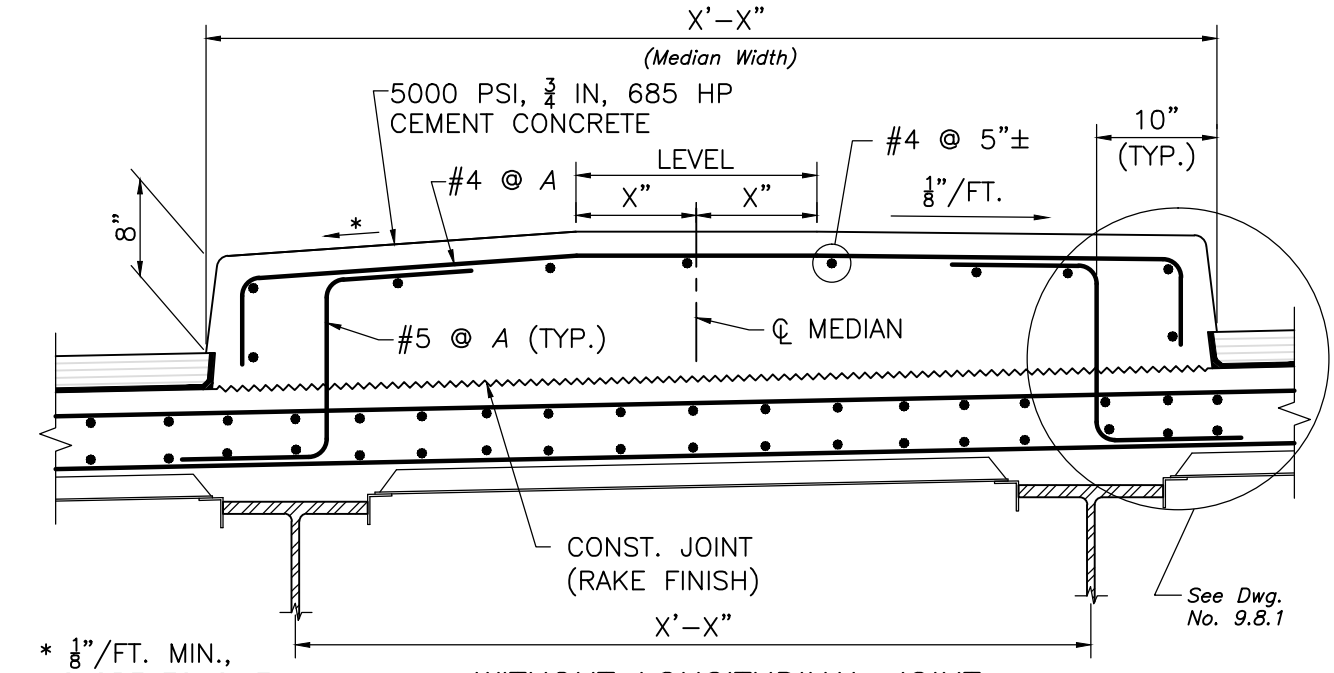
NOTES:

1. Bearings shall be designed to provide for transverse movement.
2. Dimension X" is equal to the Amount of Thermal Expansion + 1").

* ⅛"/FT. MIN., SLOPE TO SUIT

WITH LONGITUDINAL JOINT

(To be used only where total width of bridge exceeds 72'±)



* ⅛"/FT. MIN., SLOPE TO SUIT

WITHOUT LONGITUDINAL JOINT

MEDIAN DETAILS

SCALE: 1" = 1'–0"

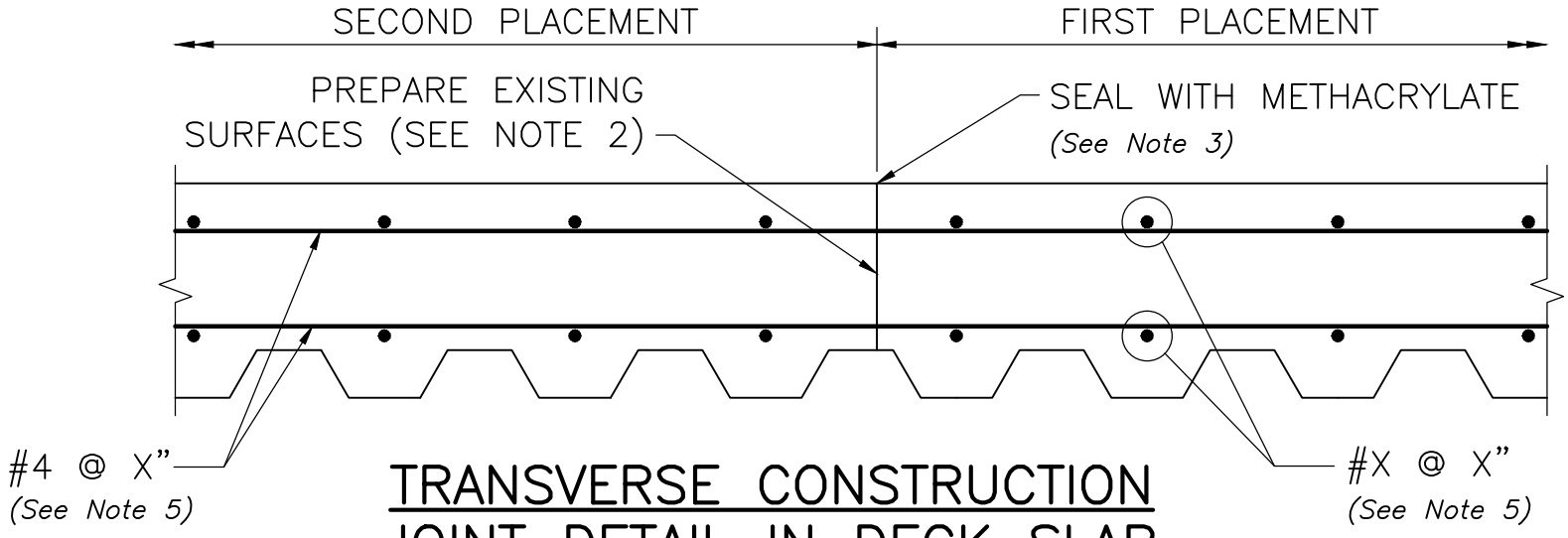
NOTES:

1. A = same spacing as deck slab reinforcement.
2. If a median rail or barrier is required, consult Director of Bridges and Structures for appropriate Crash Tested System. Omit level surface on bridges without median rail or barrier.
3. Details for separated precast beams are similar.

massDOT Highway Division LRFD BRIDGE MANUAL, PART II	MEDIAN DETAILS WITH APPROACH CURB GENERAL DECK DETAILS	DATE OF ISSUE JUNE 2013 DRAWING NUMBER **7.1.14**

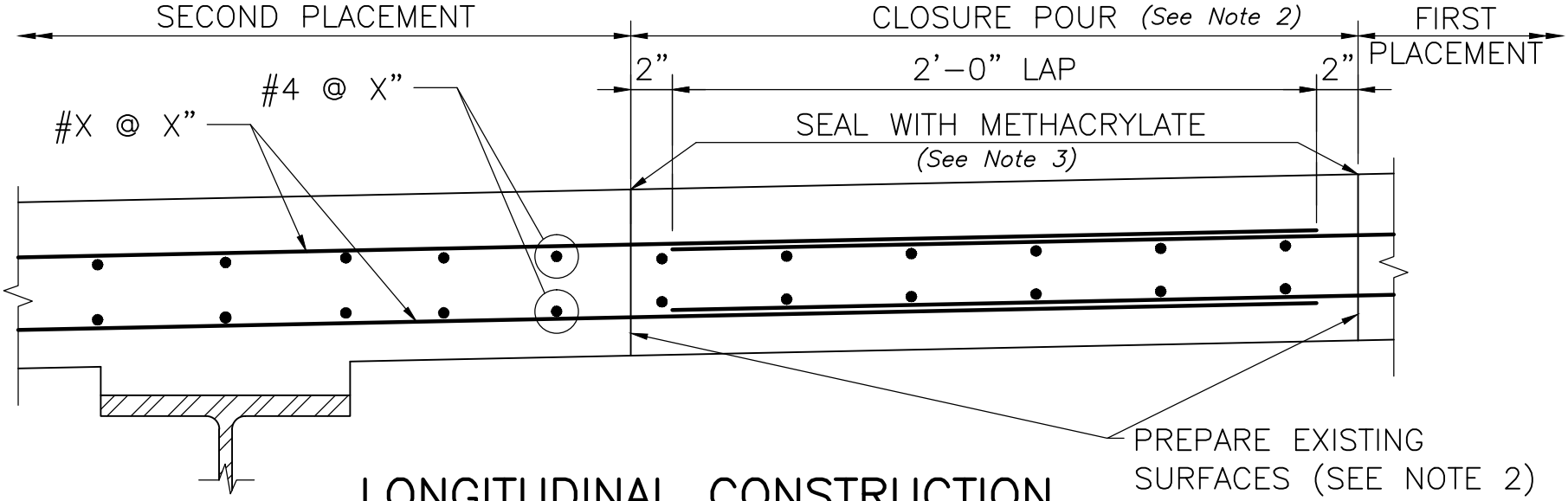
CONSTRUCTION JOINTS

GENERAL DECK DETAILS



TRANSVERSE CONSTRUCTION JOINT DETAIL IN DECK SLAB

SCALE: $1\frac{1}{2}$" = 1'–0"



LONGITUDINAL CONSTRUCTION JOINT DETAIL IN DECK SLAB

SCALE: $1\frac{1}{2}$" = 1'–0"

For Construction and Designer Notes see Dwg. No. 7.1.16

DATE OF ISSUE
JUNE 2013

DRAWING NUMBER
7.1.15

NOTES:

1. BRIDGE DECK SLAB SHALL BE PLACED IN ACCORDANCE WITH THE PLACEMENT SEQUENCE SHOWN ON THE PLANS.
(Include this note on integral abutment bridges)

1. BRIDGE DECK SLAB SHALL BE PLACED IN ACCORDANCE WITH THE PLACEMENT SEQUENCE SHOWN ON THE PLANS. THE CONTRACTOR MAY PLACE THE ENTIRE DECK IN ONE CONTINUOUS OPERATION WITHOUT CONSTRUCTION JOINTS WITH THE APPROVAL OF THE ENGINEER PROVIDED THAT THE INITIAL SET (Fc = 500 PSI) OF ALL CONCRETE DOES NOT OCCUR UNTIL AFTER THE COMPLETION OF THE PLACEMENT. AN APPROVED RETARDER SHALL BE USED, WHEN NECESSARY, TO RETAIN THE WORKABILITY OF THE CONCRETE. IF MULTIPLE PLACEMENTS ARE MADE, POSITIVE MOMENT REGIONS SHALL BE PLACED PRIOR TO NEGATIVE MOMENT REGIONS AND A MINIMUM OF 72 HOURS SHALL PASS BETWEEN PLACEMENTS.
(Include this note on continuous span non–integral bridges)
2. THE SURFACE OF THE PREVIOUSLY CAST CONCRETE SHALL BE BLAST CLEANED, ROUGHENED, WETTED WITH CLEAN WATER, AND THEN FLUSHED WITH A MORTAR COMPOSED OF EQUAL PARTS OF THE CEMENT AND SAND SPECIFIED FOR THE NEW CONCRETE, BEFORE NEW CONCRETE IS PLACED ADJACENT THERETO. NEW CONCRETE SHALL BE PLACED BEFORE MORTAR HAS TAKEN INITIAL SET.

3. IN LIEU OF THE MORTAR, AN EPOXY ADHESIVE SUITABLE FOR BONDING FRESH CONCRETE TO HARDENED CONCRETE FOR LOAD BEARING APPLICATIONS MAY BE USED. THE EPOXY ADHESIVE SHALL CONFORM TO AASHTO M 235 TYPE V AND SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

4. THE CONTRACTOR MAY SUBMIT A PROPOSAL DETAILING THE ELIMINATION OF THE CLOSURE POUR FOR THE APPROVAL OF THE ENGINEER. THE PROPOSAL SHALL DETAIL THE CONTRACTOR'S MEANS AND METHODS FOR ACCURATELY CONSTRUCTING THE DECK SLAB TO THE LINES, GRADES, AND THICKNESS SHOWN ON THE PLANS WITHOUT LEAKAGE OF CONCRETE.

5. DOWEL BAR SPLICERS SHALL BE USED WHERE USE OF LAP SPLICES IS NOT FEASIBLE.

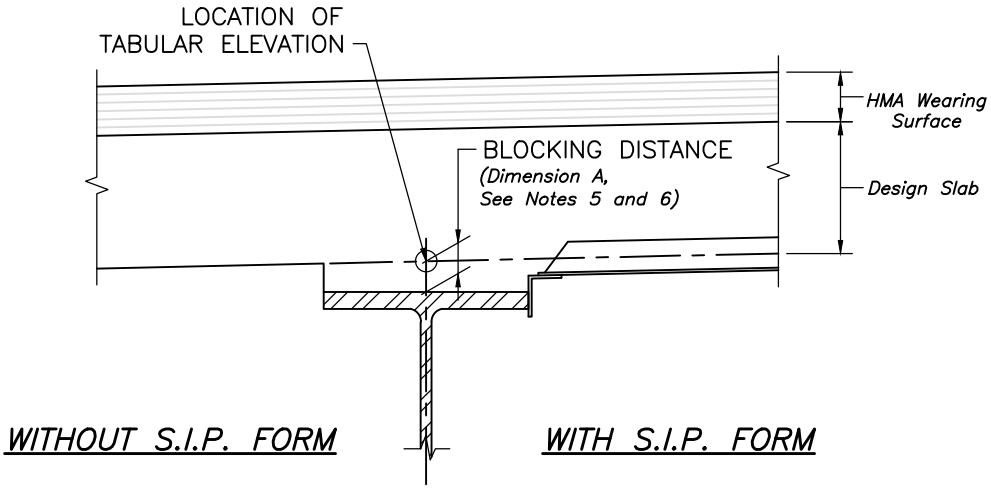
NOTES:

1. *Wherever feasible, the concrete bridge deck shall be continuously placed over the full length and width of the bridge in order to minimize the potential for cracking and future deterioration. Concrete slabs for single non–integral spans and for each span of multiple simple span bridges shall be placed in one continuous operation without construction joints. In all other cases include the following:*
   a) *The Construction Notes shown above;*
   b) *Details of the deck construction joints;*
   c) *Location of the longitudinal joints, if any;*
   d) *Location of the transverse construction joints on continuous structures, if any (at the dead load point of contraflexure).*
2. *Closure pours are generally only required for stage construction conditions where large differential deflections are anticipated and/or diaphragm action between deck placement stages is limited.*
3. *Methacrylate crack sealer shall be used for exposed decks, as well as for bridges with HMA wearing surface.*
4. *Exposed deck is shown. Show HMA wearing surface when applicable.*
5. *For curved girders, transverse (primary) steel reinforcement in the lower mat does not need to be centered over the valleys of the S.I.P. forms and shall have 1½" clearance over the peaks of the S.I.P. forms.*

	TOP OF FORM ELEVATIONS FOR DECK SLAB PRIOR TO PLACEMENT OF CONCRETE								
BEAM NO.	INCREASING STATIONS →								
	℄ BRG.	1/8 PT.	1/4 PT.	3/8 PT.	1/2 PT.	5/8 PT.	3/4 PT.	7/8 PT.	℄ BRG.

NOTE:

AFTER THE BEAMS ARE ERECTED BUT BEFORE THE FORMS ARE BUILT, ELEVATIONS ON TOP OF THE FLANGE OF THE BEAMS ARE TO BE OBTAINED AT THE POINTS INDICATED IN THE TABLE. THE DIFFERENCE BETWEEN THE ELEVATIONS OBTAINED AND THOSE SHOWN IN THE TABLE GIVES THE ACTUAL BLOCKING DISTANCE FROM THE TOP OF BEAM TO THE BOTTOM OF THE SLAB AT CENTER LINE OF BEAM.



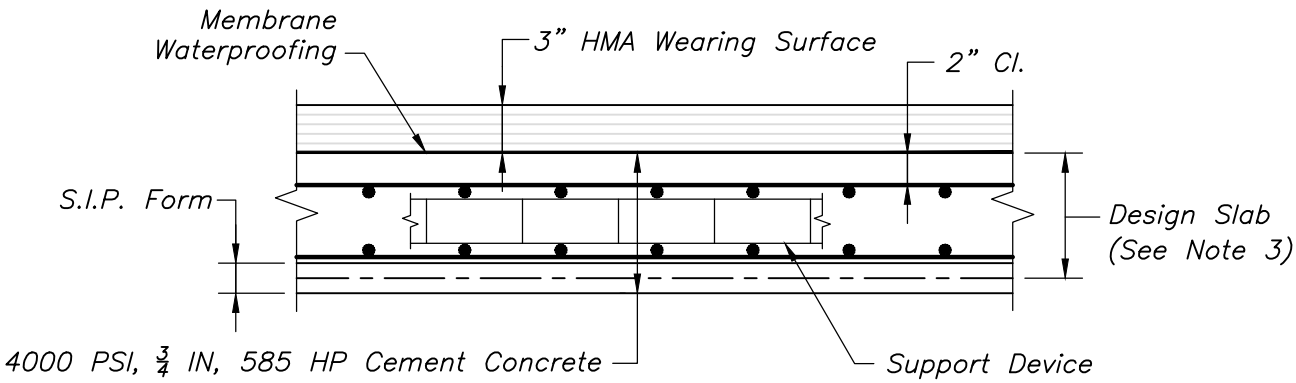
HAUNCH DETAIL

TOP OF FORM DETAILS

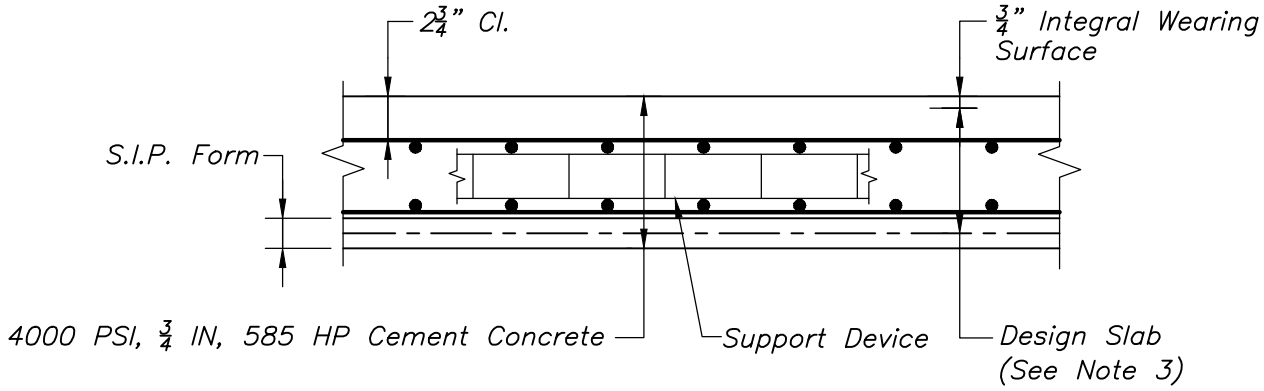
NOT TO SCALE

NOTES:

1. *The haunch detail above shows both methods of deck construction, i.e. with S.I.P. forms and w/o S.I.P. forms. The Designer shall modify the detail as required to suite the actual project.*
2. *The Top of Form Elevation Table and Haunch Detail shall appear on the Construction Drawings.*
3. *For spans of 50 ft. and less, elevations are to be shown at 1/4 points only.*
4. *The tabular elevations shall be calculated by taking the proposed finished grade at the centerline of beams and:*
   - *A) Subtracting the surfacing and concrete slab thickness and*
   - *B) Adding the theoretical deflection of the beams due to the weight of the slab, surfacing, and all other superimposed dead loads.*
5. *At the point of maximum camber, dimension A shall be 1" for spans up to 50 ft. and 1½" for spans over 50 ft. Use dimension A for the computation of bridge seat elevations, but do not show on the Construction Drawings. Dimension A shall be considered as 0" when calculating the physical properties of composite beams, however, the weight of haunch shall be included in the design calculations.*
6. *For plate girders with different top flange plate thicknesses or rolled beams with top flange cover plates, Dimension A shall be measured from the top of the thickest plate or top of cover plate.*



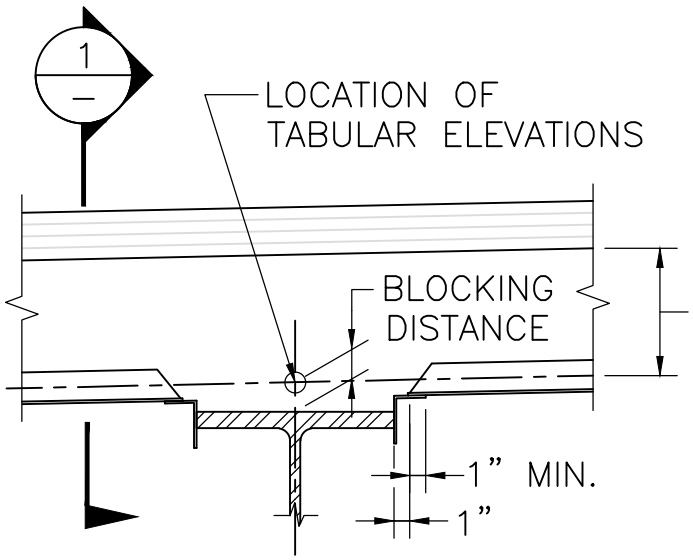
HOT MIX ASPHALT (HMA) WEARING SURFACE



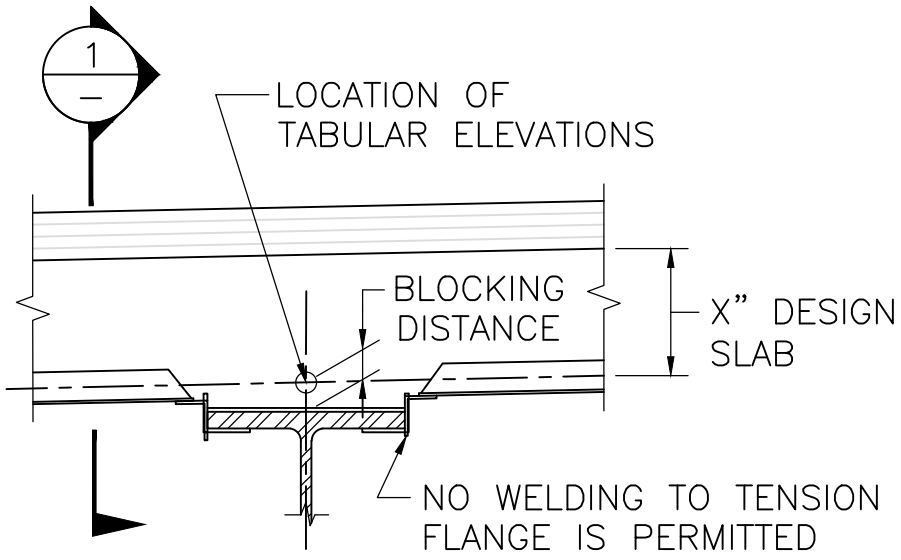
EXPOSED DECK

NOTES:

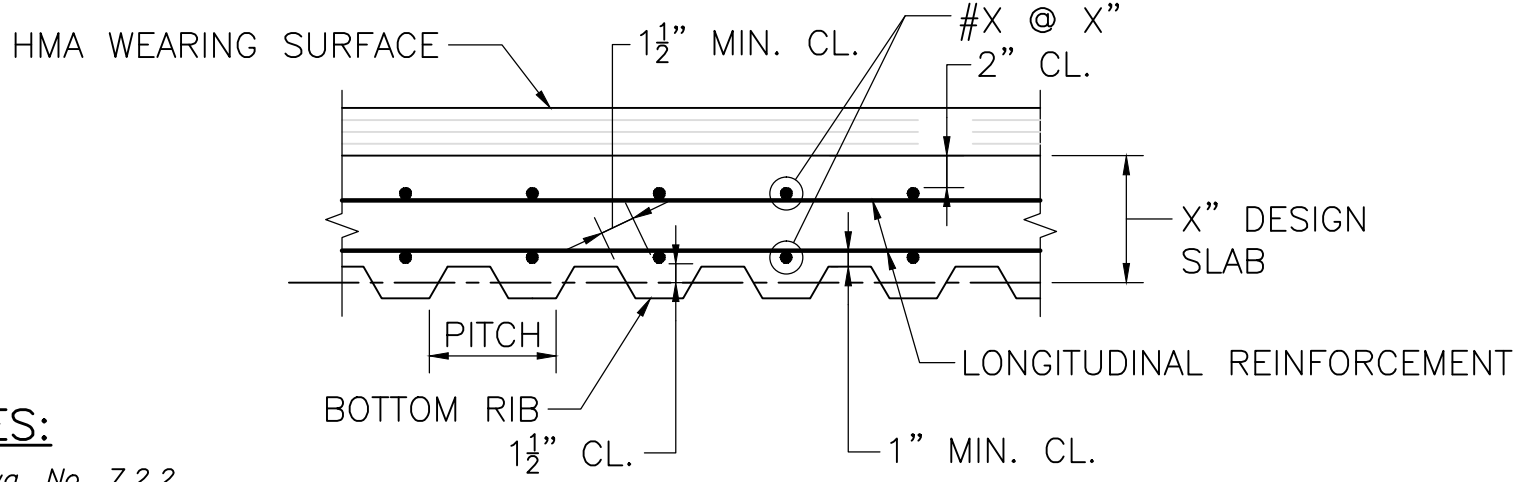
1. HMA wearing surface shall be placed on all bridges when the profile slope on the bridge is less than or equal to 4%.
2. When the profile slope on the bridge is greater than 4% or when special conditions may warrant the Designer shall select exposed deck option.
3. For curved girders, the form valleys will be filled with expanded polystyrene (EPS) and the bottom of the design slab will be at the peaks of the forms.



HAUNCH DETAIL AT NON–TENSION FLANGE AREA



HAUNCH DETAIL AT TENSION FLANGE AREA



SECTION 1

STAY–IN–PLACE FORM DETAILS

NOT TO SCALE

NOTES:

(See Dwg. No. 7.2.2 for Construction Notes to be provided here.)

NOTE:

Adjust the above details as necessary for exposed deck bridges.

DATE OF ISSUE JUNE 2013

DRAWING NUMBER **7.2.1**

(Include these Notes with details shown on dwg. No. 7.2.1)

NOTES:

1. FOR 2" S.I.P. FORM, SET BOTTOM OF FORM 1" BELOW ELEVATION GIVEN IN TABLE. FOR 3" S.I.P. FORM, SET BOTTOM OF FORM $1\frac{1}{2}$" BELOW TABLE ELEVATIONS.

2. FORM ENDS SHALL BE CRIMPED CLOSED IN A TAPERED MANNER. SEPARATE END CLOSURE PIECES WILL NOT BE ALLOWED.

3. SUPPORT ANGLES SHALL BE PLACED IN THE "LEG DOWN" POSITION WHERE POSSIBLE. WHERE "LEG UP" POSITION IS NECESSARY, THE UPPER MOST PORTION OF THE ANGLE SHALL NOT PROJECT MORE THAN 1" ABOVE THE TOP FLANGE OR COVER PLATE. THE CONTRACTOR SHALL HAVE AN ASSORTMENT OF ANGLES OF VARIOUS SIZES AVAILABLE ON THE SITE TO CONFORM TO THIS REQUIREMENT.

4. ALL MAIN STEEL REINFORCEMENT IN THE LOWER MAT SHALL BE CENTERED OVER THE VALLEY OF THE S.I.P. FORM.

5. CONTRACTOR SHALL DESIGN AND DETAIL ALL ELEMENTS OF THE FORMING SYSTEM AND SHALL SUBMIT TO THE ENGINEER FOR APPROVAL.

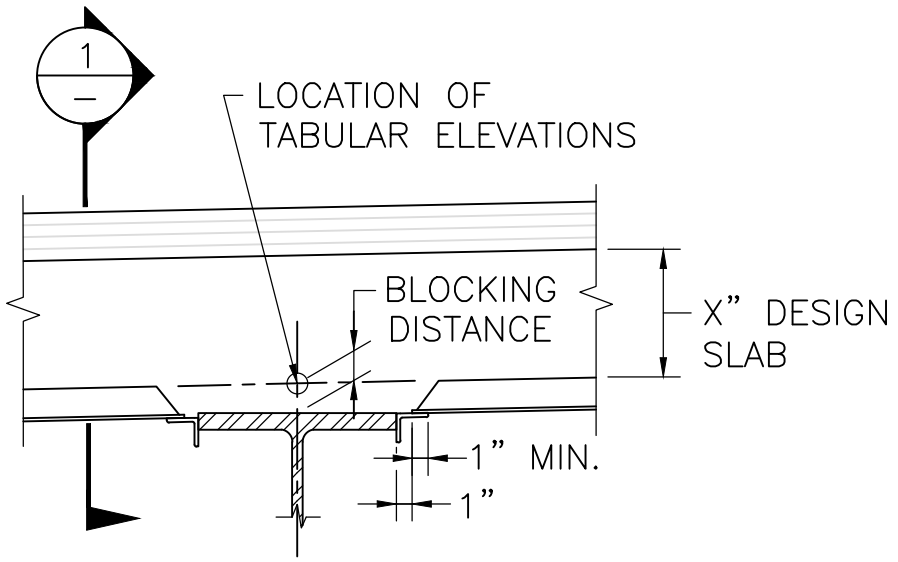
6. IN CASES WHERE STANDARD 2" OR 3" DEEP S.I.P. FORMS DO NOT SATISFY DESIGN REQUIREMENTS AN ALTERNATIVE FORMING SYSTEM CONSISTING OF DEEPER S.I.P. FORMS OR REMOVABLE FORMS SHALL BE DESIGNED AND DETAILED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER FOR APPROVAL. THE DESIGN THICKNESS OF THE SLAB SHALL NOT BE REDUCED.

S.I.P. FORM NOTES:

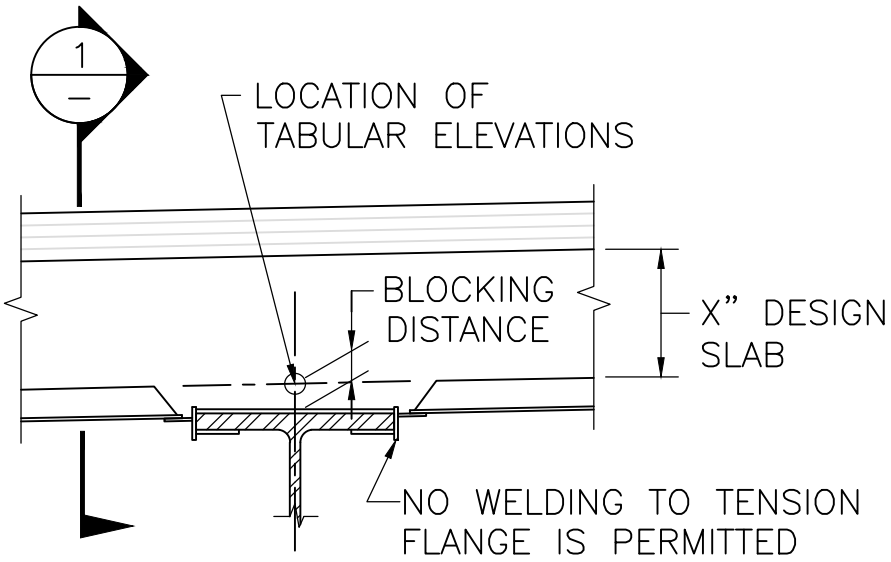
1. *The top 1" of concrete within the S.I.P. form supported deck shall be considered solid concrete for calculation of dead load and slab section properties.*
2. *The additional weight of the S.I.P. form may be neglected in dead load computations for 2" and 3" deep forms spanning 10' or less. This is because the voided upward corrugation eliminates more concrete weight than is added by the sum on the downward concrete filled corrugation and the S.I.P. form. For spans in excess of 10' or form depth in excess of 3", the Designer shall determine what, if any, additional dead load to include.*
3. *Readily available 2" and 3" deep S.I.P. forms with design span lengths in excess of 7.5 feet (9'± beam spacing) and 9.5 feet (11'± beam spacing), respectively, may not satisfy deflection limits.*

DETAILS FOR CURVED GIRDERS

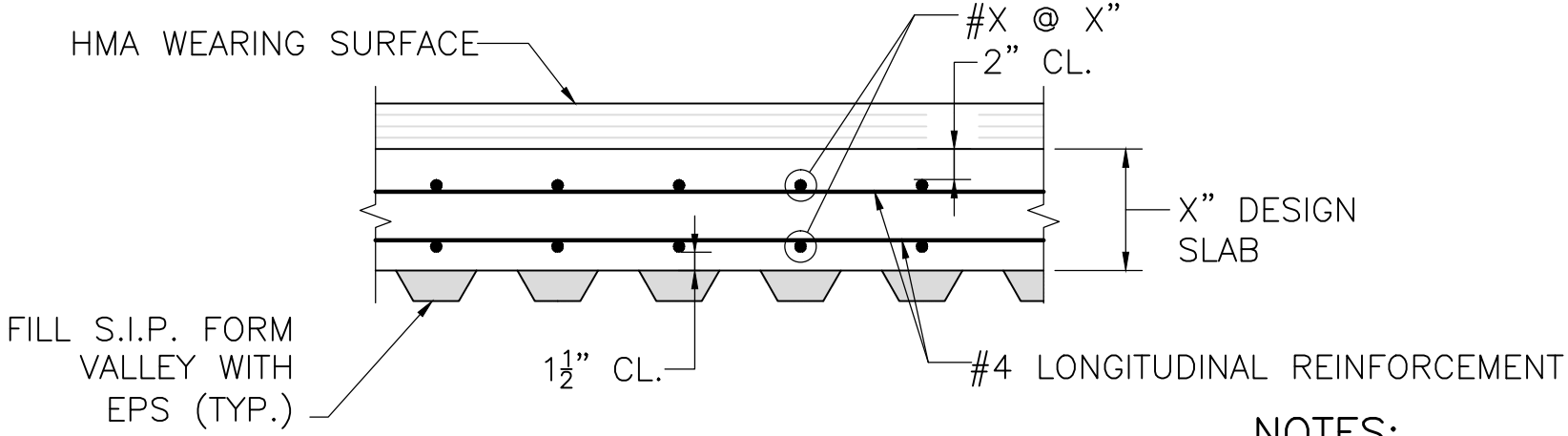
STAY-IN-PLACE FORMS



HAUNCH DETAIL AT NON-TENSION FLANGE AREA



HAUNCH DETAIL AT TENSION FLANGE AREA



SECTION 1

STAY-IN-PLACE FORM DETAILS

NOT TO SCALE

NOTES:

(See Dwg. No. 7.2.4 for Construction Notes to be provided here.)

NOTE:

Adjust the above details as necessary for exposed deck bridges.

DATE OF ISSUE
JUNE 2013

DRAWING NUMBER
7.2.3

(Include these Notes with details shown on dwg. No. 7.2.3)

NOTES:

1. SET TOP OF FORMS AT ELEVATIONS GIVEN IN TABLE.

2. FILL THE VALLEYS OF THE S.I.P. FORM WITH EXPANDED POLYSTYRENE (EPS).

3. FORM ENDS SHALL BE CRIMPED CLOSED IN A TAPERED MANNER. TAPER THE EPS FILL AND SEPARATE END CLOSURE PIECES WILL NOT BE ALLOWED.

4. SUPPORT ANGLES SHALL BE PLACED IN THE "LEG DOWN" POSITION WHERE POSSIBLE. WHERE "LEG UP" POSITION IS NECESSARY, THE UPPER MOST PORTION OF THE ANGLE SHALL NOT PROJECT MORE THAN 1" ABOVE THE TOP FLANGE OR COVER PLATE. THE CONTRACTOR SHALL HAVE AN ASSORTMENT OF ANGLES OF VARIOUS SIZES AVAILABLE ON THE SITE TO CONFORM TO THIS REQUIREMENT.

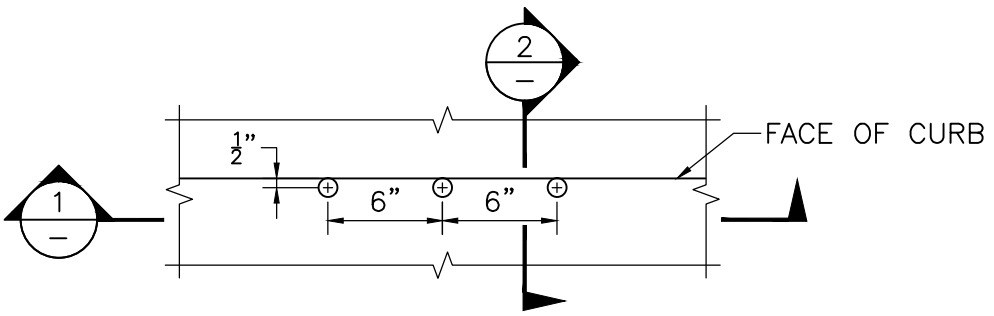
5. CONTRACTOR SHALL DESIGN AND DETAIL ALL ELEMENTS OF THE FORMING SYSTEM AND SHALL SUBMIT TO THE ENGINEER FOR APPROVAL.

6. PRIMARY STEEL REINFORCEMENT IN THE LOWER MAT DOES NOT NEED TO BE CENTERED OVER THE VALLEYS OF THE S.I.P. FORMS. *(Include this note for beam spacings greater than 9'±)*

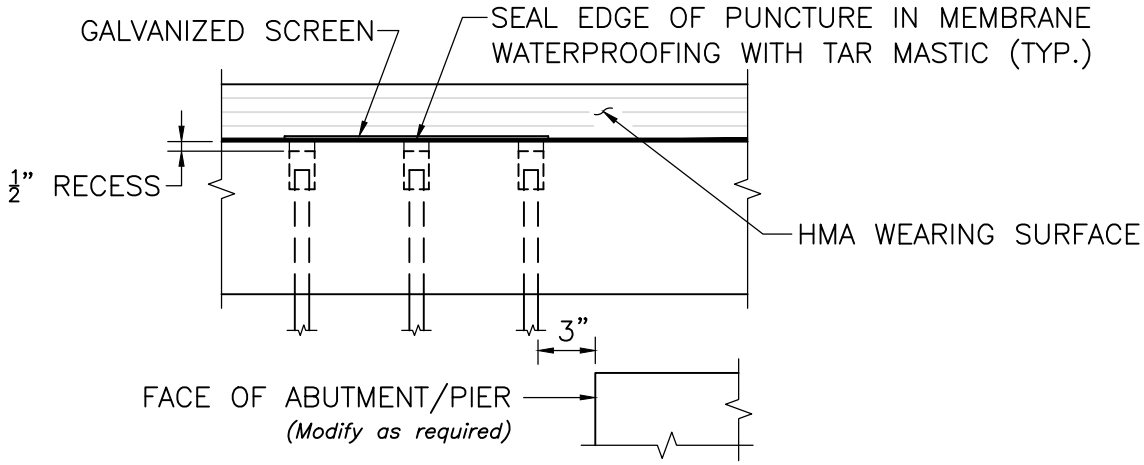
7. IN CASES WHERE STANDARD 2" OR 3" DEEP S.I.P. FORMS DO NOT SATISFY DESIGN REQUIREMENTS AN ALTERNATIVE FORMING SYSTEM CONSISTING OF DEEPER S.I.P. FORMS OR REMOVABLE FORMS SHALL BE DESIGNED AND DETAILED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER FOR APPROVAL. THE DESIGN THICKNESS OF THE SLAB SHALL NOT BE REDUCED.

S.I.P. FORM NOTES:

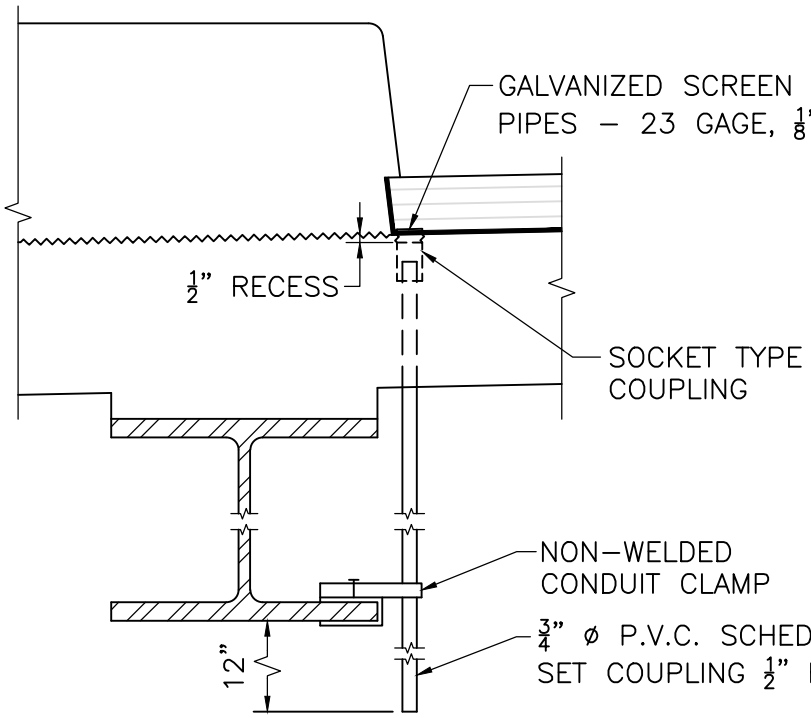
1. *The additional weight of the S.I.P. form shall be included in dead load computations.*
2. *Readily available 2" and 3" deep S.I.P. forms with design span lengths in excess of 7.5 feet (9'± beam spacing) and 9.5 feet (11'± beam spacing), respectively, may not satisfy deflection limits.*



DECK PLAN



SECTION 1



NOTE:

DRAINS SHALL BE LOCATED AT ALL ROADWAY JOINTS AND/OR LOW POINT OF VERTICAL CURVE.

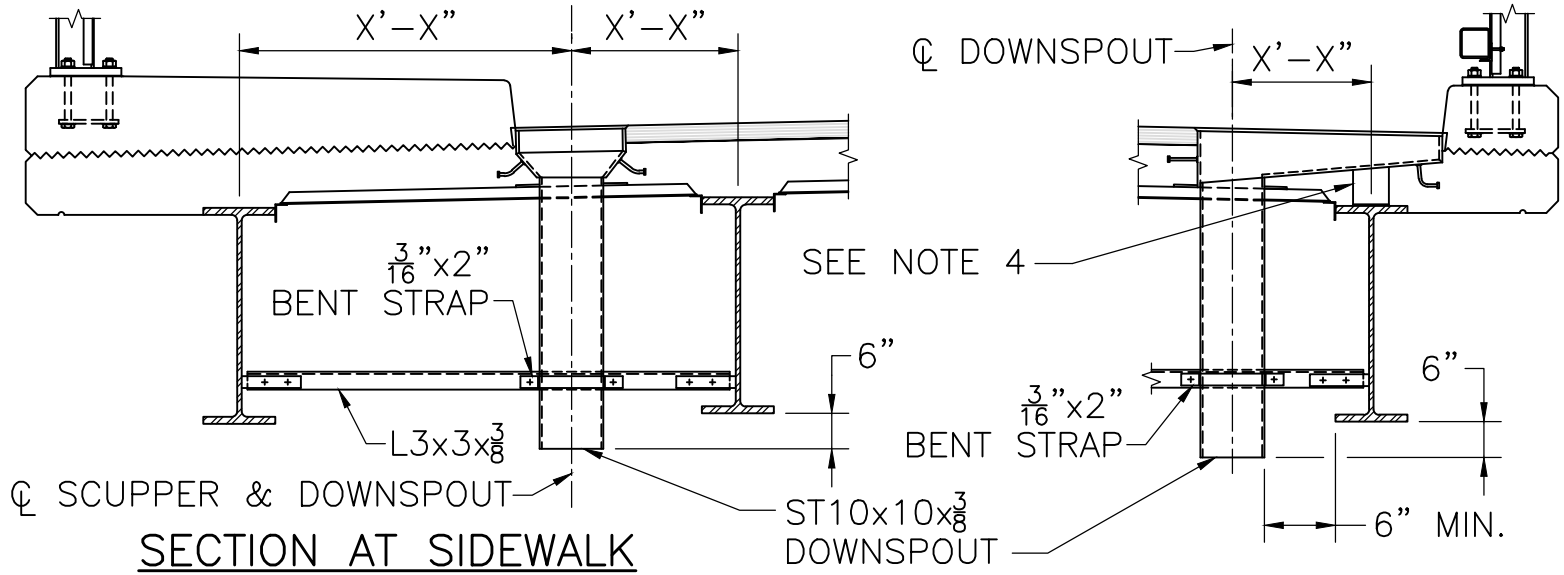
NOTES:

1. *Use deck drains only for bridges with HMA wearing surface.*
2. *Revise stringer type as required. Show inserts in precast concrete beams to secure conduit clamp at each drain pipe.*

SECTION 2

DECK DRAIN PIPES

SCALE: 1½" = 1'–0"



SECTION AT SIDEWALK

SECTION AT SAFETY CURB

NOTES:

1. ALL STEEL PLATES SHALL BE AASHTO M 270 GRADE 36 AND SQUARE TUBE SHALL BE ASTM A 500 GRADE A OR B.

2. ALL WELDS SHALL BE CONTINUOUS. ALL JOINTS SHALL BE WELDED USING TWO–SIDED $\frac{1}{4}$" FILLET WELDS OR $\frac{1}{4}$" PJP WELDS WITH A BACKING SEAL WELD, AS APPLICABLE.

3. ALL STEEL TO BE HOT–DIP GALVANIZED. 10" SQUARE TUBE TO BE GALVANIZED AND PAINTED TO MATCH COLOR OF THE STEEL GIRDERS. *(Omit paint for non–steel bridges)*

4. TEMPORARY SUPPORT IS REQUIRED. SUPPORT DESIGN SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

SCUPPER SECTIONS

SCALE: $\frac{3}{8}$" = 1'–0"

NOTES:

1. *Scupper sections are conceptual and shall be modified to suit structure requirements.*
2. *Where beam geometry prevents use of scupper detailed on Dwg. No. 7.3.3, the scupper shall be redesigned and detailed consistent with section at safety curb depiction.*
3. *If grating span or spacing is altered, it shall be designed for HL–93 Live Load and shall be bicycle friendly.*

SCUPPER SECTIONS

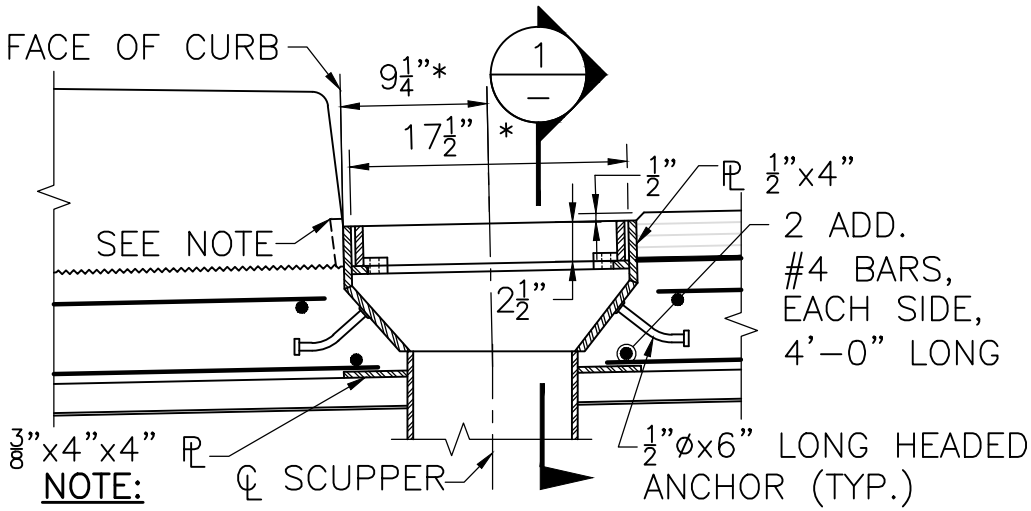
DRAINAGE DETAILS

DATE OF ISSUE
JUNE 2013

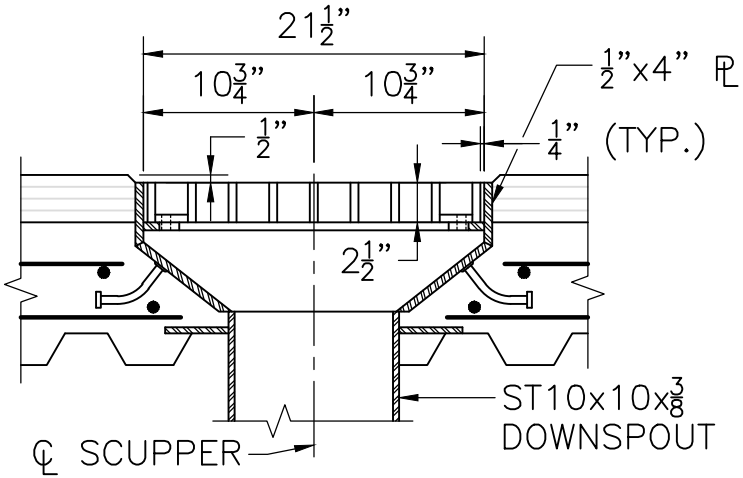
DRAWING NUMBER
7.3.2

SCUPPER DETAILS

DRAINAGE DETAILS

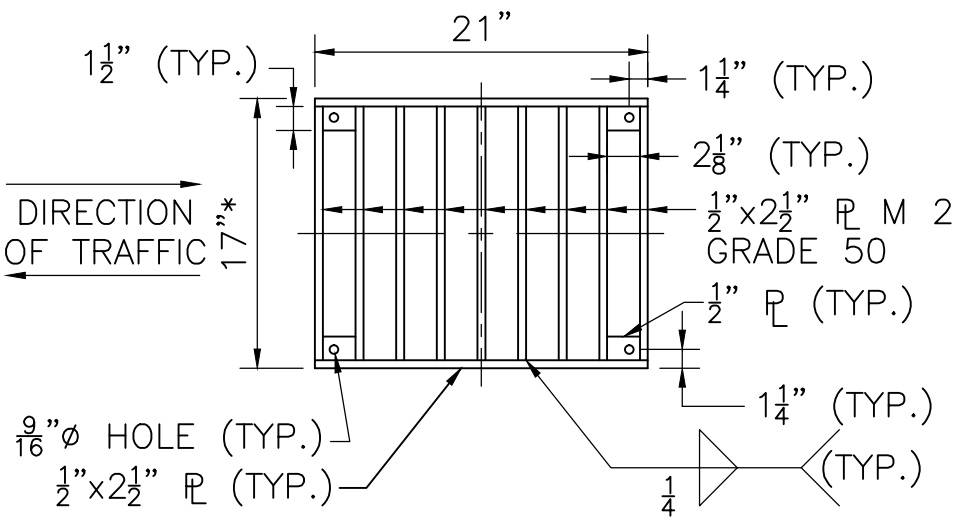


NOTE: OMIT POCKET AT SCUPPER. FILL AREA WITH JOINT SEALER.

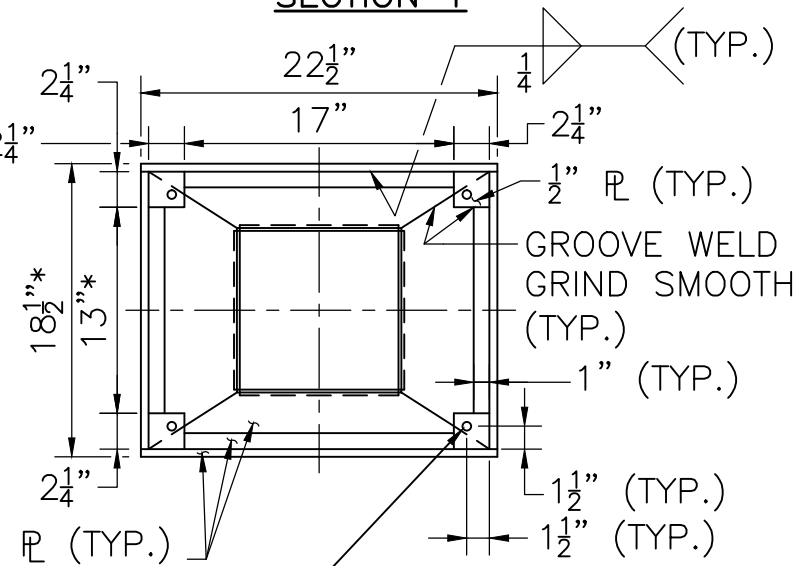


SECTION 1

SECTION



PLAN OF GRATING



PLAN
(GRATING REMOVED)

NOTE:

** – The length of the scupper may be increased to allow downspout to clear beam.*

SCUPPER DETAILS

SCALE: 1" = 1'–0"

DATE OF ISSUE
JUNE 2013

DRAWING NUMBER
7.3.3