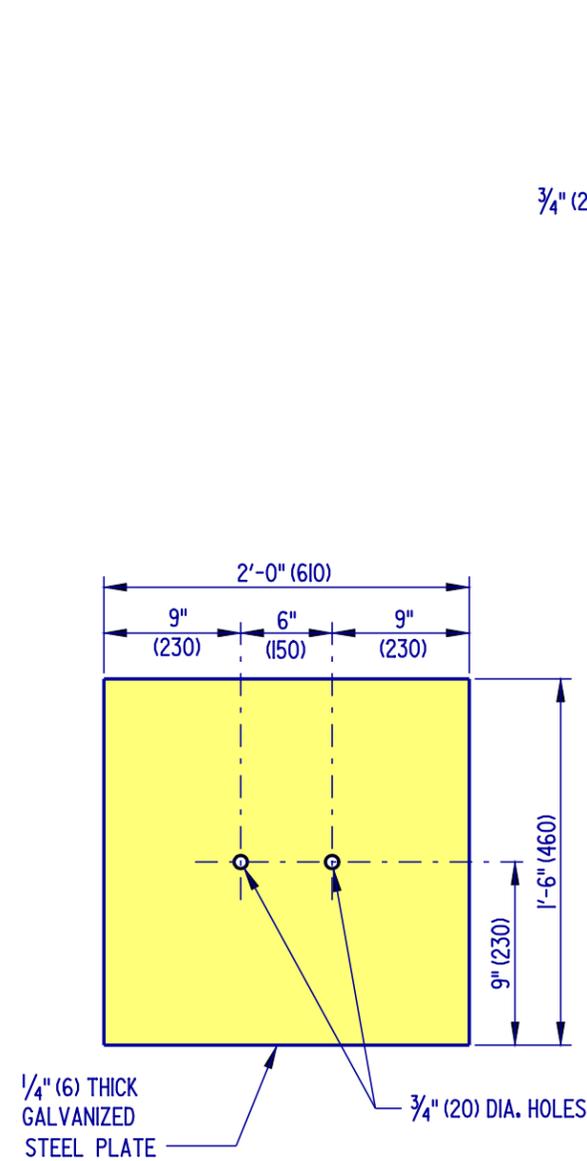
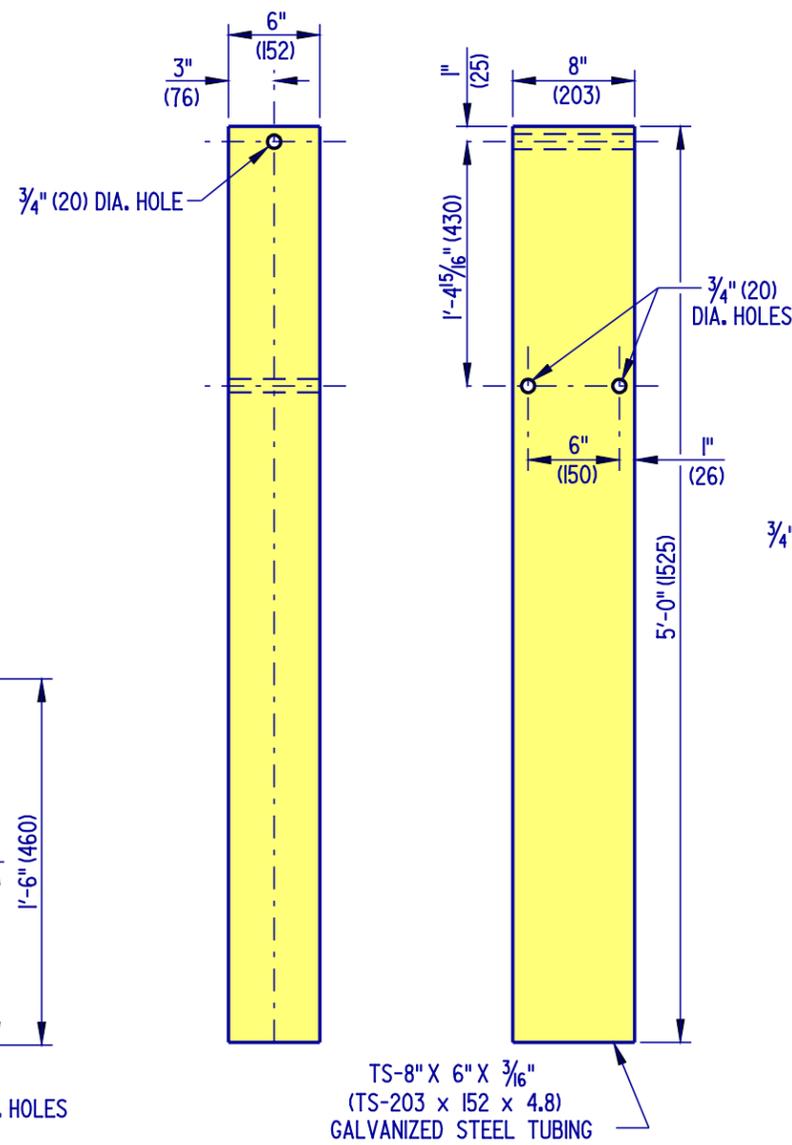


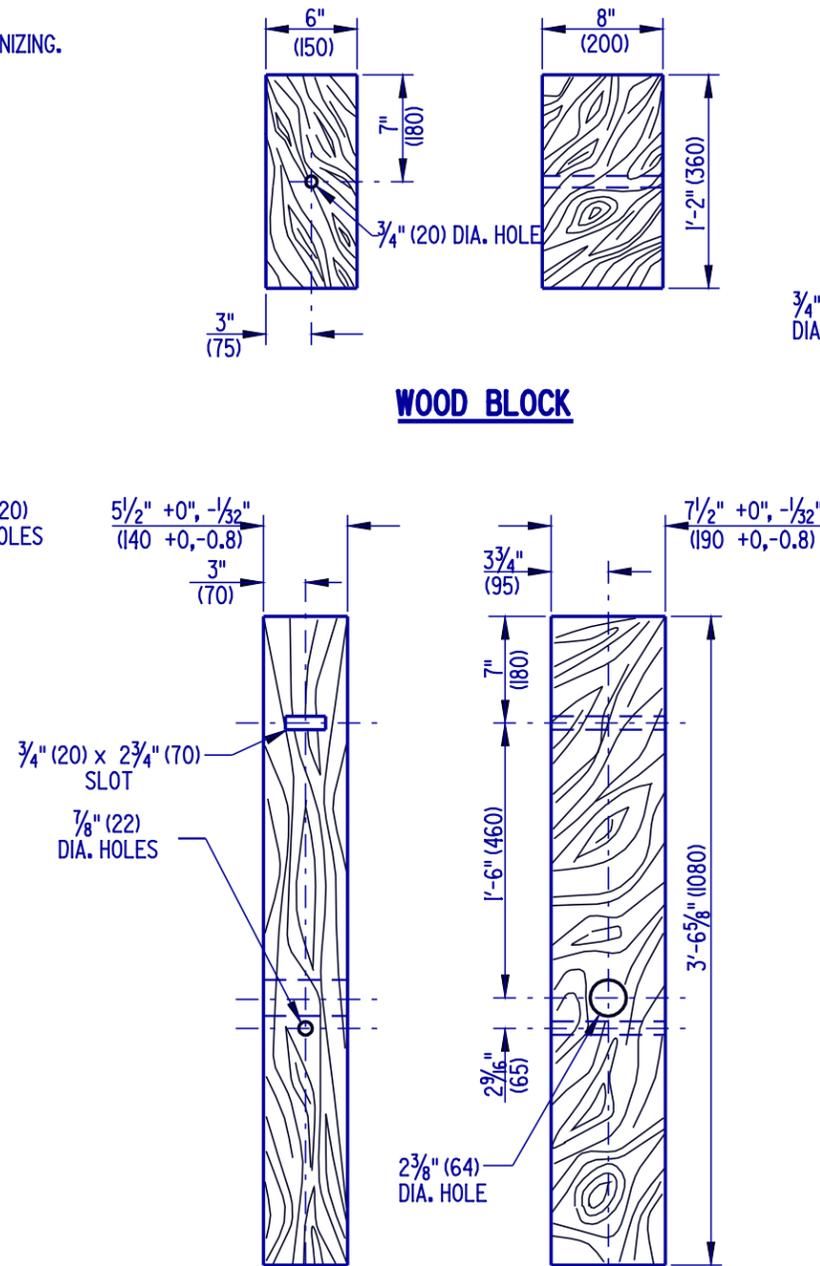
NOTES : 1). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
 2). ALL WOOD SIZES ARE NOMINAL DIMENSIONS.



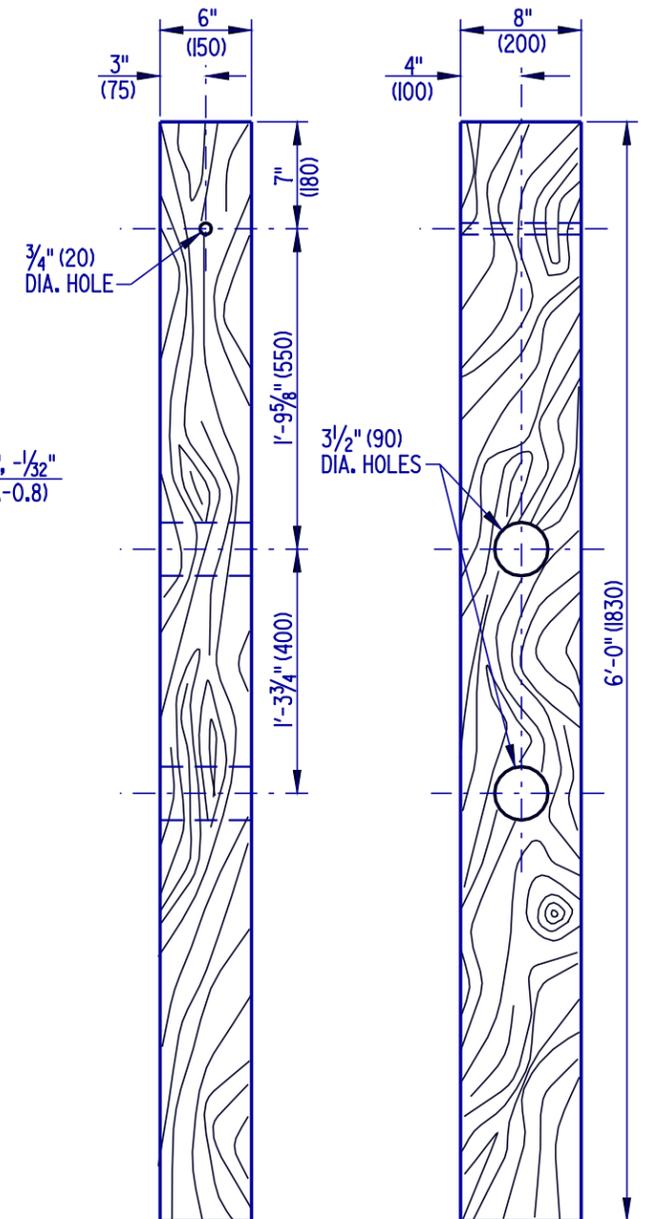
SOIL PLATE



STEEL TUBE



SHORT WOOD BREAKAWAY POST



LONG WOOD BREAKAWAY POST



**DELAWARE
 DEPARTMENT OF TRANSPORTATION**

STANDARD NO. B-13 (2004)

HARDWARE

SHT. 7 OF 13

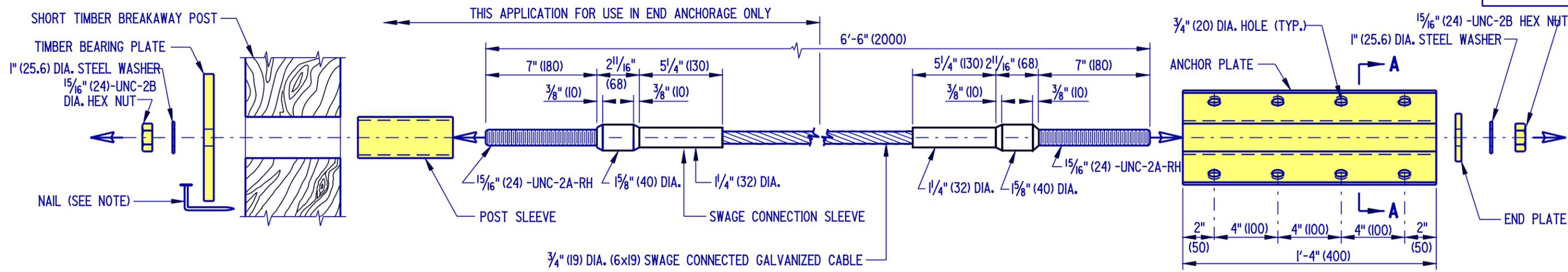
APPROVED

Carolann Wicks 1/10/05
 CHIEF ENGINEER DATE

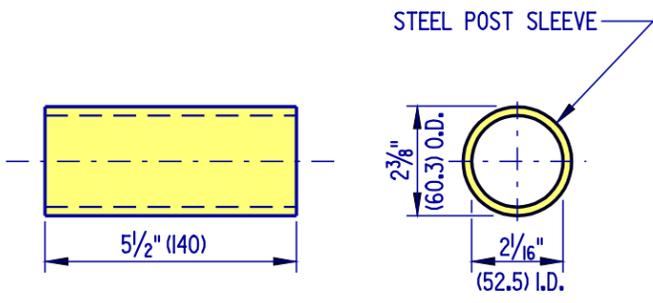
RECOMMENDED

Dennis M. O'Flaherty 1/13/05
 DESIGN ENGINEER DATE

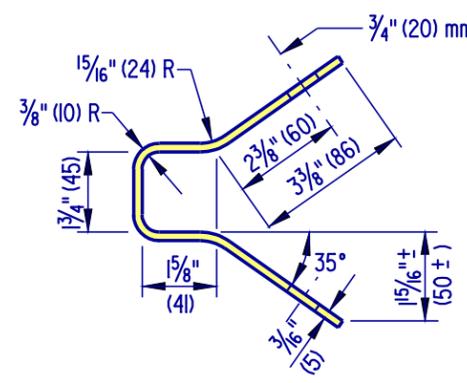
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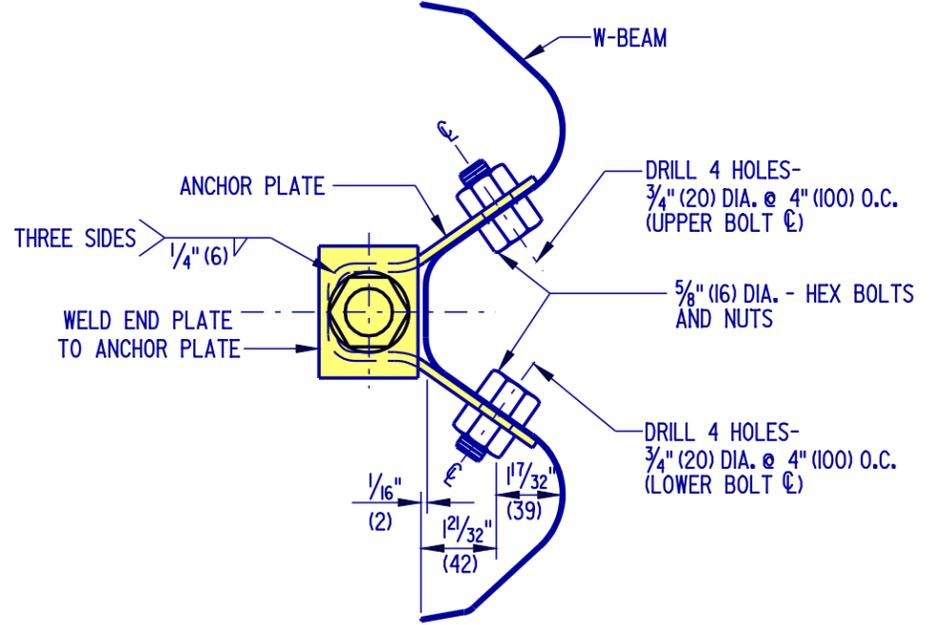
SWAGED CABLE ASSEMBLY AND RELATED HARDWARE ASSEMBLY



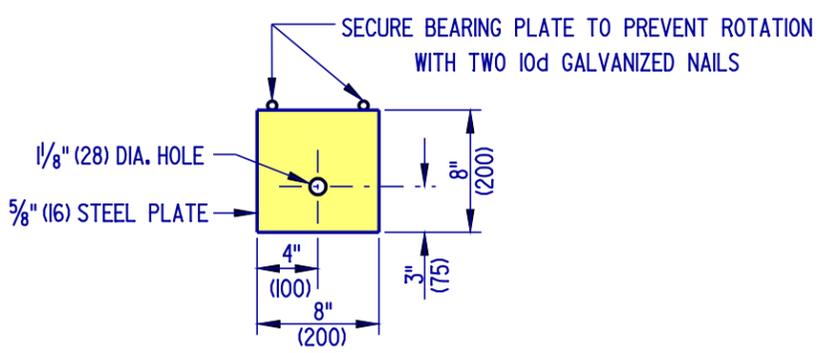
POST SLEEVE



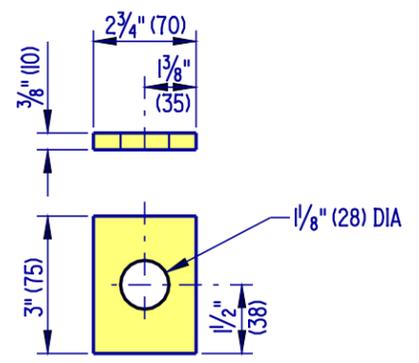
SECTION A-A



ANCHOR PLATE TO W-BEAM CONNECTION DETAIL



TIMBER BEARING PLATE



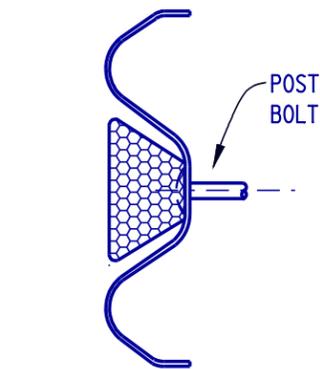
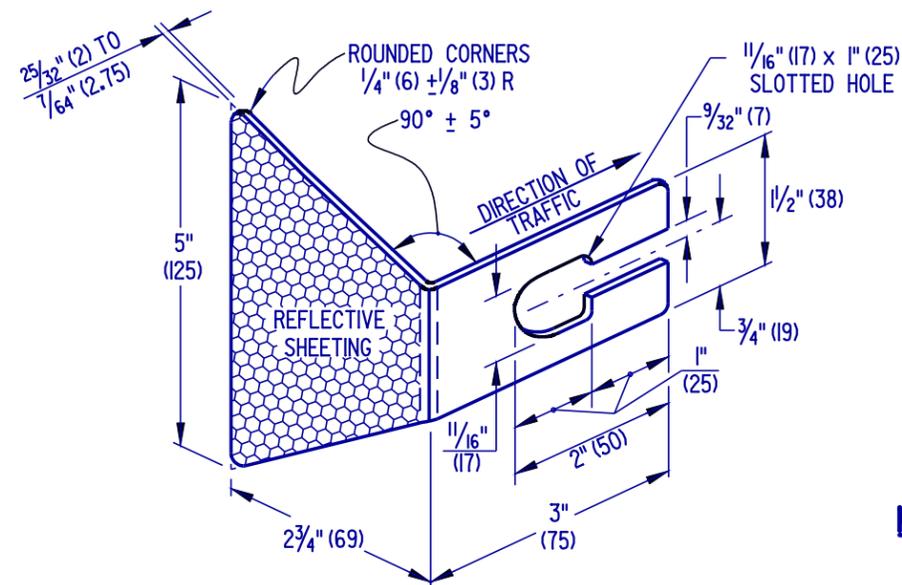
END PLATE

- NOTES:**
- 1). TO ENSURE THAT THE TIMBER BEARING PLATE REMAINS IN POSITION, 2 - 10d GALVANIZED STEEL NAILS SHALL BE DRIVEN IN THE SHORT TIMBER BREAKAWAY POST, AND BENT OVER BEARING PLATE.
 - 2). TIGHTEN ASSEMBLY UNTIL CABLE IS TAUGHT.
 - 3). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.



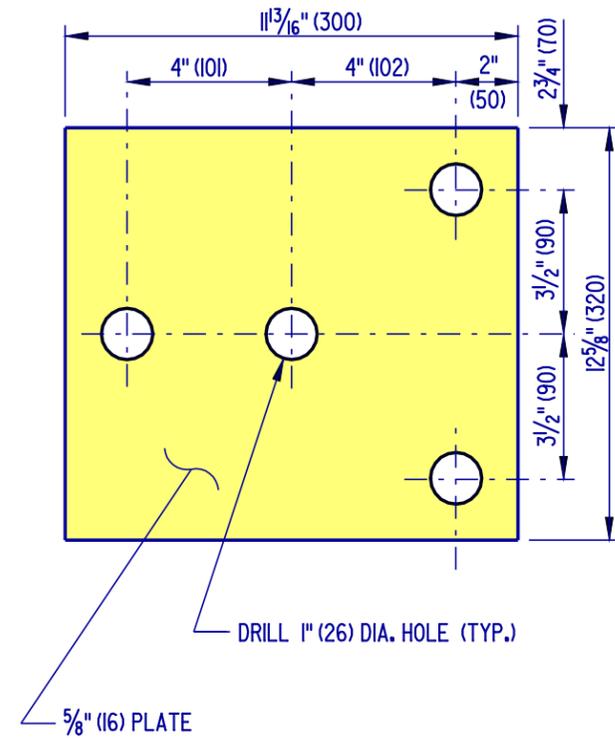
DELAWARE DEPARTMENT OF TRANSPORTATION

HARDWARE		APPROVED	
STANDARD NO. B-13 (2004)	SHT. 8 OF 13	<i>Carolann Wicks</i> CHIEF ENGINEER	1/10/05 DATE
		<i>Dennis M. O'Flaherty</i> DESIGN ENGINEER	1/13/05 DATE



MOUNTING POSITION

GUARDRAIL REFLECTOR



BEARING PLATE DETAIL II



DELAWARE
DEPARTMENT OF TRANSPORTATION

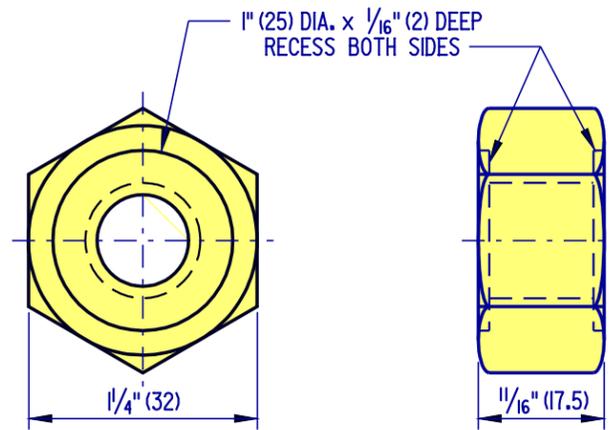
HARDWARE

STANDARD NO. B-13 (2004)

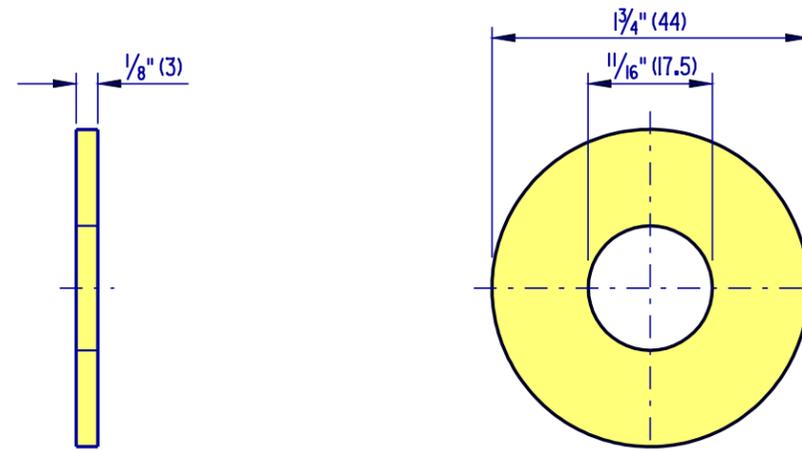
SHT. 9 OF 13

APPROVED *Carolann Wicks* 1/10/05
CHIEF ENGINEER DATE

RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE

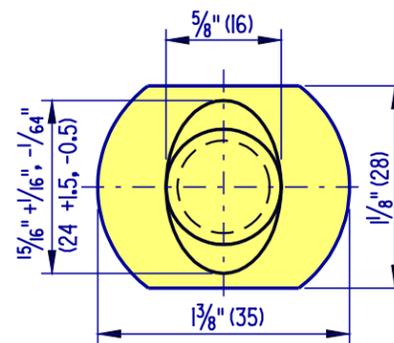
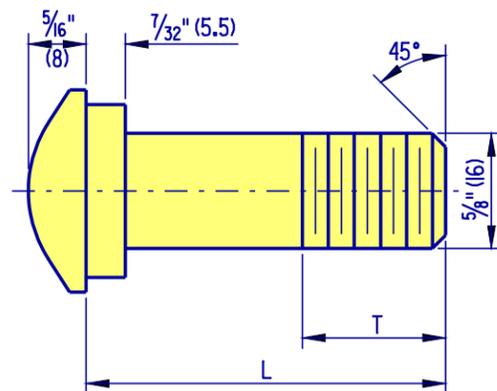


**RECESSED NUT
(FOR 5/8" (16) GUARDRAIL BOLT)**



STEEL WASHER (FOR 5/8" (16) GUARDRAIL BOLT)

NOTE: DIMENSION FOR WASHER THICKNESS IS APPROXIMATE BASED ON METAL THICKNESS.



GUARDRAIL BOLT

L	T (MIN.)
1/4" (35)	FULL THREAD LENGTH
2" (50)	FULL THREAD LENGTH
4" (100)	FULL THREAD LENGTH
10" (255)	4" (100) THREAD LENGTH
18" (460)	4" (100) THREAD LENGTH

NOTES : 1. ALL FILLETS SHALL HAVE A MINIMUM RADIUS OF 1/16" (2).
2. IF THE BOLT EXTENDS MORE THAN 1/2" (12) BEYOND THE NUT, THE BOLT SHALL BE TRIMMED BACK AS PER THE DEPARTMENT'S SPECIFICATIONS.



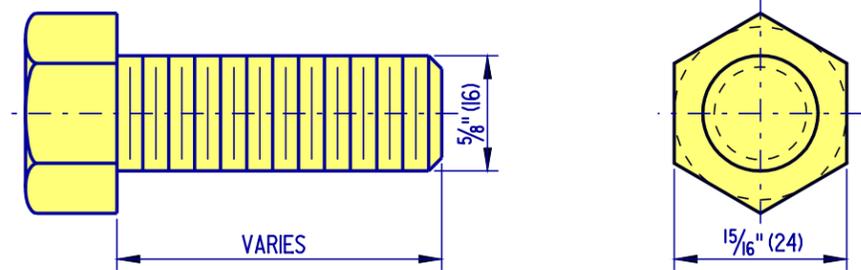
DELAWARE
DEPARTMENT OF TRANSPORTATION

HARDWARE

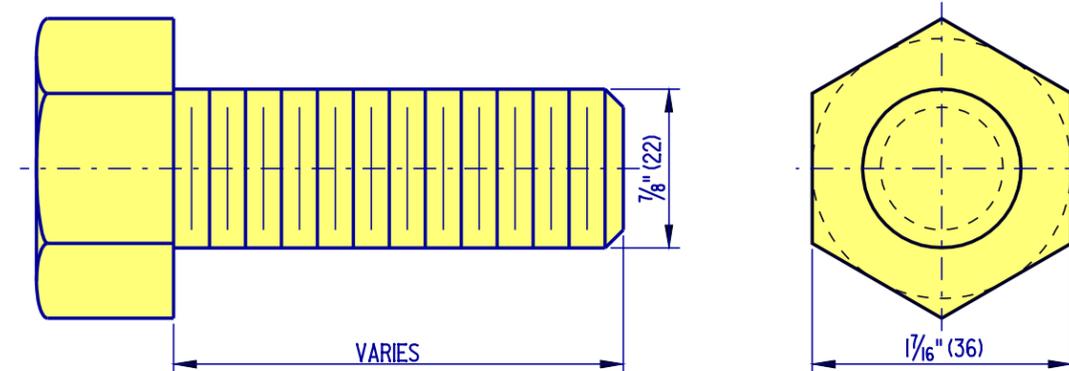
STANDARD NO. B-13 (2004) SHT. 10 OF 13

APPROVED *Carolann Wicks* 1/10/05
CHIEF ENGINEER DATE

RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE



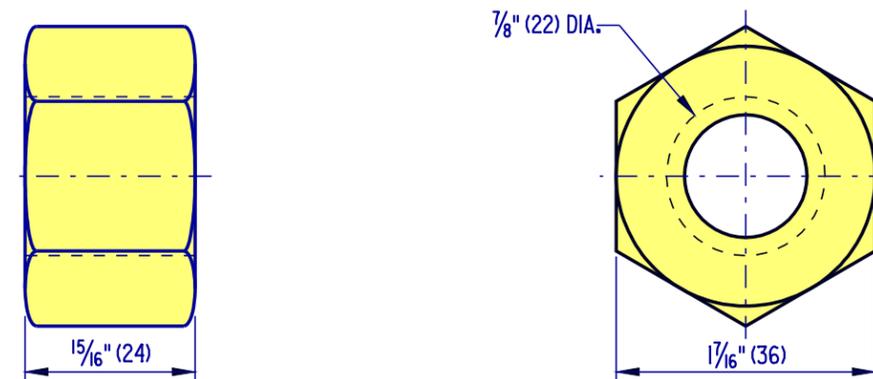
5/8" (16) HEX BOLT



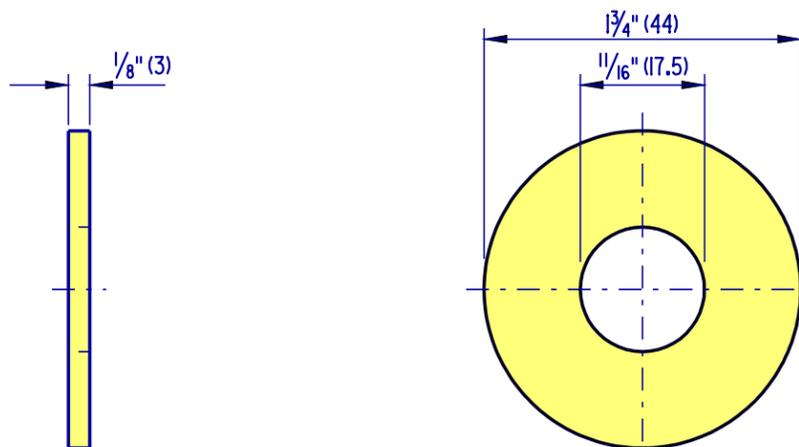
HIGH-STRENGTH STRUCTURAL HEX BOLT



5/8" (16) HEX NUT



HIGH-STRENGTH STRUCTURAL HEX NUT



5/8" (16) STEEL WASHER

NOTE : DIMENSION FOR WASHER THICKNESS IS APPROXIMATE BASE METAL THICKNESS.



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

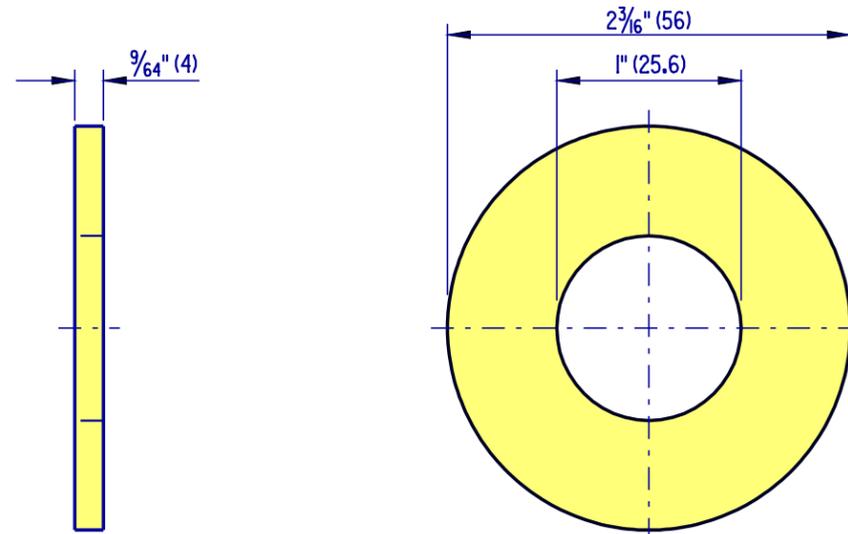
HARDWARE

STANDARD NO. **B-13 (2004)**

SHT. **11** OF **13**

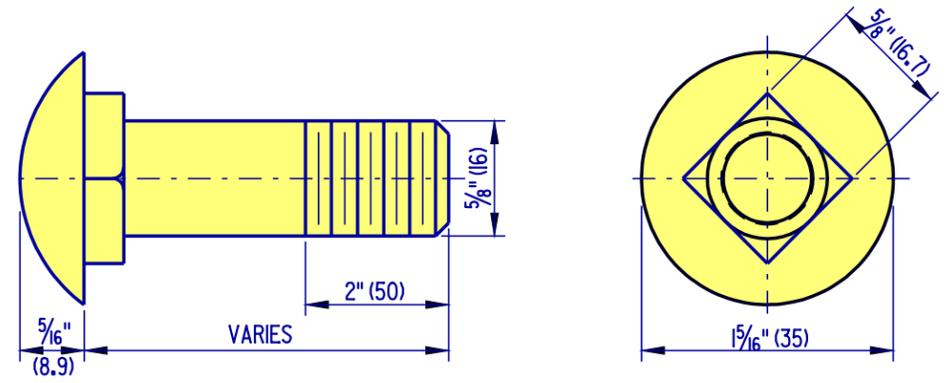
APPROVED *Carolann Wicks* 1/10/05
CHIEF ENGINEER DATE

RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE

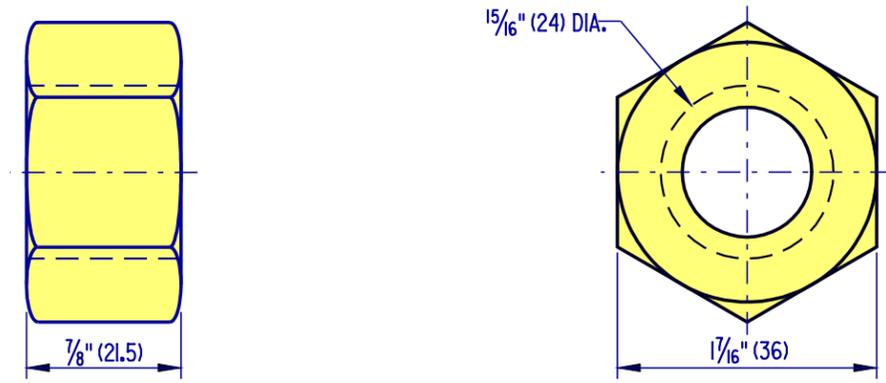


STEEL WASHER

NOTES : 1. FOR USE WITH SWAGED CABLE ASSEMBLAGE.
2. DIMENSION FOR WASHER THICKNESS IS APPROXIMATE BASE METAL THICKNESS.



5/8" (16) CARRIAGE BOLT



1 5/16" (24) HEX NUT

NOTE : FOR USE WITH SWAGED CABLE ASSEMBLAGE.

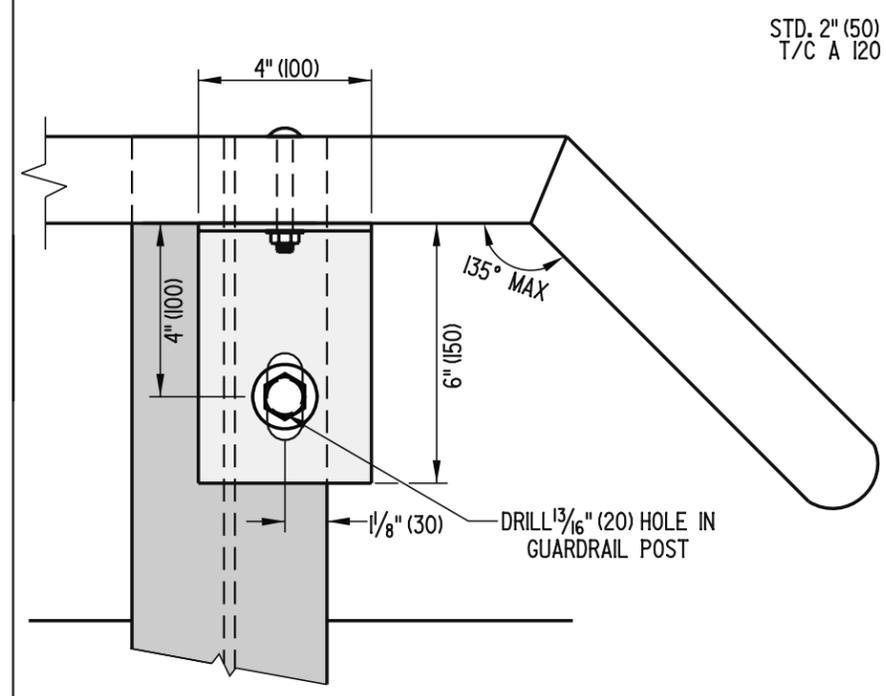


DELAWARE
DEPARTMENT OF TRANSPORTATION

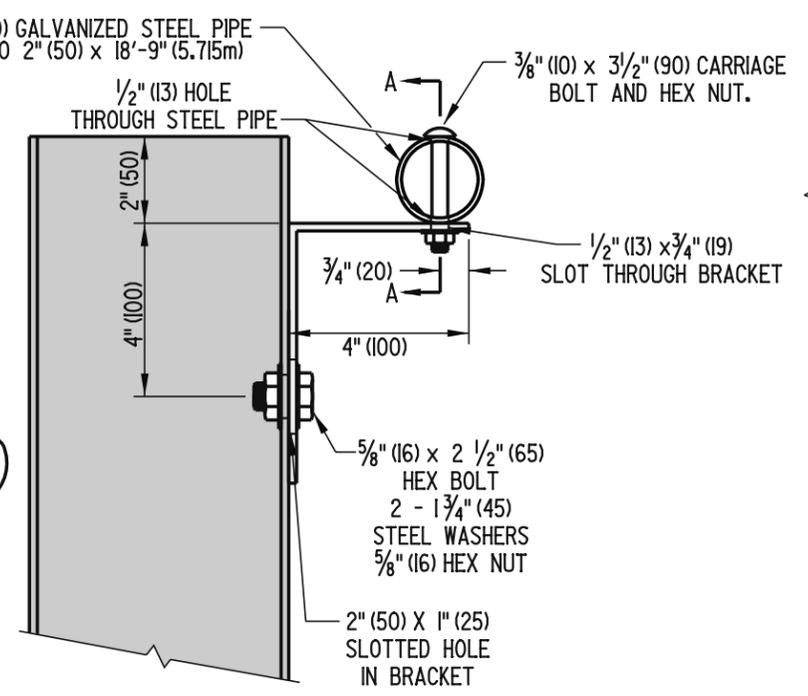
HARDWARE

STANDARD NO. B-13 (2004) SHT. 12 OF 13

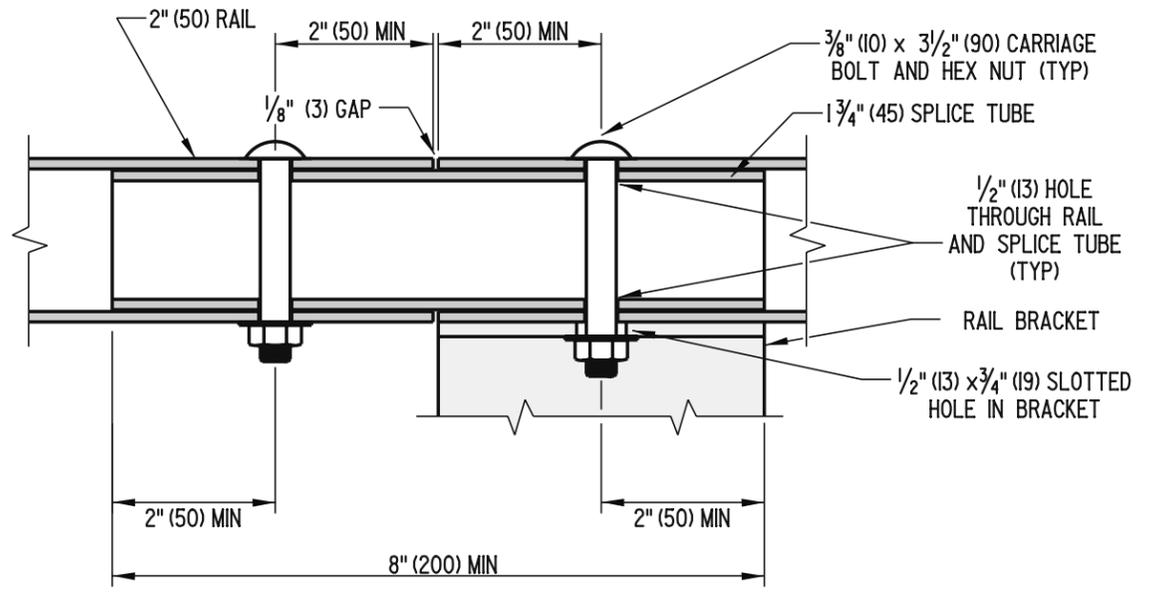
APPROVED *Carolann Wicks* 1/10/05
CHIEF ENGINEER DATE
RECOMMENDED *Dennis M. O'Flaherty* 1/3/05
DESIGN ENGINEER DATE



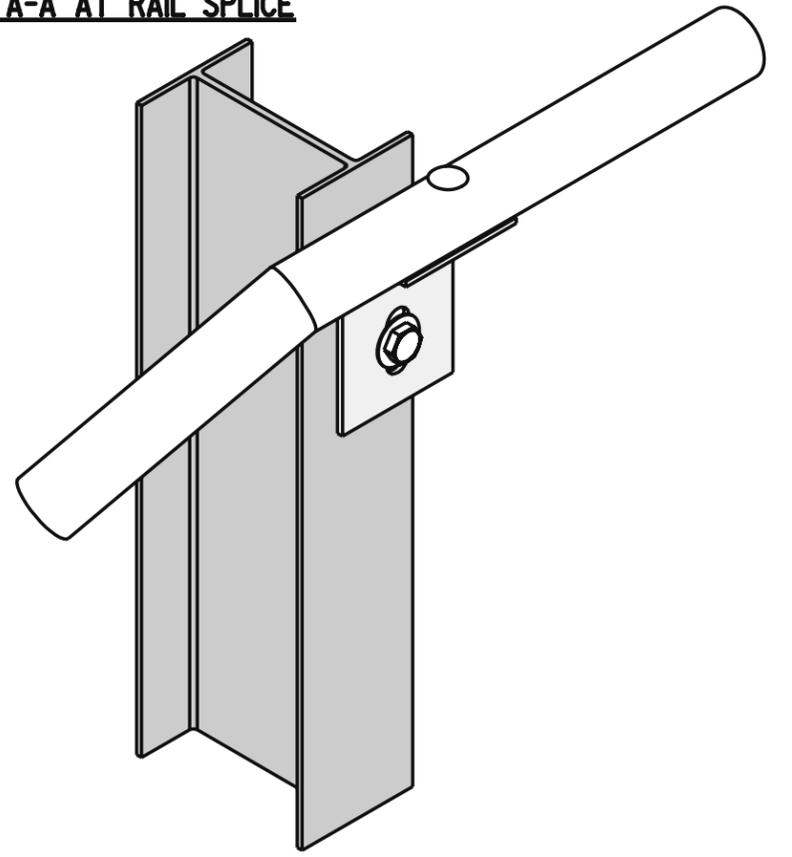
REAR VIEW WITH START & END SECTION



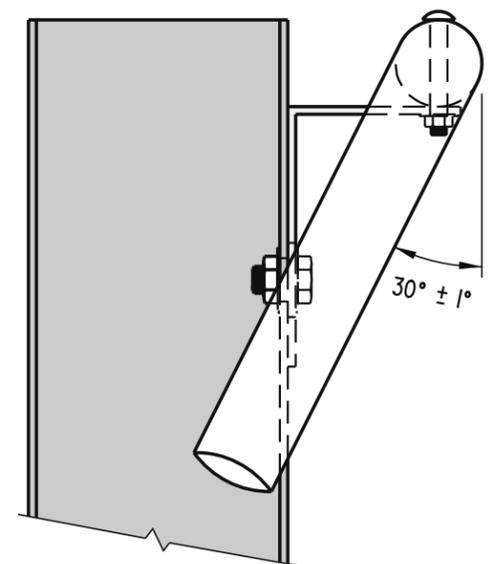
SIDE VIEW



SECTION A-A AT RAIL SPLICE

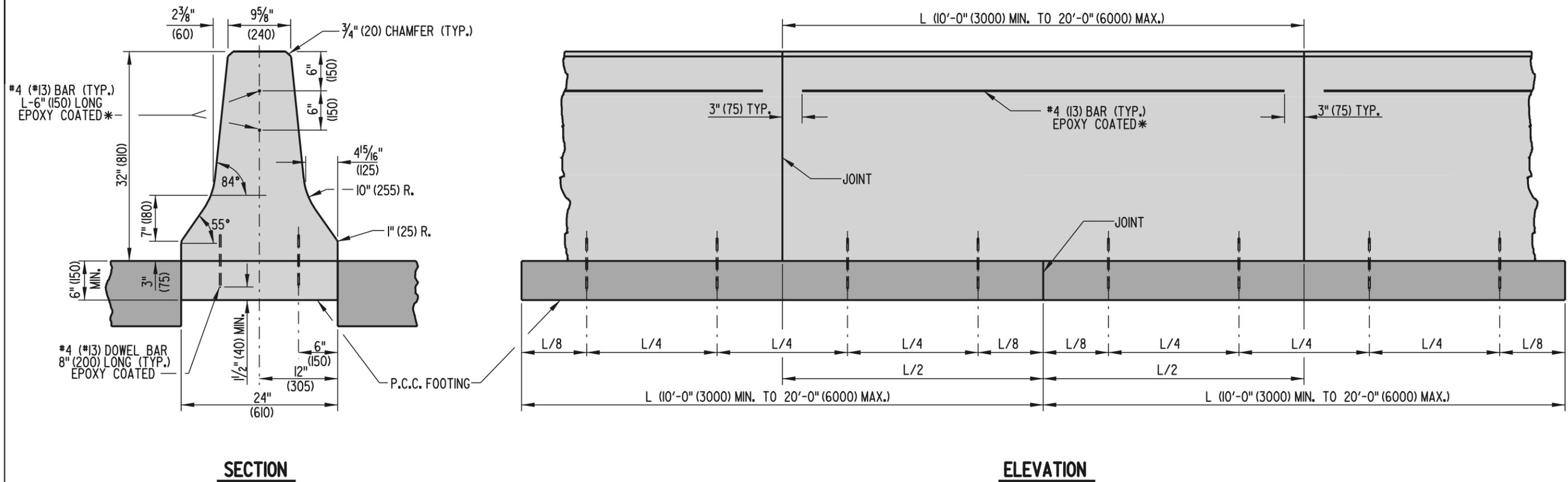


ISOMETRIC VIEW WITH START & END SECTION



SIDE VIEW WITH START & END SECTION

- NOTES:**
1. RAIL SHALL BE MOUNTED ON GUARDRAIL ADJACENT TO A BIKEWAY OR SIDEWALK.
 2. ALL COMPONENTS OF THE RAIL SHALL BE SHOP FABRICATED. ALL CUTTING AND DRILLING SHALL BE DONE IN THE SHOP.
 3. ALL EXPOSED THREADED HARDWARE SHALL BE BURRED.
 4. GUARDRAIL POSTS UPON WHICH RAIL IS TO BE INSTALLED SHALL BE SHOP DRILLED FOR THE RAIL BRACKETS DURING FABRICATION.
 5. ALL RAIL SPLICES WILL BE AT RAIL SUPPORT BRACKETS, THE SAME BOLT USED TO ATTACH THE RAIL TO THE BRACKET WILL BE USED TO SECURE THE SPLICE TUBE.
 6. RAILS SHALL BE INSTALLED ONLY ON STANDARD W-BEAM SECTIONS AND AT LEAST ONE POST AWAY FROM THE PAYMENT LIMITS OF THE END TREATMENT.



TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

* BAR SHALL BE CUT AT EVERY JOINT IF MADE CONTINUOUS FOR SLIP-FORM CONSTRUCTION



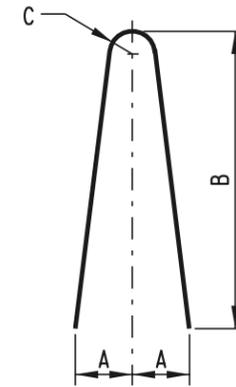
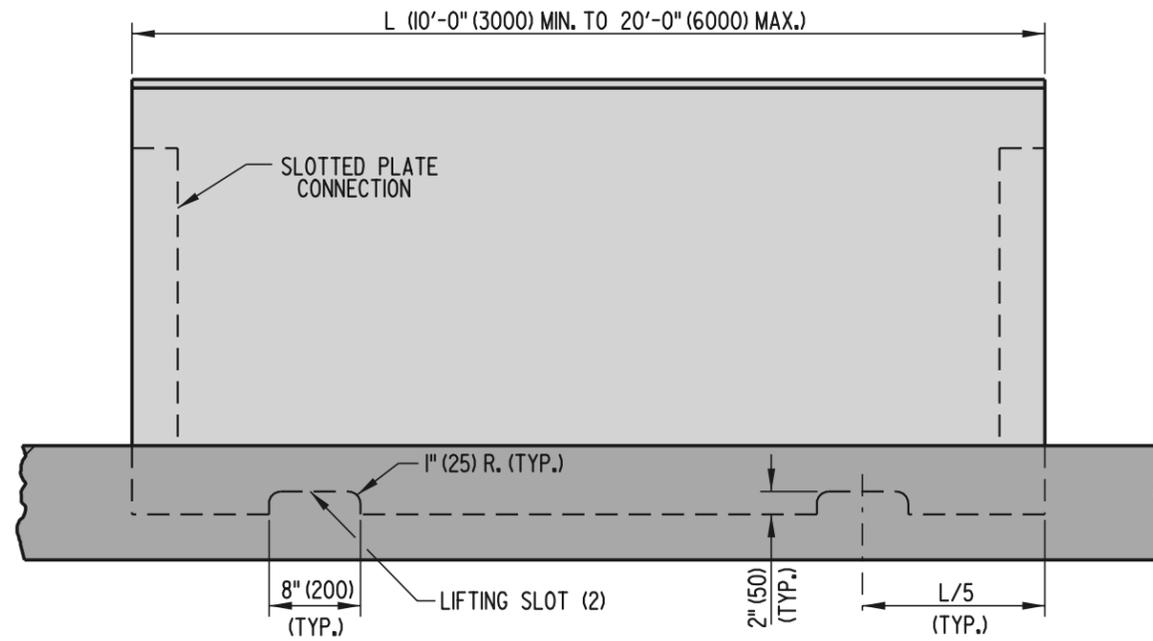
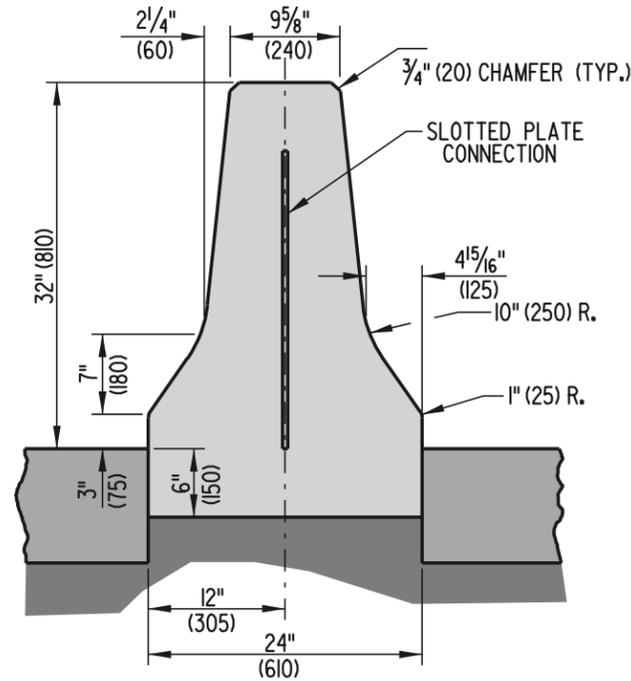
**DELAWARE
DEPARTMENT OF TRANSPORTATION**

CONCRETE SAFETY BARRIER (F SHAPE)

STANDARD NO. **B-14 (2001)**

SHT. **1** OF **3**

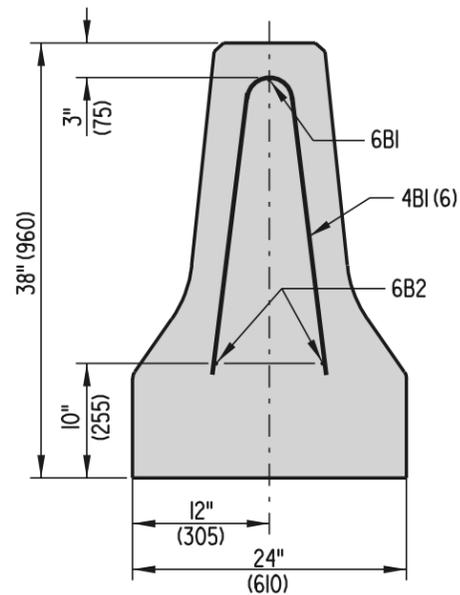
APPROVED *Ryan M. Harkins* 6/18/01
CHIEF ENGINEER DATE
 RECOMMENDED *Mehal Akhavan* 6/18/01
DESIGN ENGINEER DATE



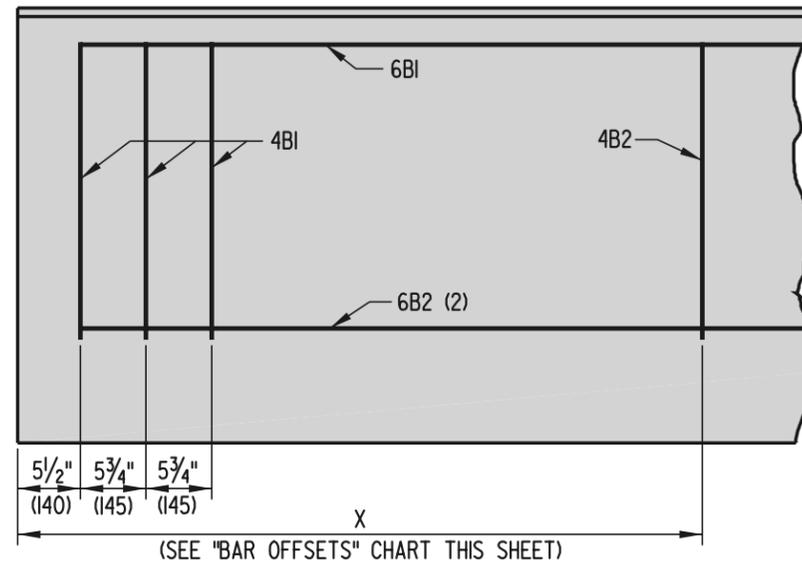
TYPE 'I' BAR

TYPICAL PRE-CAST CONSTRUCTION

BAR OFFSETS		
NOMINAL LENGTH OF BARRIER UNIT	"X"	NO. REQ'D FOR EACH BARRIER UNIT
20' (6000)	6' - 11" (2100)	2
18' (5500)	6' - 5" (1950)	2
16' (5000)	5' - 11" (1800)	2
14' (4500)	7' - 0" (2250)	1
12' (4000)	6' - 0" (2000)	1
10' (3000)	5' - 0" (1500)	1



'F' SHAPE BARRIER SECTION



ELEVATION

BAR LIST							
MARK	SIZE	NUMBER IN EACH SECTION	LENGTH	TYPE	A	B	C
4B1	4 (13)	6	4'-7" (1400)	I	5" (125)	26" (660)	2" (50)
4B2	4 (13)	**	4'-7" (1400)	I	5" (125)	26" (660)	2" (50)
6B1	6 (19)	1	*	STR.			
6B2	6 (19)	2	*	STR.			

* THE LENGTH OF BARS 6B1 AND 6B2 SHALL BE 1" (280) SHORTER IN LENGTH THAN THE NOMINAL SIZE OF THE BARRIER IN WHICH IT IS USED.
 ** SEE "BAR OFFSETS" CHART ON THIS SHEET FOR MORE INFORMATION.

TYPICAL PRE-CAST REINFORCEMENT DETAILS

NOTES: 1). CONCRETE CLEAR COVER FOR REINFORCING BARS SHALL BE 1/2" (40) MIN..

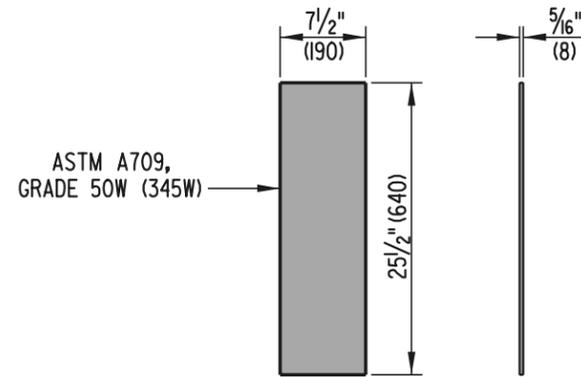


DELAWARE
DEPARTMENT OF TRANSPORTATION

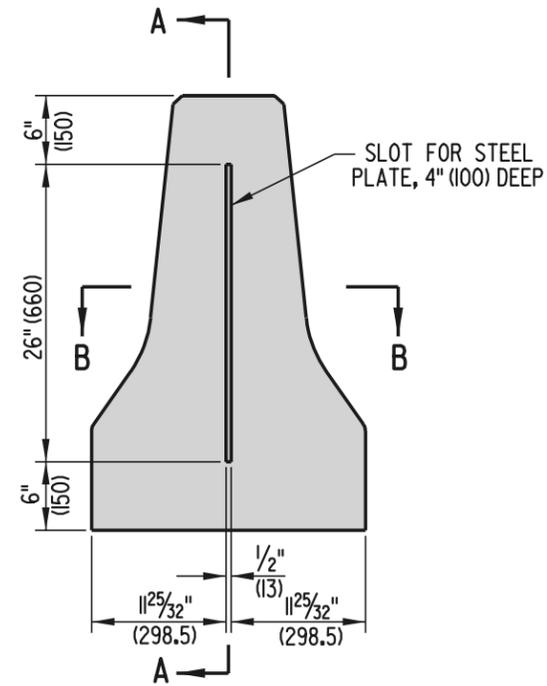
CONCRETE SAFETY BARRIER (F SHAPE)

STANDARD NO. B-14 (2001) SHT. 2 OF 3

APPROVED *Ryan M. Harshbarger* 6/18/01
CHIEF ENGINEER DATE
 RECOMMENDED *Mehmet Aksoy* 6/18/01
DESIGN ENGINEER DATE

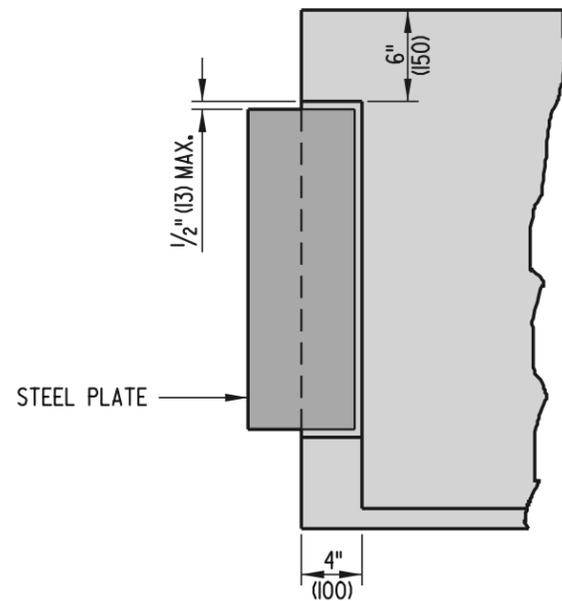


STEEL CONNECTOR PLATE

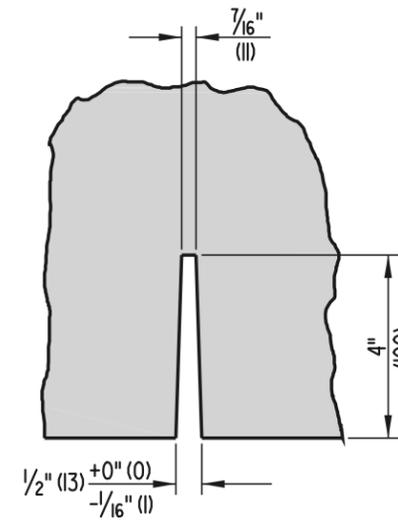


SLOT DIMENSIONS

CONCRETE SAFETY BARRIER, PRECAST CONSTRUCTION
'F' SHAPE BARRIER SECTION



SECTION A-A



SECTION B-B



DELAWARE
DEPARTMENT OF TRANSPORTATION

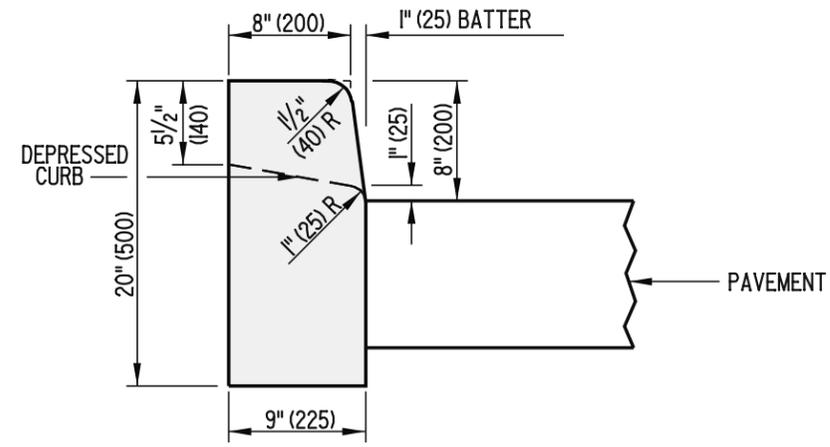
SLOTTED PLATE CONNECTION DETAILS

STANDARD NO. B-14 (2001)

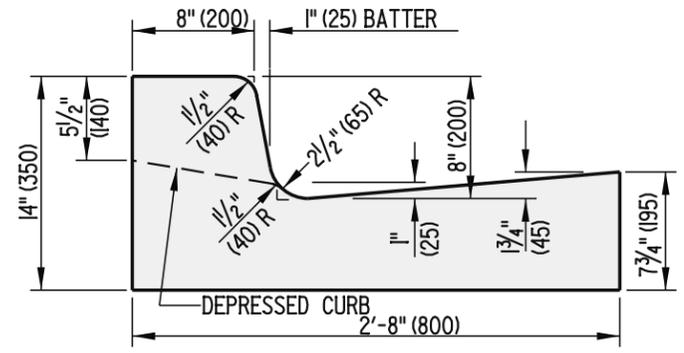
SHT. 3 OF 3

APPROVED *Ryan M. Harkins* 6/18/01
CHIEF ENGINEER DATE

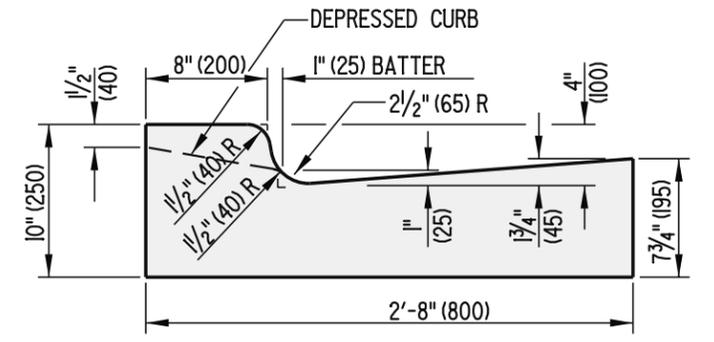
RECOMMENDED *Mehal Alghob* 6/18/01
DESIGN ENGINEER DATE



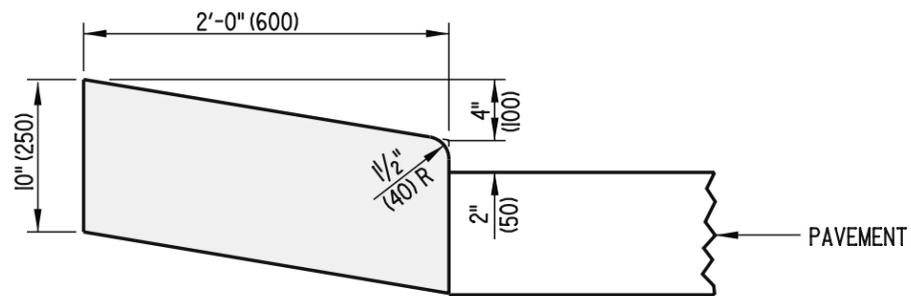
P.C.C. CURB
TYPE I



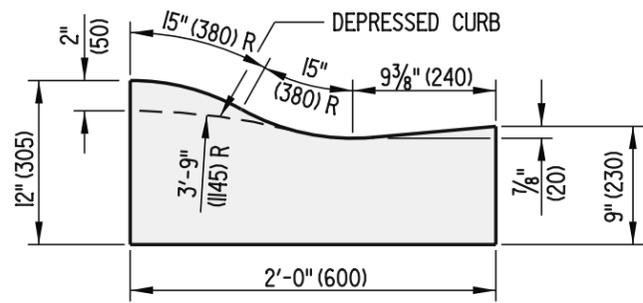
INTEGRAL P.C.C. CURB AND GUTTER
TYPE 1



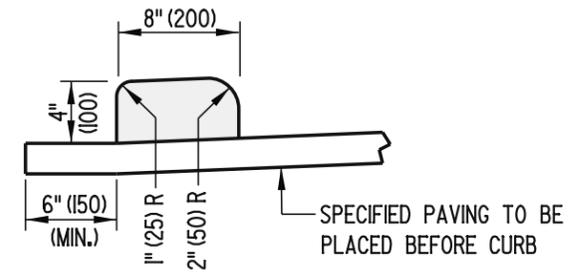
INTEGRAL P.C.C. CURB AND GUTTER
TYPE 4



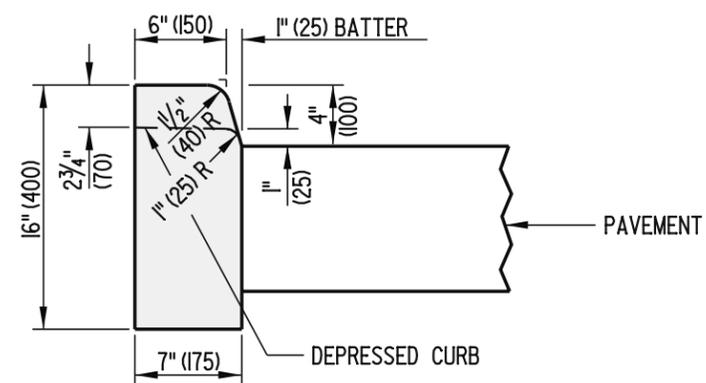
P.C.C. CURB
TYPE 2



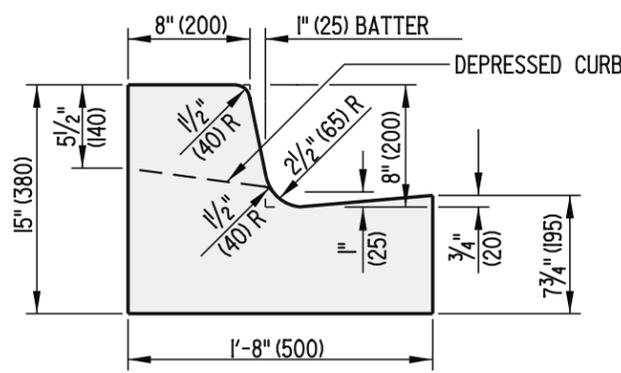
INTEGRAL P.C.C. CURB AND GUTTER
TYPE 2



HOT-MIX, HOT LAID BITUMINOUS CONCRETE CURB

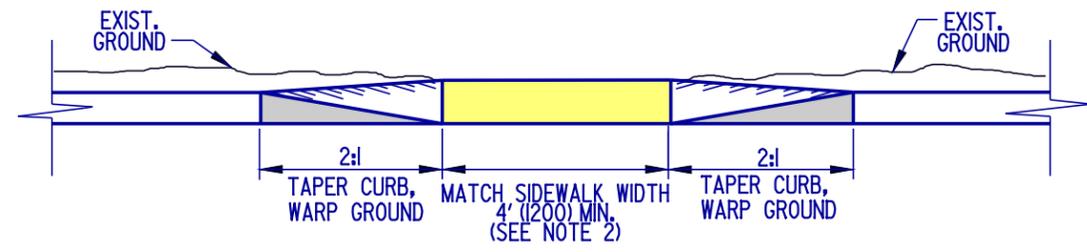
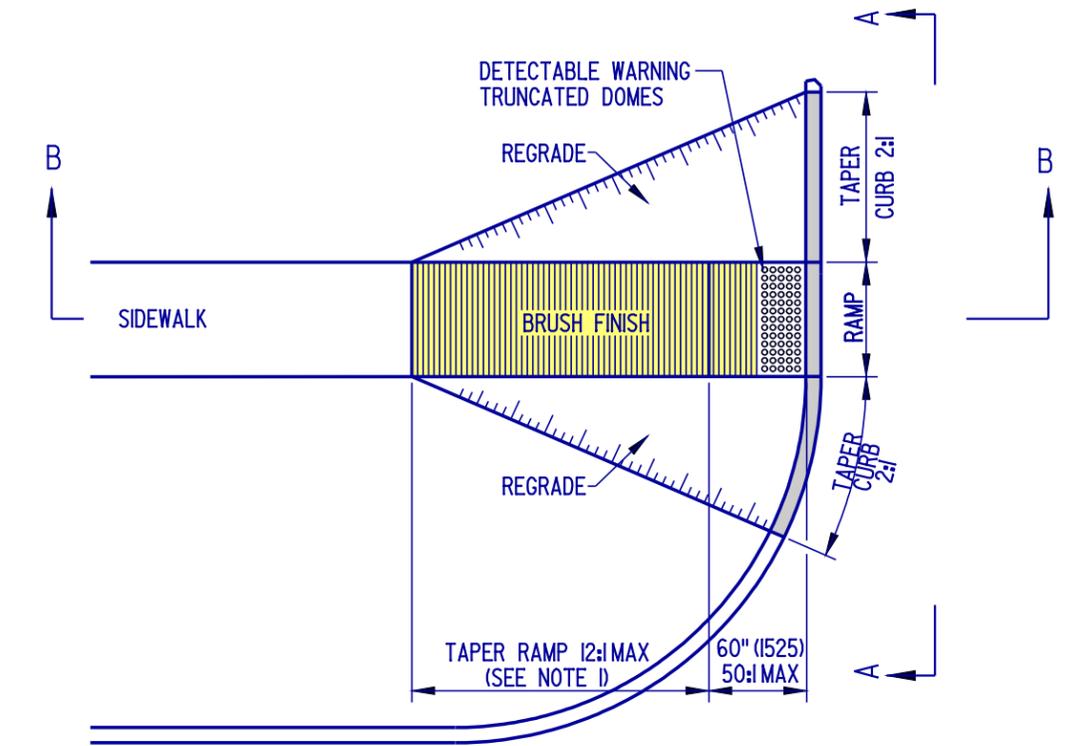


P.C.C. CURB
TYPE 3

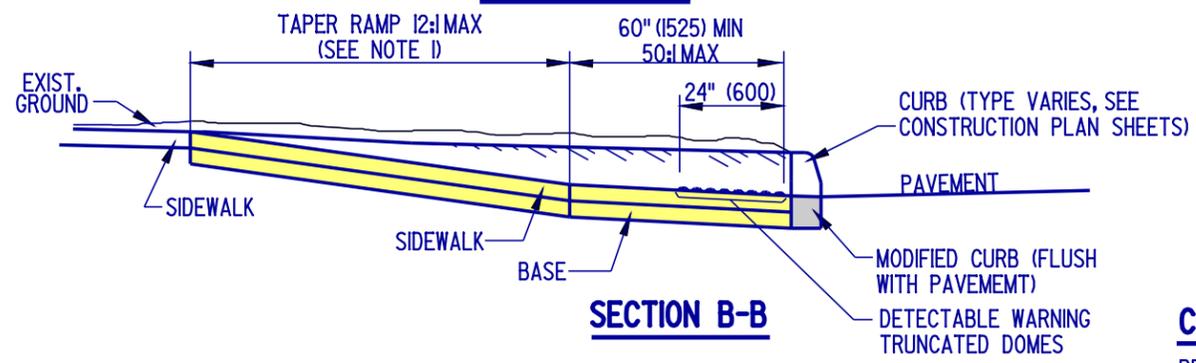


INTEGRAL P.C.C. CURB AND GUTTER
TYPE 3

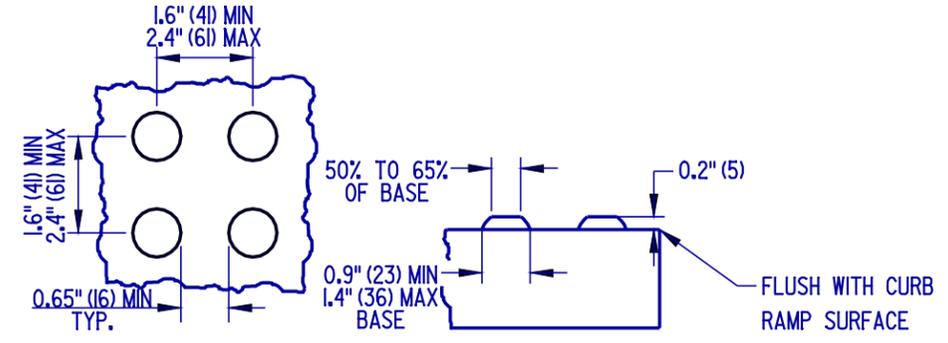
- NOTES:
1. WHEN P.C.C. CURB OR INTEGRAL P.C.C. CURB AND GUTTER IS PLACED ADJACENT TO PORTLAND CEMENT CONCRETE PAVEMENT, CONSTRUCT THE JOINT AS PER THE LONGITUDINAL JOINT SEALANT DETAIL ON STANDARD P-2, SHEET 3 OF 5. USE APPROVED JOINT FILLER TO SEAL. WORK TO BE PAID UNDER RESPECTIVE CURB AND GUTTER ITEM.
 2. DEPRESS CURB AT ENTRANCES AS DETAILED ON THIS SHEET.
 3. DEPRESS CURB FLUSH WITH PAVEMENT AT CURB RAMPS. MAXIMUM SLOPE OF CURB AT CURB RAMPS IS 20:1 IN THE DIRECTION OF PEDESTRIAN TRAVEL. SEE STANDARD NO C-2, 1 OF 4.



ELEVATION A-A

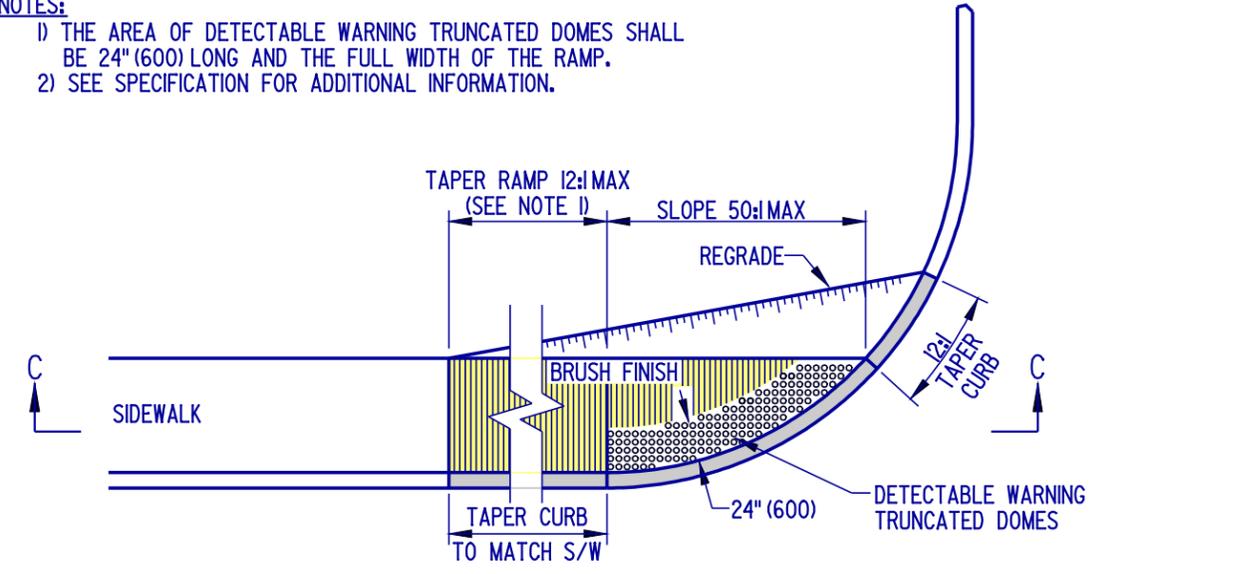


SECTION B-B

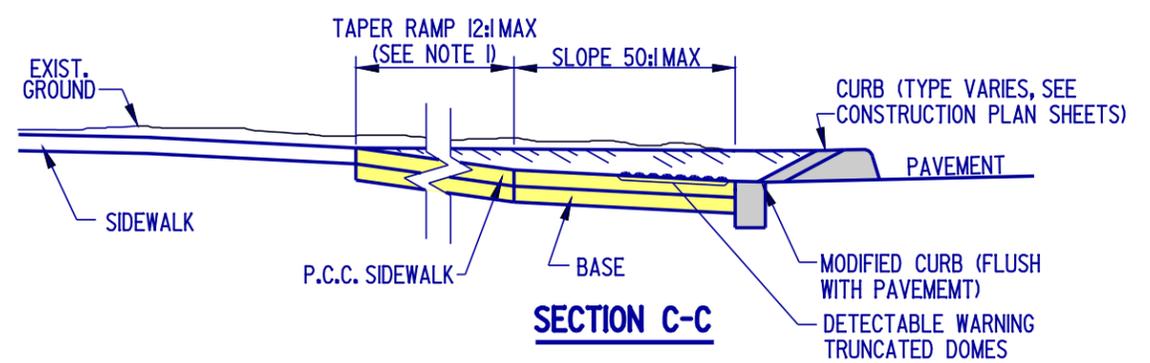


DETECTABLE WARNING TRUNCATED DOME DETAILS

- NOTES:**
- 1) THE AREA OF DETECTABLE WARNING TRUNCATED DOMES SHALL BE 24" (600) LONG AND THE FULL WIDTH OF THE RAMP.
 - 2) SEE SPECIFICATION FOR ADDITIONAL INFORMATION.



SECTION C-C



- NOTES:**
- 1). WHERE A 12:1 MAXIMUM SLOPE RAMP WILL NOT MEET THE SIDEWALK GRADE WITHIN A LENGTH OF 15' (4570) DUE TO STEEP ADJACENT ROADWAY, THE RAMP LENGTH MAY BE LIMITED TO 15' (4570), AND THE RAMP SLOPE ALLOWED TO EXCEED 12:1.
 - 2). RAMP WIDTH SHALL BE 4' (1200) MINIMUM, HOWEVER, 5' (1525) IS PREFERRED.

CURB RAMP, TYPE 1
PERPENDICULAR CURB RAMP

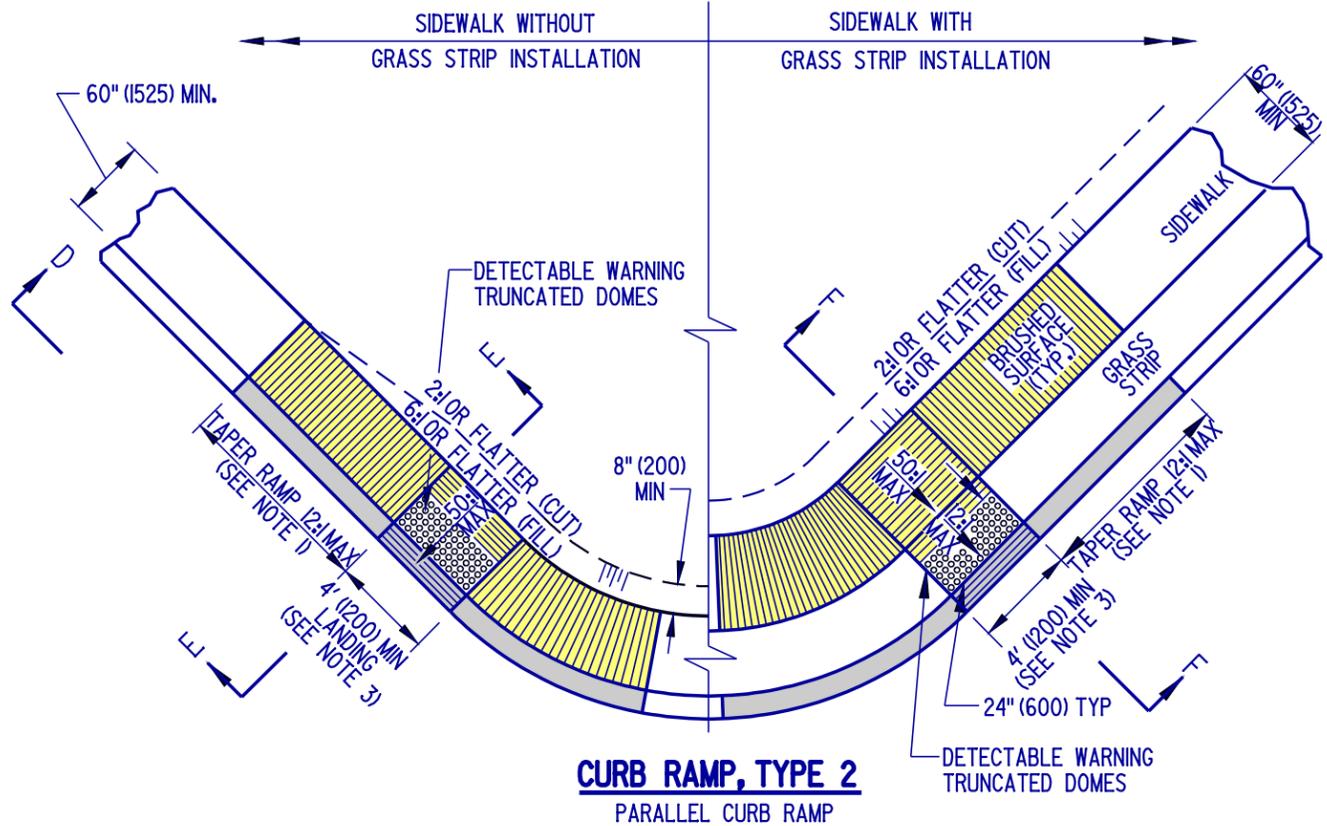


DELAWARE
DEPARTMENT OF TRANSPORTATION

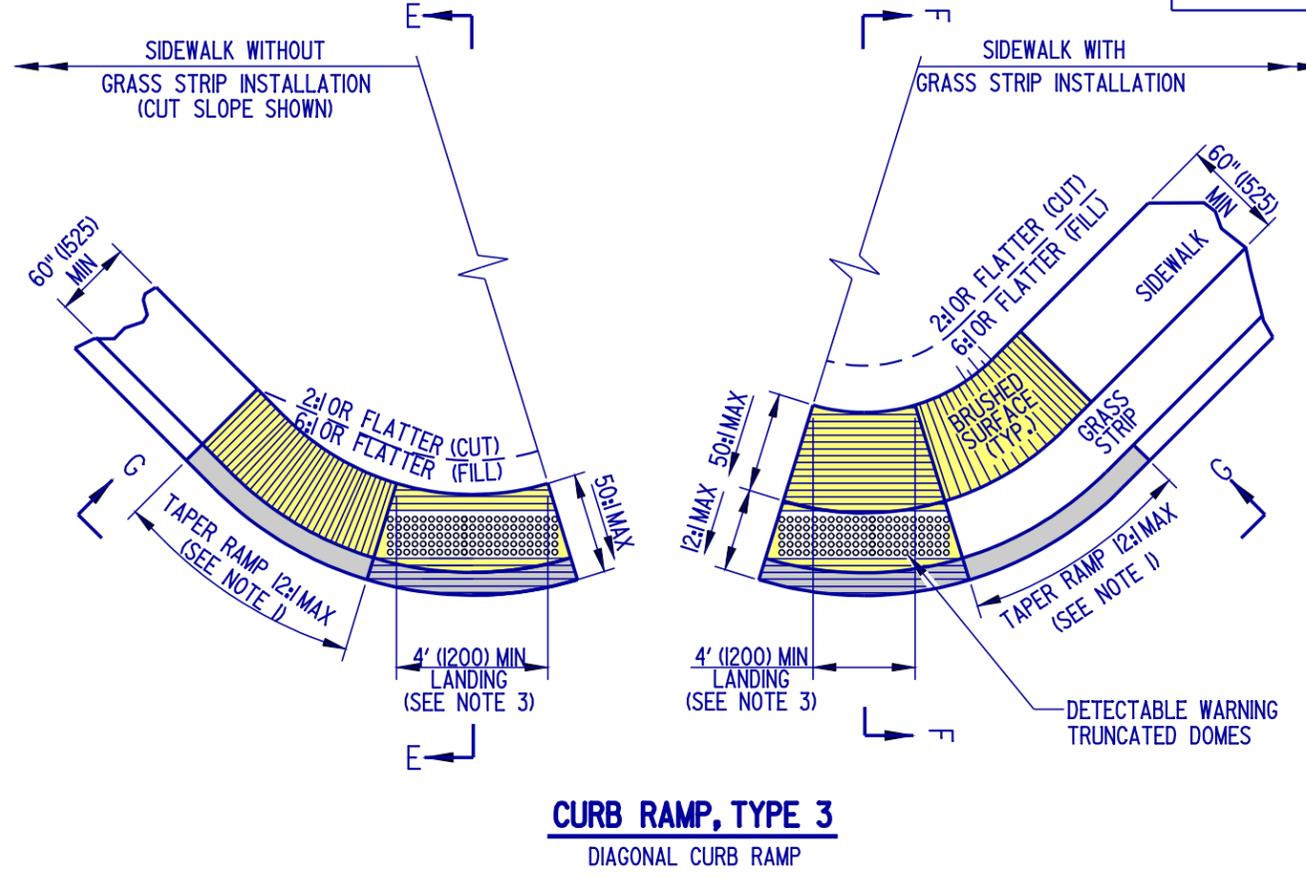
CURB RAMP, TYPE 1 AND SECTIONS

STANDARD NO. C-2 (2004) SHT. 1 OF 4

APPROVED *Carolann Wick* 1/10/05
CHIEF ENGINEER DATE
RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE

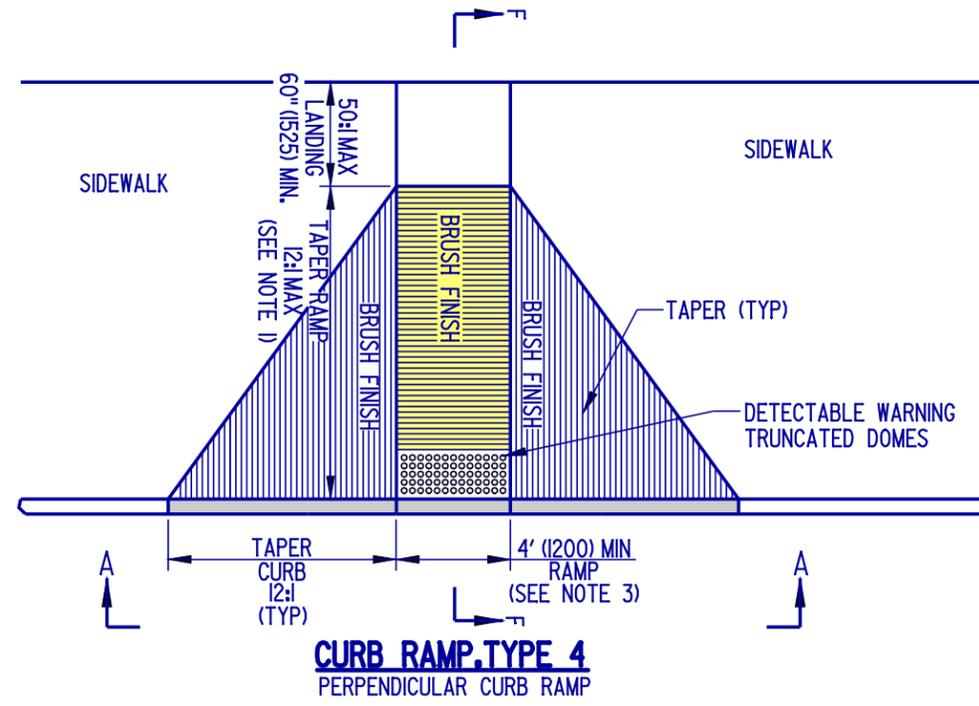


CURB RAMP, TYPE 2
PARALLEL CURB RAMP



CURB RAMP, TYPE 3
DIAGONAL CURB RAMP

NOTE: THE DIAGONAL CURB RAMP IS NOT THE PREFERRED TREATMENT.



CURB RAMP, TYPE 4
PERPENDICULAR CURB RAMP

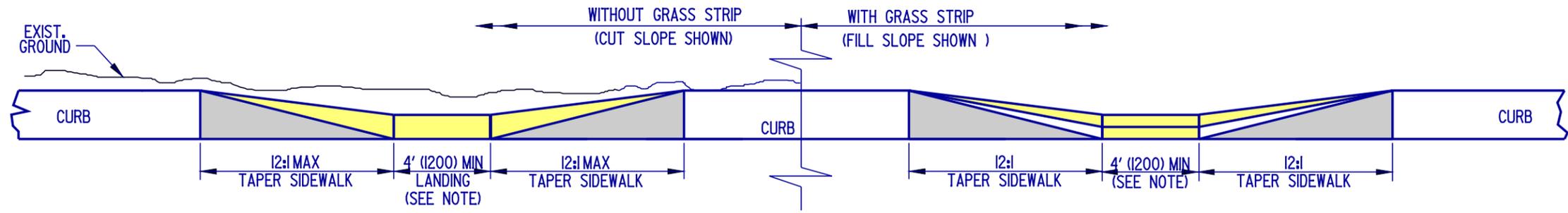
- NOTES:**
- 1). WHERE A 12:1 MAXIMUM SLOPE RAMP WILL NOT MEET THE SIDEWALK GRADE WITHIN A LENGTH OF 15' (4570) DUE TO STEEP ADJACENT ROADWAY, THE RAMP LENGTH MAY BE LIMITED TO 15' (4570), AND THE RAMP SLOPE ALLOWED TO EXCEED 12:1.
 - 2). TRANSITION TO EXISTING SIDEWALK WIDTH OVER THE LENGTH OF THE RAMP.
 - 3). RAMP WIDTH SHALL BE 4' (1200) MINIMUM, HOWEVER, 5' (1525) IS PREFERRED.



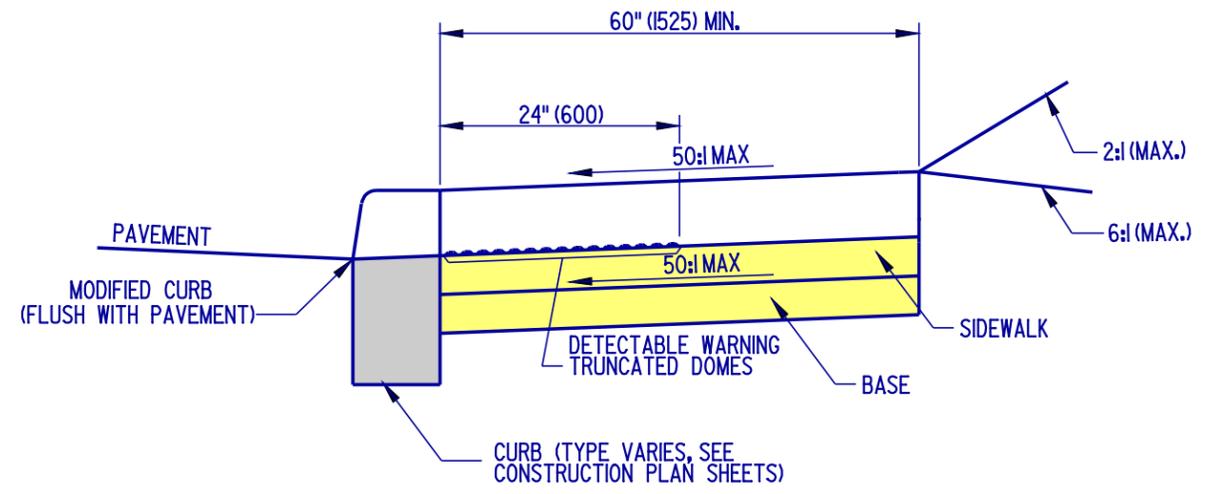
DELAWARE
DEPARTMENT OF TRANSPORTATION

CURB RAMPS, TYPES 2, 3, & 4
STANDARD NO. C-2 (2004) SHT. 2 OF 4

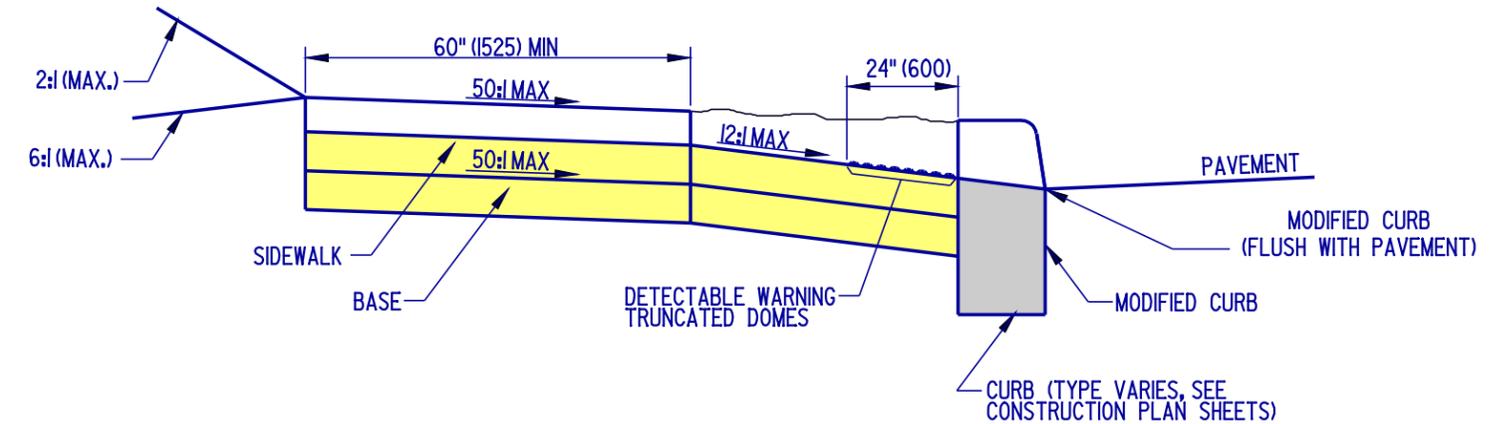
APPROVED *Carolann Wick* 1/10/05
CHIEF ENGINEER DATE
RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE



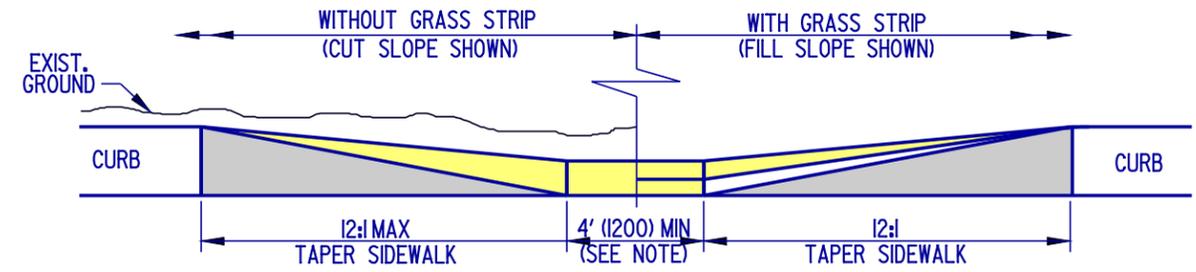
ELEVATION D-D



SECTION E-E



SECTION F-F



ELEVATION G-G

NOTE: CURB RAMP WIDTH SHALL BE 4' (1200) MINIMUM, HOWEVER, 5' (1525) IS PREFERRED.

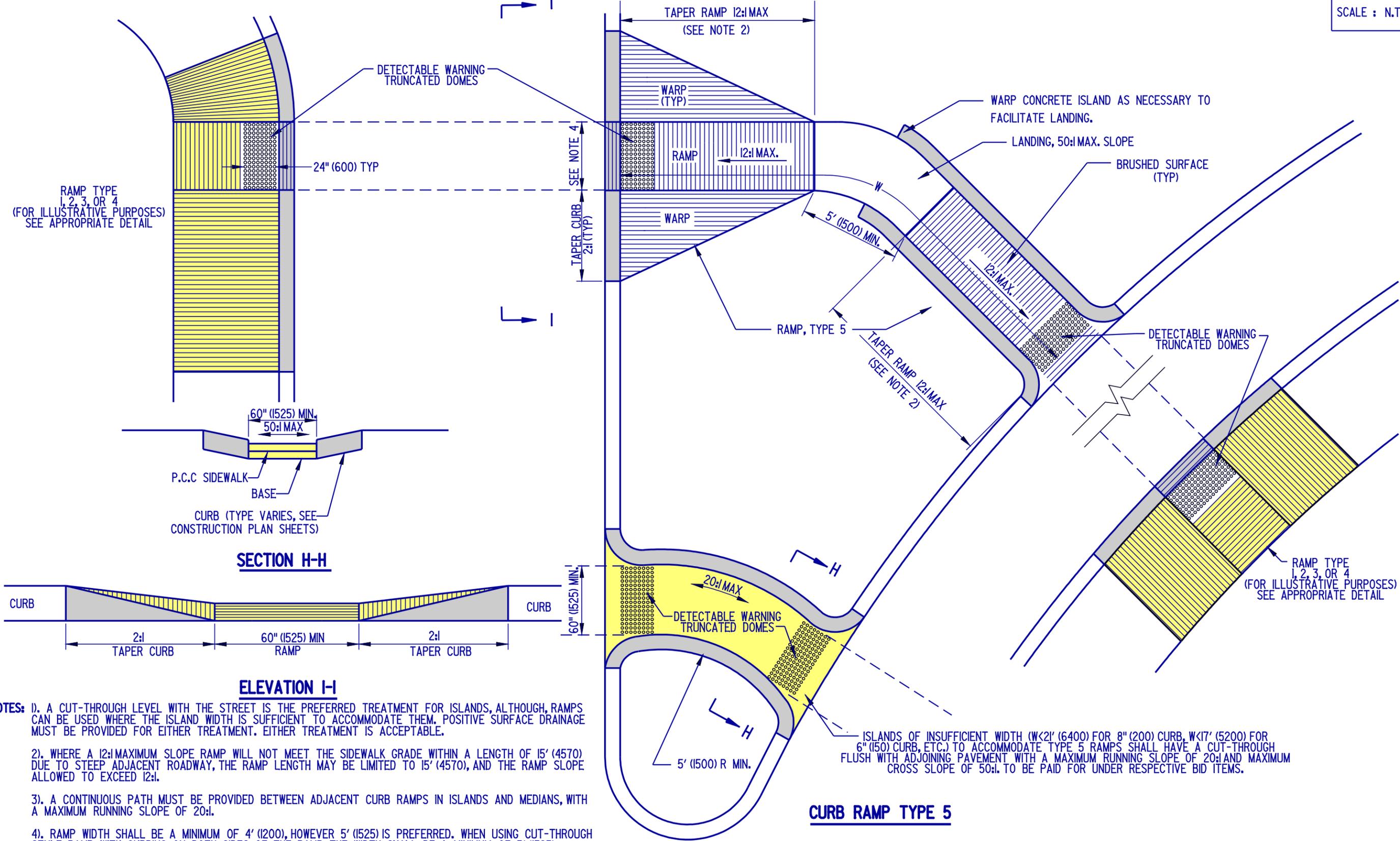


DELAWARE
DEPARTMENT OF TRANSPORTATION

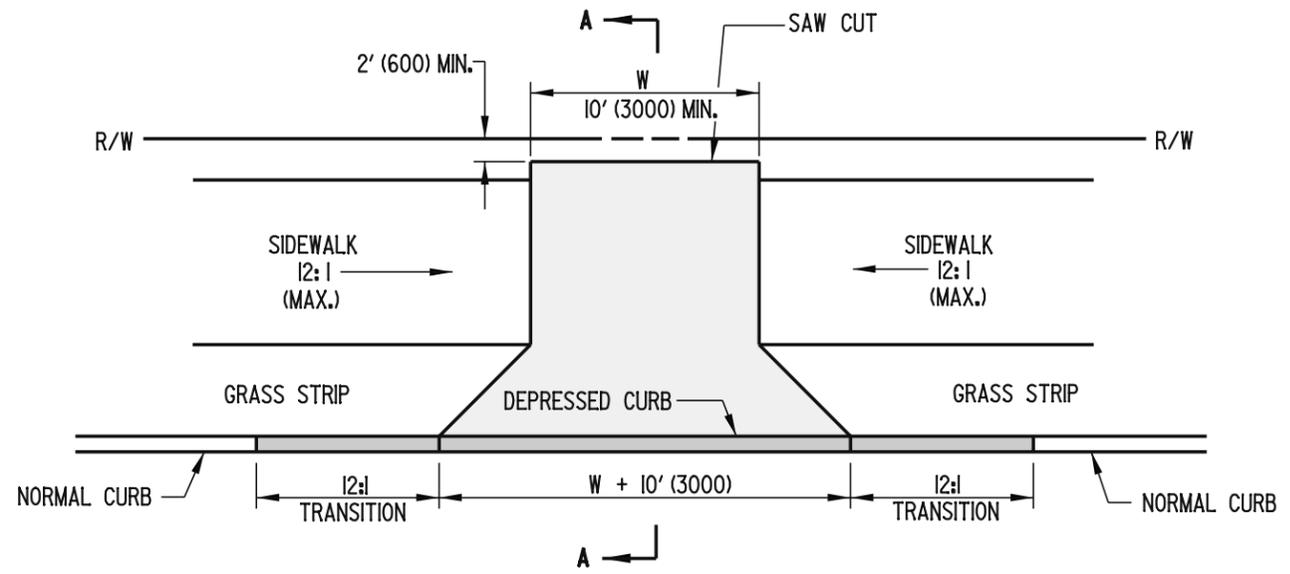
CURB RAMP SECTIONS FOR TYPES 2 & 3			
STANDARD NO.	C-2 (2004)	SHT.	3 OF 4

APPROVED *Carolann Wicks* 1/10/05
CHIEF ENGINEER DATE

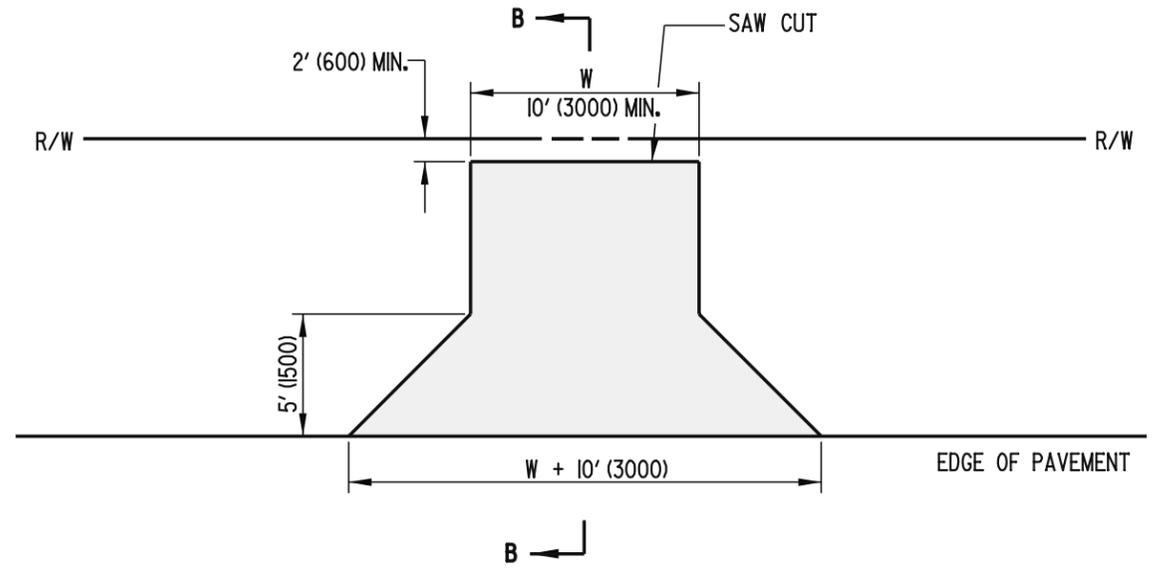
RECOMMENDED *Dennis M. O'Flaherty* 1/3/05
DESIGN ENGINEER DATE



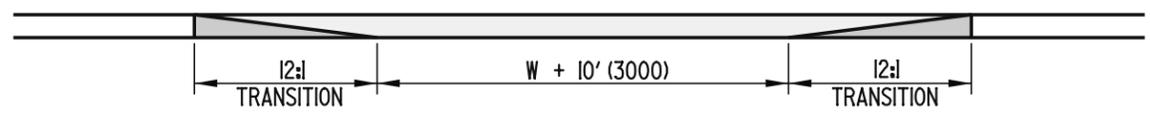
- NOTES:**
- 1). A CUT-THROUGH LEVEL WITH THE STREET IS THE PREFERRED TREATMENT FOR ISLANDS, ALTHOUGH, RAMPS CAN BE USED WHERE THE ISLAND WIDTH IS SUFFICIENT TO ACCOMMODATE THEM. POSITIVE SURFACE DRAINAGE MUST BE PROVIDED FOR EITHER TREATMENT. EITHER TREATMENT IS ACCEPTABLE.
 - 2). WHERE A 12:1 MAXIMUM SLOPE RAMP WILL NOT MEET THE SIDEWALK GRADE WITHIN A LENGTH OF 15' (4570) DUE TO STEEP ADJACENT ROADWAY, THE RAMP LENGTH MAY BE LIMITED TO 15' (4570), AND THE RAMP SLOPE ALLOWED TO EXCEED 12:1.
 - 3). A CONTINUOUS PATH MUST BE PROVIDED BETWEEN ADJACENT CURB RAMPS IN ISLANDS AND MEDIANS, WITH A MAXIMUM RUNNING SLOPE OF 20:1.
 - 4). RAMP WIDTH SHALL BE A MINIMUM OF 4' (1200), HOWEVER 5' (1525) IS PREFERRED. WHEN USING CUT-THROUGH STYLE RAMP, WITH CURBING ON BOTH SIDES OF THE RAMP, THE WIDTH SHALL BE A MINIMUM OF 5' (1525).



PLAN
ENTRANCE WITH SIDEWALK



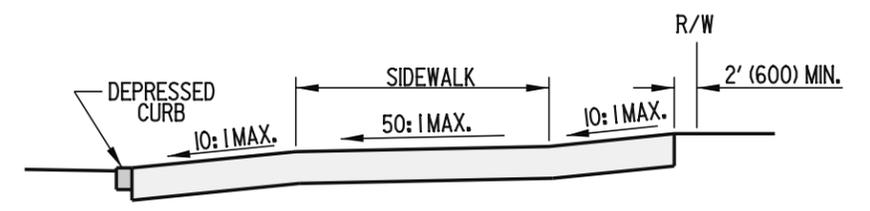
PLAN
ENTRANCE WITHOUT SIDEWALK



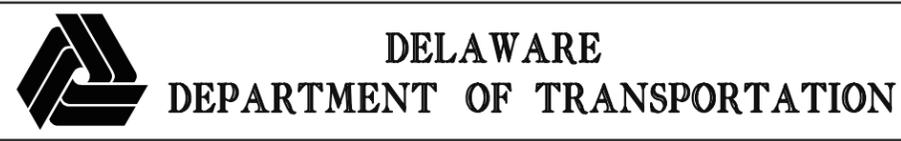
ELEVATION



SECTION B-B



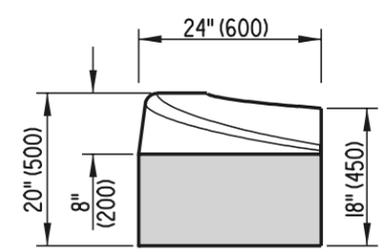
SECTION A-A



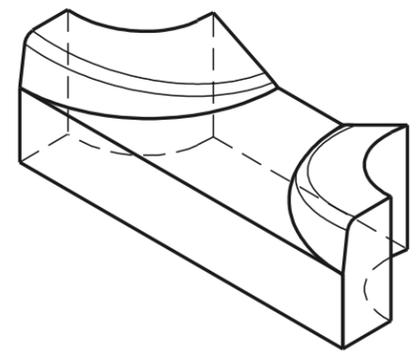
ENTRANCES			
STANDARD NO.	C-3 (2005)	SHT.	1 OF 1

APPROVED	<i>Carolann Wick</i> CHIEF ENGINEER	12/5/05 DATE
RECOMMENDED	<i>James M. O'Brien</i> DESIGN ENGINEER	11/29/05 DATE

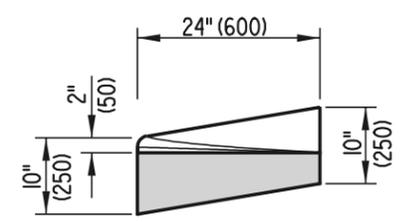
SCALE : N.T.S.



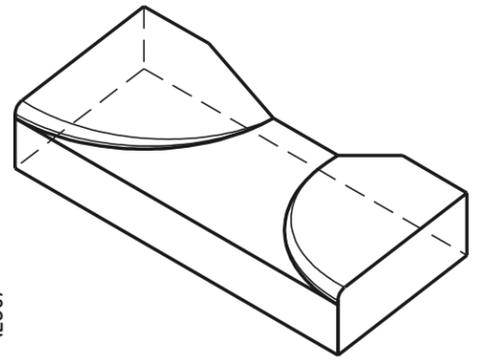
SECTION A-A



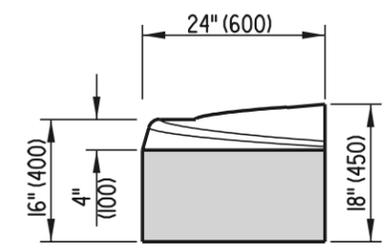
ISOMETRIC VIEW



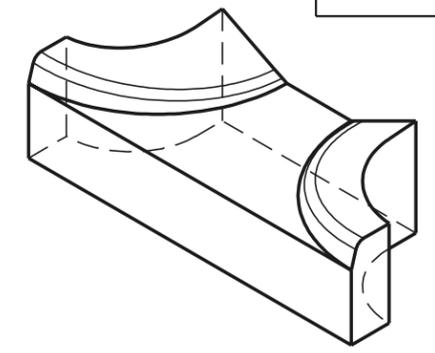
SECTION B-B



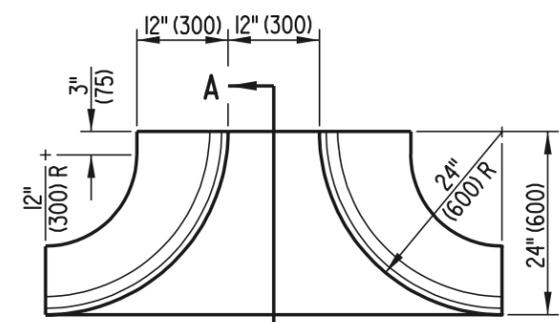
ISOMETRIC VIEW



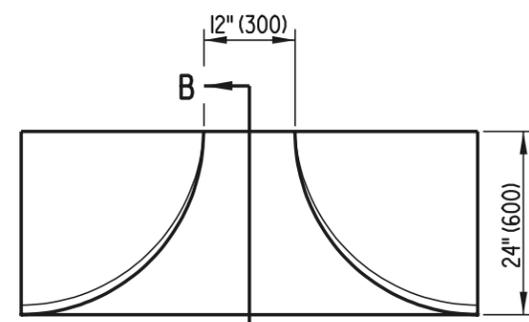
SECTION C-C



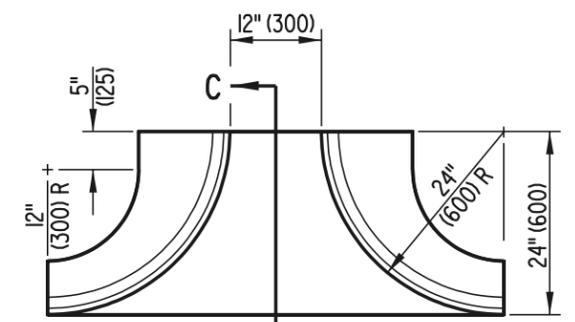
ISOMETRIC VIEW



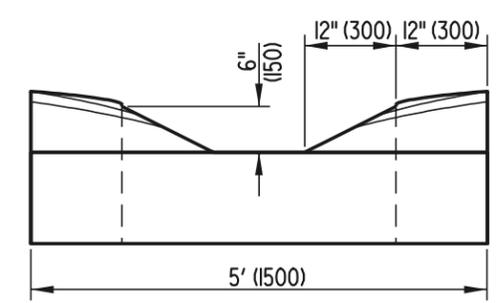
TOP VIEW



TOP VIEW

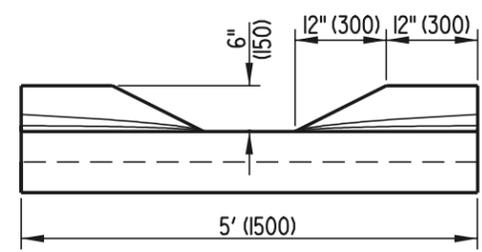


TOP VIEW



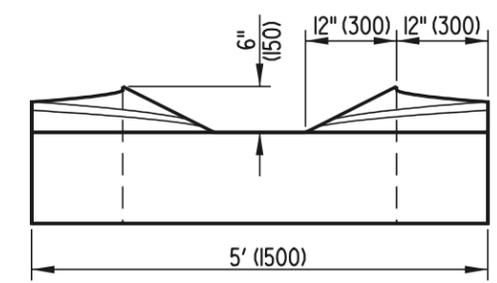
FRONT VIEW

TYPE A
P.C.C. CURB, TYPE 1



FRONT VIEW

TYPE B
P.C.C. CURB, TYPE 2



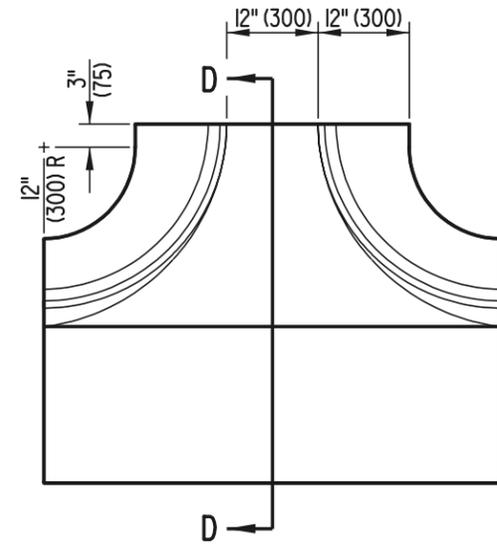
FRONT VIEW

TYPE C
P.C.C. CURB, TYPE 3

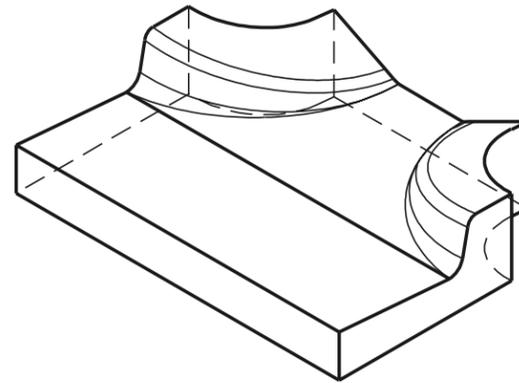


CURB OPENINGS			
STANDARD NO.	C-4 (2001)	SHT.	1 OF 3

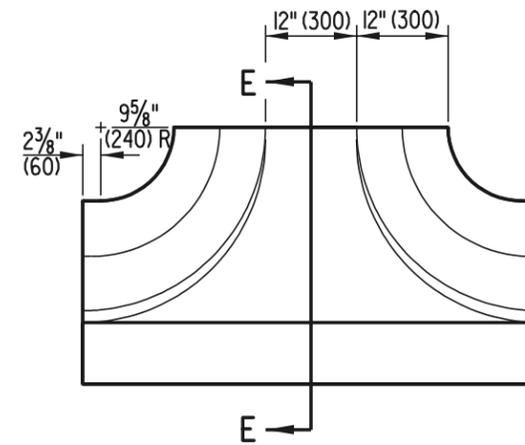
APPROVED	<i>Ryan M. Harshbarger</i>	6/18/01
RECOMMENDED	<i>Mehal Alghobari</i>	6/18/01



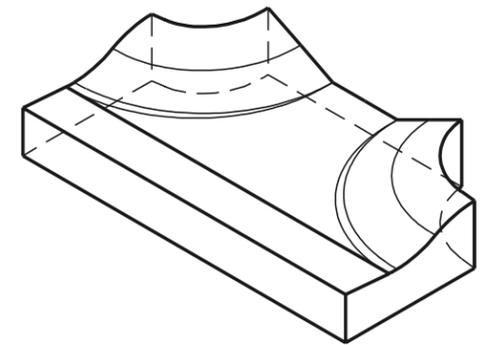
TOP VIEW



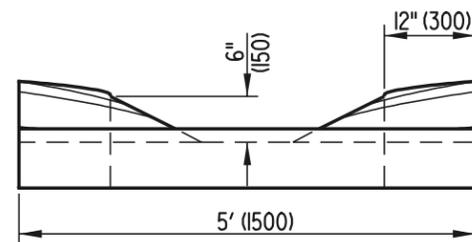
ISOMETRIC VIEW



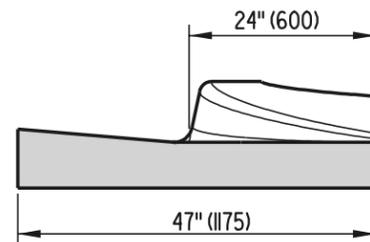
TOP VIEW



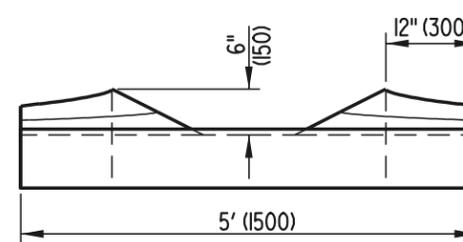
ISOMETRIC VIEW



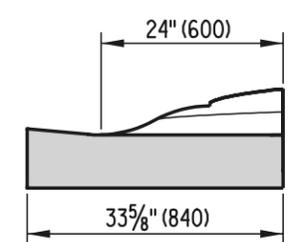
FRONT VIEW



SECTION D-D



FRONT VIEW



SECTION E-E

TYPE D
INTEGRAL P.C.C. CURB AND GUTTER, TYPE 1

TYPE E
INTEGRAL P.C.C. CURB AND GUTTER, TYPE 2

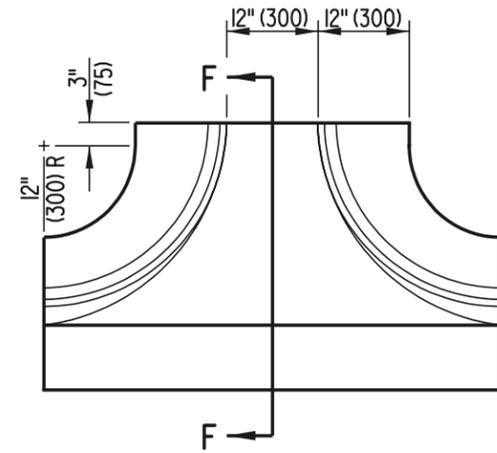


DELAWARE
DEPARTMENT OF TRANSPORTATION

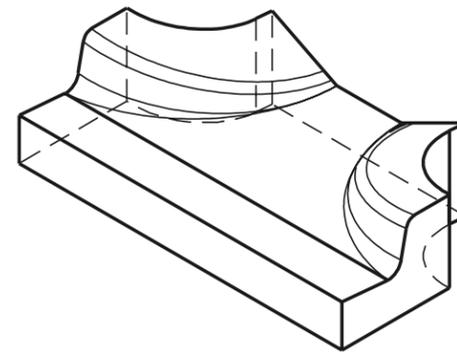
CURB OPENINGS

STANDARD NO. C-4 (2001) SHT. 2 OF 3

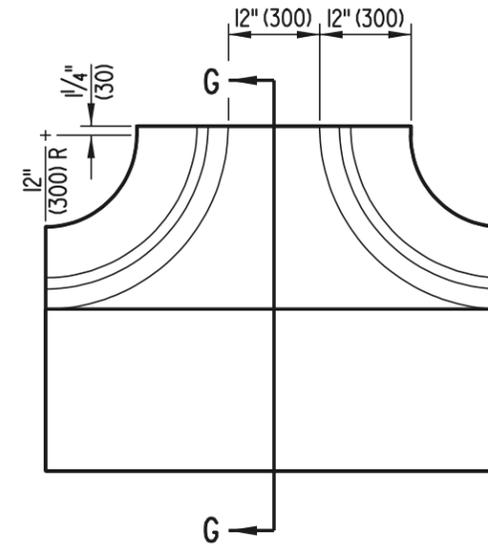
APPROVED *Ryan M. Harkins* 6/18/01
CHIEF ENGINEER DATE
 RECOMMENDED *Mehal Aksh* 6/18/01
DESIGN ENGINEER DATE



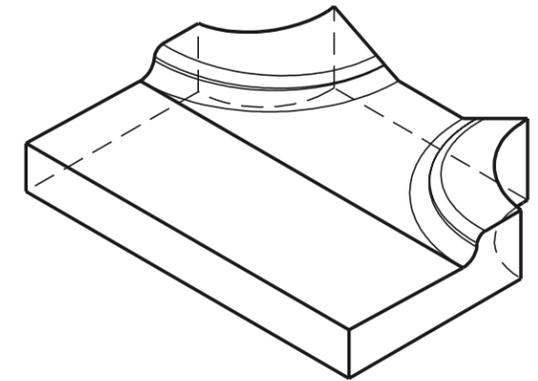
TOP VIEW



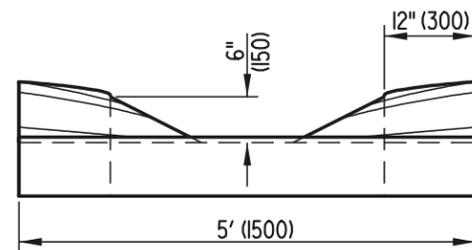
ISOMETRIC VIEW



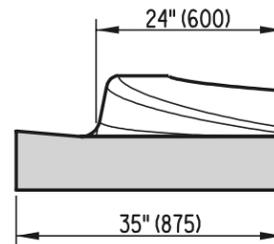
TOP VIEW



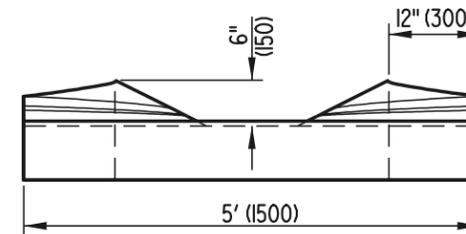
ISOMETRIC VIEW



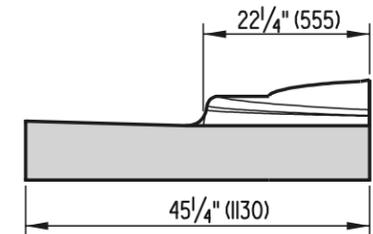
FRONT VIEW



SECTION F-F



FRONT VIEW



SECTION G-G

TYPE F
INTEGRAL P.C.C. CURB AND GUTTER, TYPE 3

TYPE G
INTEGRAL P.C.C. CURB AND GUTTER, TYPE 4

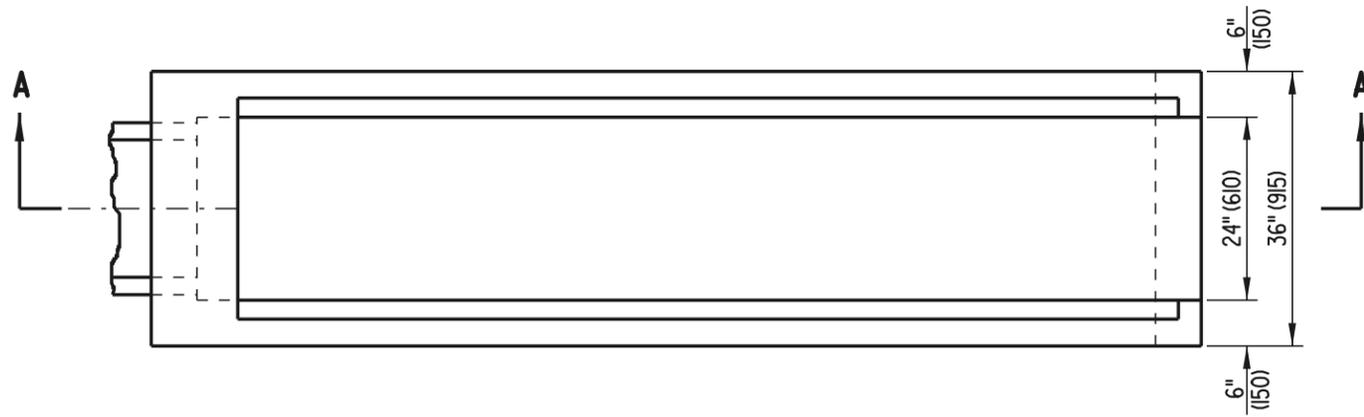


DELAWARE
DEPARTMENT OF TRANSPORTATION

CURB OPENINGS

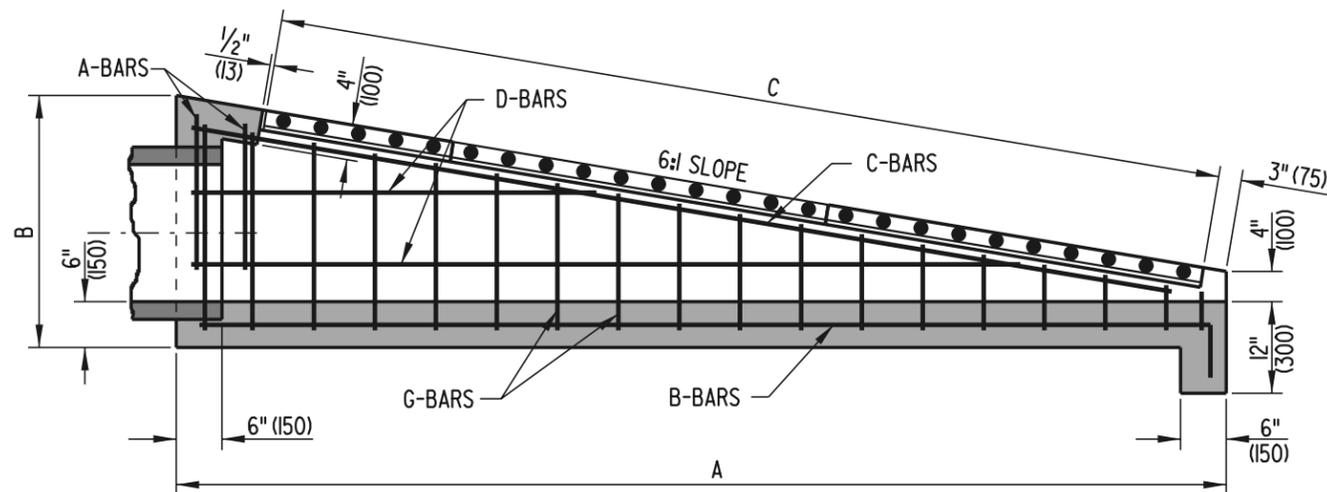
STANDARD NO. C-4 (2001) SHT. 3 OF 3

APPROVED *Ryan M. Harshbarger* 6/18/01
CHIEF ENGINEER DATE
 RECOMMENDED *Mehal Alghobari* 6/18/01
DESIGN ENGINEER DATE

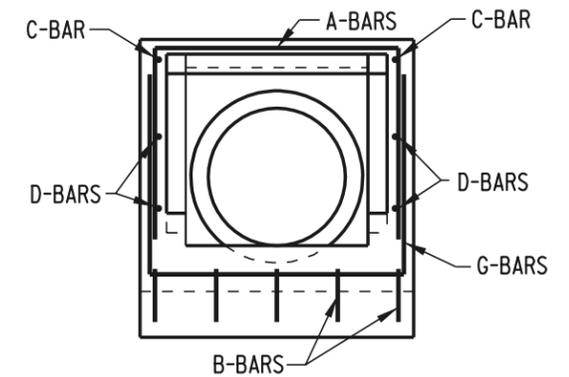


PLAN VIEW
SHOWN WITHOUT GRATE

NOTE: 6:1 SAFETY END STRUCTURE TO BE PRECAST



SECTION A-A



FRONT VIEW



DELAWARE
DEPARTMENT OF TRANSPORTATION

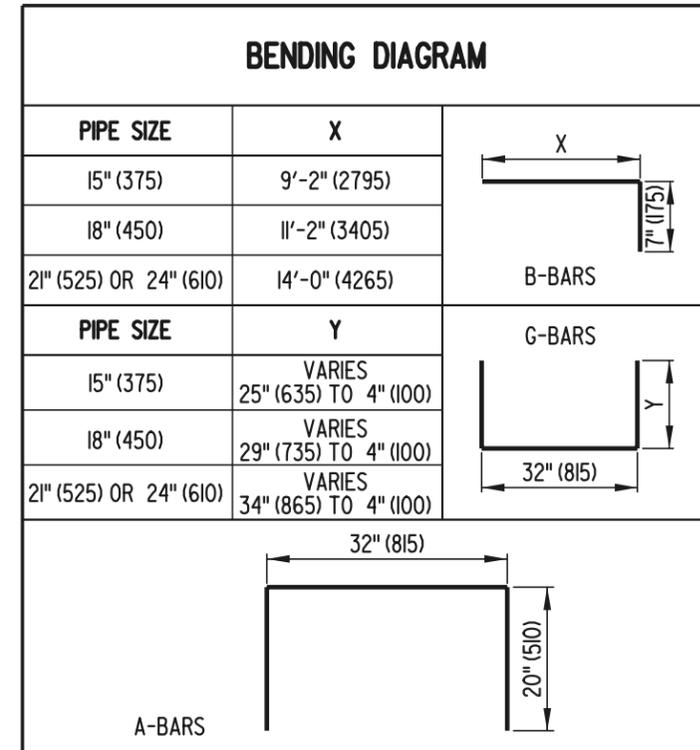
6:1 SAFETY END STRUCTURE

STANDARD NO. D-1 (2001)

SHT. 1 OF 2

APPROVED *Ryan M. Harshbarger* 6/18/01
CHIEF ENGINEER DATE
 RECOMMENDED *Mehal Alghob* 6/18/01
DESIGN ENGINEER DATE

DIMENSIONS			
PIPE SIZE	A	B	C
15" (375)	9'-6" (2895)	2'-5" (735)	8'-4" (2540)
18" (450)	11'-6" (3505)	2'-9" (840)	10'-5" (3175)
21" (525) OR 24" (600)	14'-4" (4370)	3'-2 ⁵ / ₈ " (980)	12'-6" (3810)



APPROXIMATE QUANTITIES							
PIPE SIZE	CONCRETE FT ³ (m ³)		REINF. STEEL LBS. (kg)	NO. OF GRATES	LENGTH TO BE CUT FROM 1 GRATE	WEIGHT OF FULL SIZE GRATE LBS. (kg)	WEIGHT OF CUT GRATE LBS. (kg)
	CONC. PIPE	C.M. PIPE					
15" (375)	25 (0.708)	25.43 (0.720)	121.12 (54.94)	2	--	270.92 (122.89)	--
18" (450)	31.5 (0.892)	32.07 (0.908)	156.7 (71.08)	3	2'-1" (635)	270.92 (122.89)	135.47 (61.45)
21" (525) OR 24" (600)	40.75 (1.154)	39.87 (1.129)	194.0 (88.00)	3	--	270.92 (122.89)	--

SCHEDULE OF REINFORCING STEEL																				
PIPE SIZE	A-BARS				B-BARS				C-BARS				D-BARS				G-BARS			
	SIZE	NO.	SPA.	LENGTH	SIZE	NO.	SPA.	LENGTH	SIZE	NO.	SPA.	LENGTH	SIZE	NO.	SPA.	LENGTH	SIZE	NO.	SPA.	LENGTH
15" (375)	*4 (#13)	2	8" (200)	72" (1830)	*4 (#13)	5	8" (200)	9'-9" (2970)	*4 (#13)	2	-	9'-3" (2820)	*4 (#13)	4	8" (200)	VARIES 50" (1270) TO 100" (2540)	*4 (#13)	15	8" (200)	VARIES 40" (1015) TO 82" (2085)
18" (450)	*4 (#13)	2	8" (200)	72" (1830)	*4 (#13)	5	8" (200)	11'-9" (3580)	*4 (#13)	2	-	11'-5" (3480)	*4 (#13)	6	8" (200)	43 ¹ / ₂ " (1105) TO 130 ¹ / ₂ " (3315)	*4 (#13)	18	8" (200)	VARIES 40" (1015) TO 90" (2285)
21" (525) OR 24" (600)	*4 (#13)	2	8" (200)	72" (1830)	*4 (#13)	5	8" (200)	14'-7" (4445)	*4 (#13)	2	-	14'-3" (4345)	*4 (#13)	6	8" (200)	VARIES 51" (1295) TO 153" (3885)	*4 (#13)	22	8" (200)	VARIES 40" (1015) TO 100" (2540)



DELAWARE
DEPARTMENT OF TRANSPORTATION

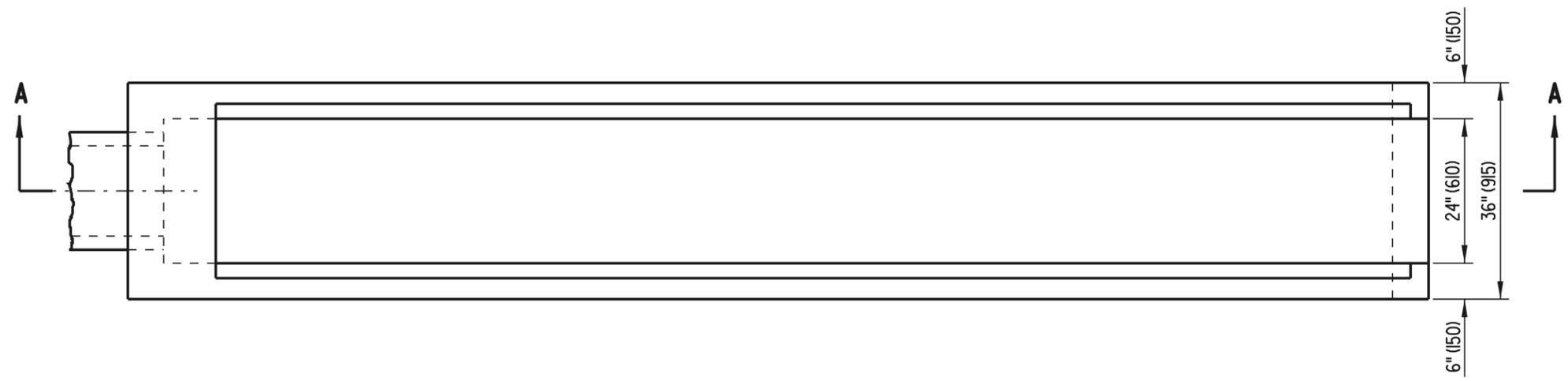
6:1 SAFETY END STRUCTURE

STANDARD NO. D-1 (2001)

SHT. 2 OF 2

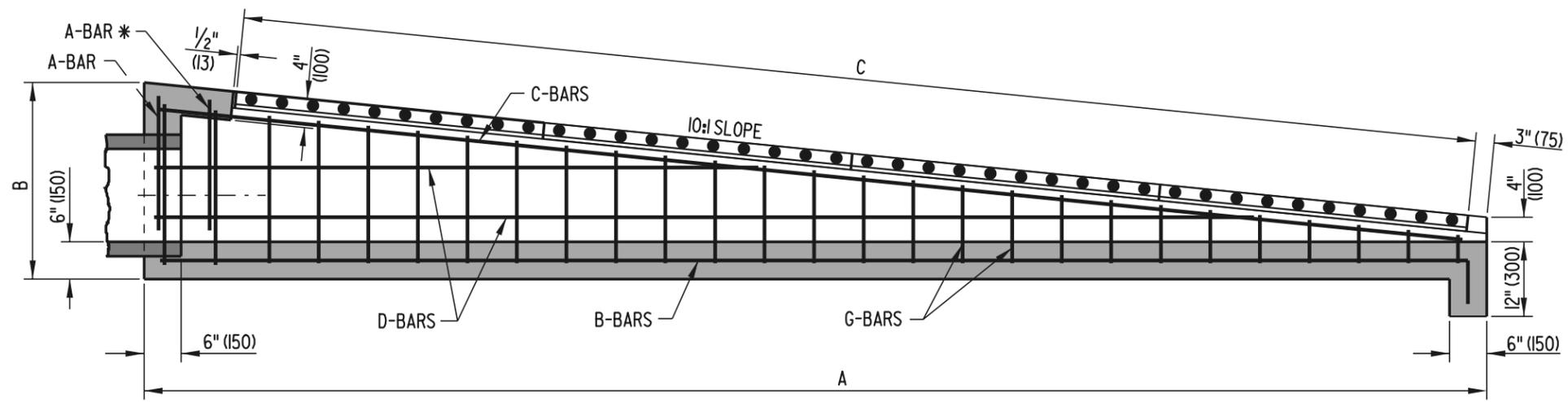
APPROVED *Ryan M. Hershman* 6/18/01
CHIEF ENGINEER DATE

RECOMMENDED *Mehal Rajda* 6/18/01
DESIGN ENGINEER DATE



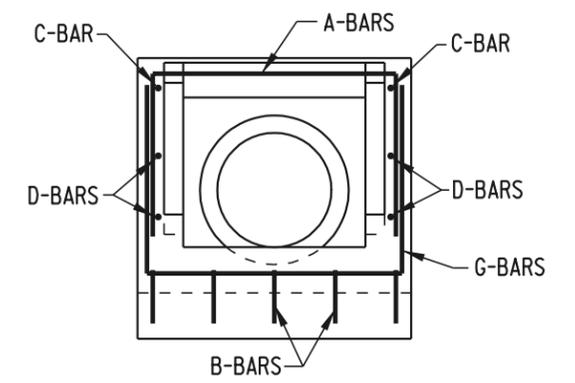
PLAN VIEW
SHOWN WITHOUT GRATE

NOTE: 10:1 SAFETY END STRUCTURE TO BE PRECAST



SECTION A-A

* REQUIRED ONLY FOR PIPE SIZE OF 21" (525) OR 24" (600)

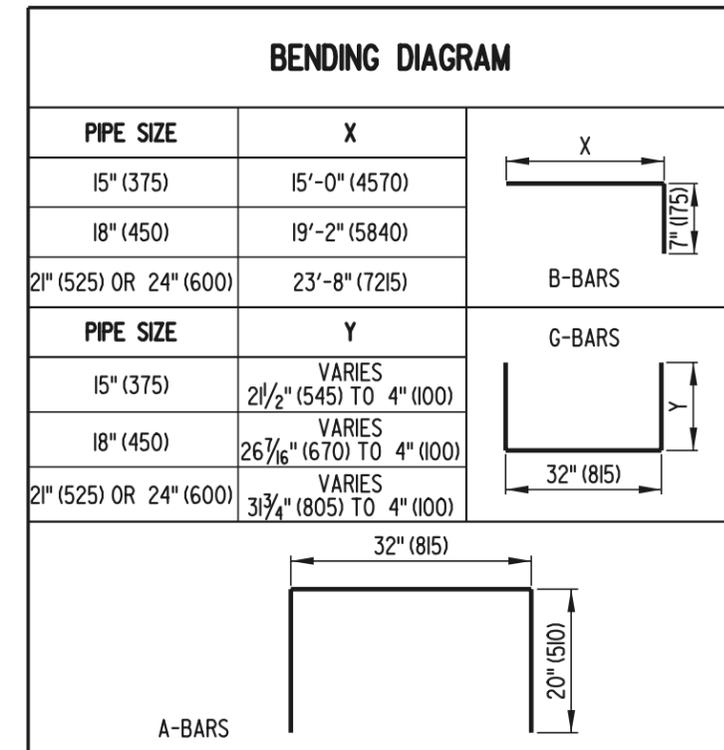


FRONT VIEW

 DELAWARE DEPARTMENT OF TRANSPORTATION	10:1 SAFETY END STRUCTURE			APPROVED <i>Ryan M. Harshbarger</i> 6/18/01 <small>CHIEF ENGINEER DATE</small>
	STANDARD NO. D-2 (2001)	SHT. 1	OF 2	RECOMMENDED <i>Mehal Akhavan</i> 6/18/01 <small>DESIGN ENGINEER DATE</small>

DIMENSIONS			
PIPE SIZE	A	B	C
15" (375)	15'-4" (4675)	2'-4 ³ / ₈ " (720)	14'-7" (4445)
18" (450)	19'-6" (5945)	2'-9 ³ / ₈ " (850)	18'-9" (5715)
21" (525) OR 24" (600)	24'-0" (7315)	3'-2 ¹³ / ₁₆ " (985)	22'-11" (6985)

APPROXIMATE QUANTITIES							
PIPE SIZE	CONCRETE FT ³ (m ³)		REINF. STEEL LBS. (kg)	NO. OF GRATES	LENGTH TO BE CUT FROM 1 GRATE	WEIGHT OF FULL SIZE GRATE LBS. (kg)	WEIGHT OF CUT GRATE LBS. (kg)
	CONC. PIPE	C.M. PIPE					
15" (375)	41.35 (1.171)	41.78 (1.183)	175.0 (79.38)	4	2'-1" (635)	270.92 (122.89)	135.47 (61.45)
18" (450)	50.11 (1.419)	50.68 (1.435)	227.0 (102.98)	5	2'-1" (635)	270.92 (122.89)	135.47 (61.45)
21" (525) OR 24" (600)	69.43 (1.966)	70.31 (1.991)	310.4 (140.79)	6	2'-1" (635)	270.92 (122.89)	135.47 (61.45)



SCHEDULE OF REINFORCING STEEL																				
PIPE SIZE	A-BARS				B-BARS				C-BARS				D-BARS				G-BARS			
	SIZE	NO.	SPA.	LENGTH	SIZE	NO.	SPA.	LENGTH	SIZE	NO.	SPA.	LENGTH	SIZE	NO.	SPA.	LENGTH	SIZE	NO.	SPA.	LENGTH
15" (375)	*4 (#13)	1	-	72" (1830)	*4 (#13)	5	8" (200)	15'-7" (4750)	*4 (#13)	2	-	15'-1 1/16" (4600)	*4 (#13)	4	8" (200)	VARIES 72 13/16" (1850) TO 145 5/8" (3700)	*4 (#13)	24	8" (200)	VARIES 40" (1015) TO 75 11/16" (1920)
18" (450)	*4 (#13)	1	-	72" (1830)	*4 (#13)	5	8" (200)	19'-9" (6020)	*4 (#13)	2	-	19'-3 3/8" (5875)	*4 (#13)	4	8" (200)	VARIES 89 5/8" (2275) TO 179 3/16" (4550)	*4 (#13)	30	8" (200)	VARIES 40" (1015) TO 85 3/4" (2180)
21" (525) OR 24" (600)	*4 (#13)	2	-	72" (1830)	*4 (#13)	5	8" (200)	24'-3" (7390)	*4 (#13)	2	-	23'-9 5/8" (7255)	*4 (#13)	6	8" (200)	VARIES 80 3/4" (2050) TO 242 1/8" (6150)	*4 (#13)	37	8" (200)	VARIES 40" (1015) TO 96 9/16" (2455)

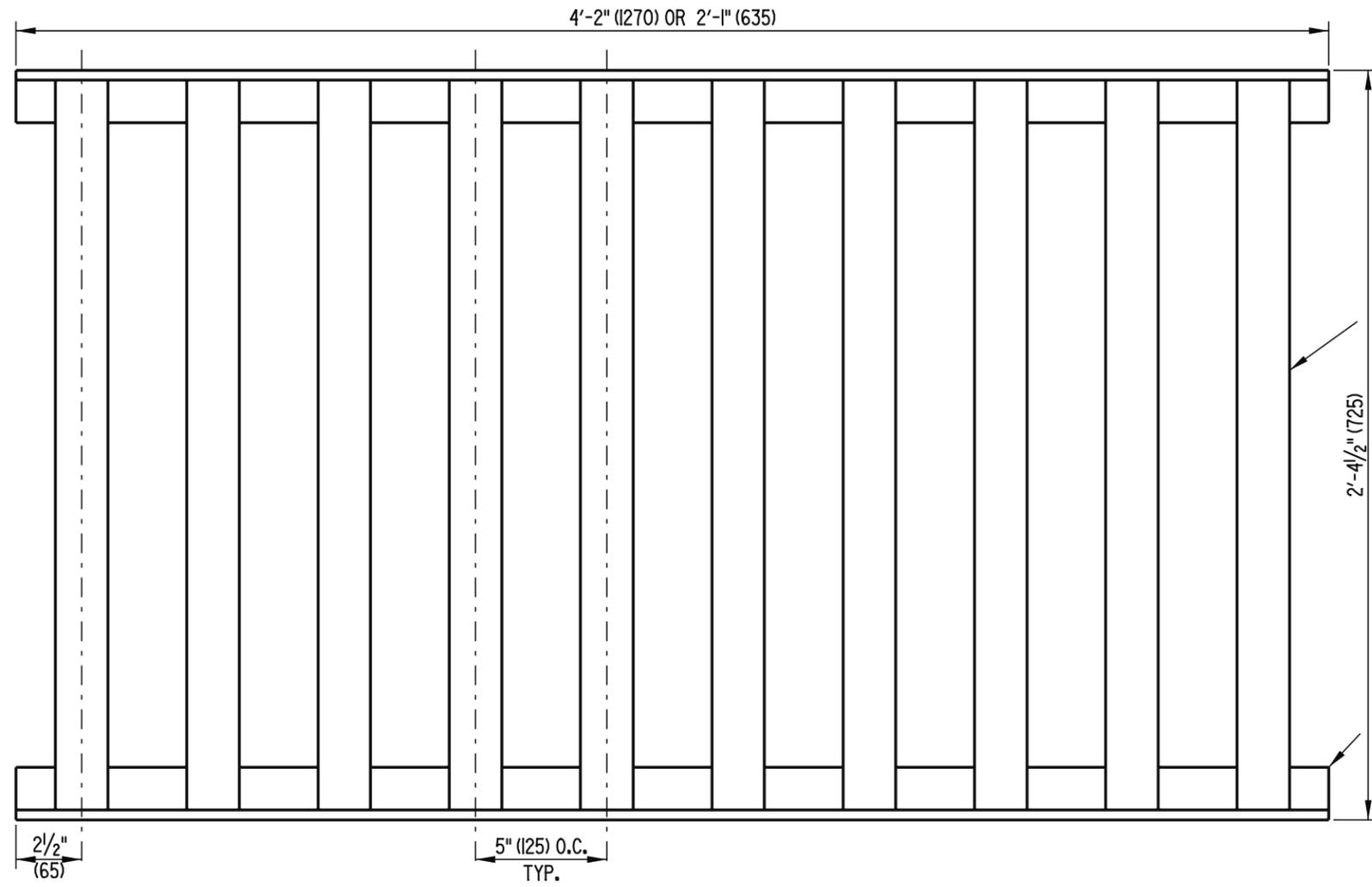


DELAWARE
DEPARTMENT OF TRANSPORTATION

10:1 SAFETY END STRUCTURE

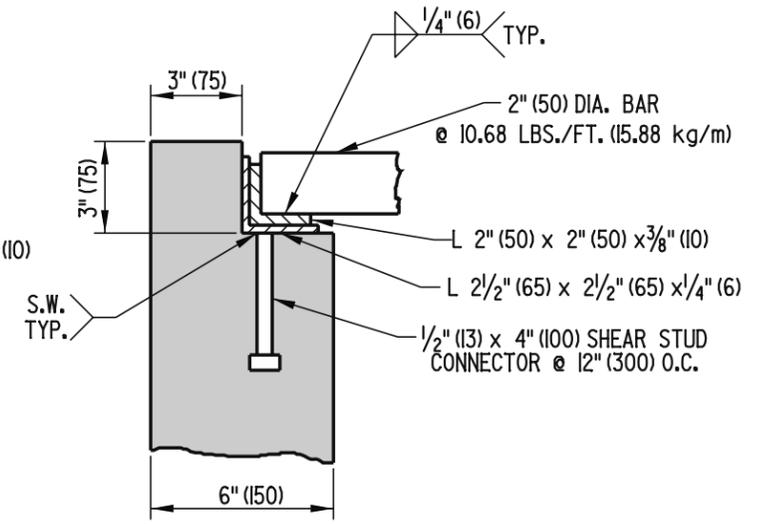
STANDARD NO. D-2 (2001) SHT. 2 OF 2

APPROVED *Ryan M. Hershberg* 6/18/01
CHIEF ENGINEER DATE
 RECOMMENDED *Mehal Rajda* 6/18/01
DESIGN ENGINEER DATE

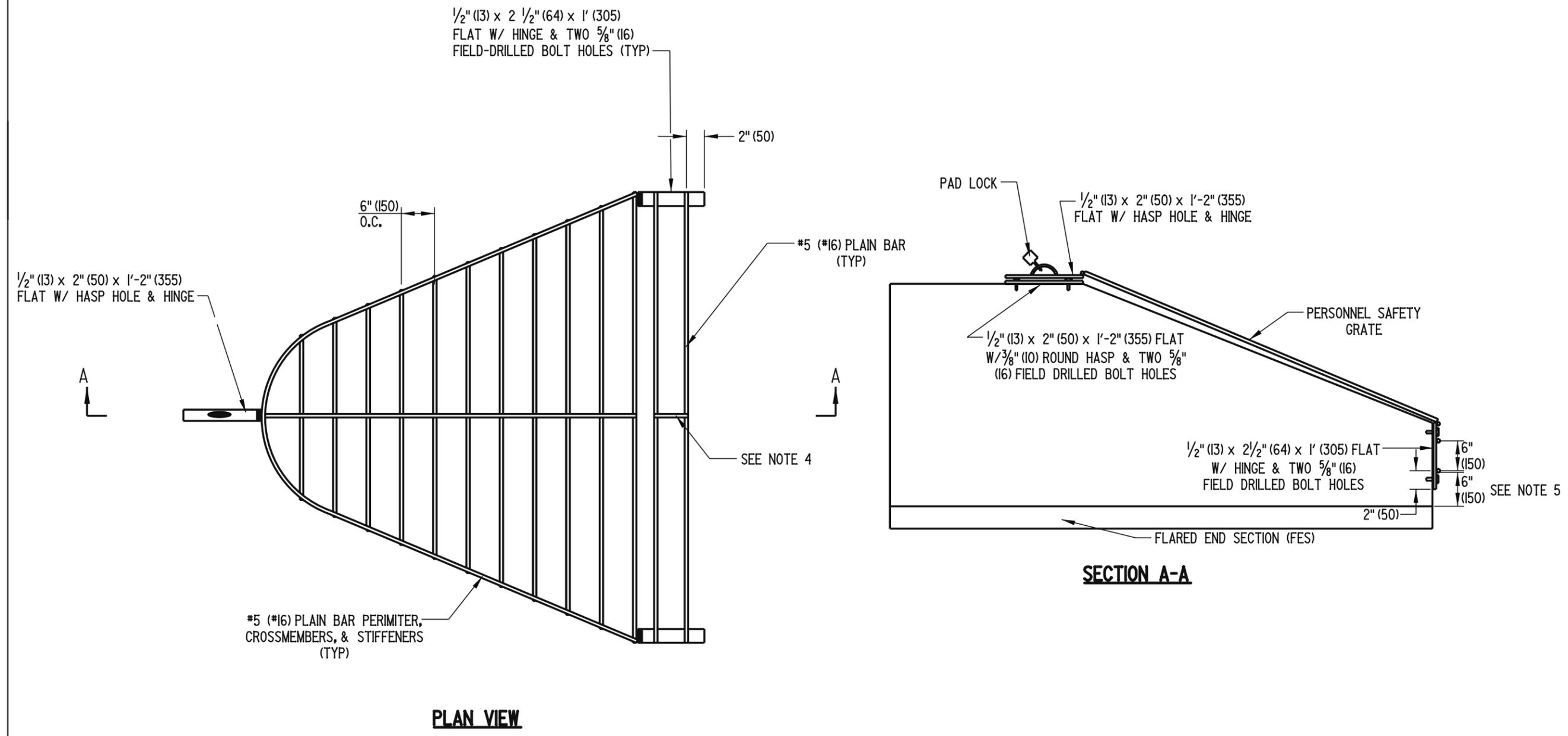


GRATE DETAIL

2" (50) DIA. BAR @ 10.68 LBS./FT. (15.88 kg/m)

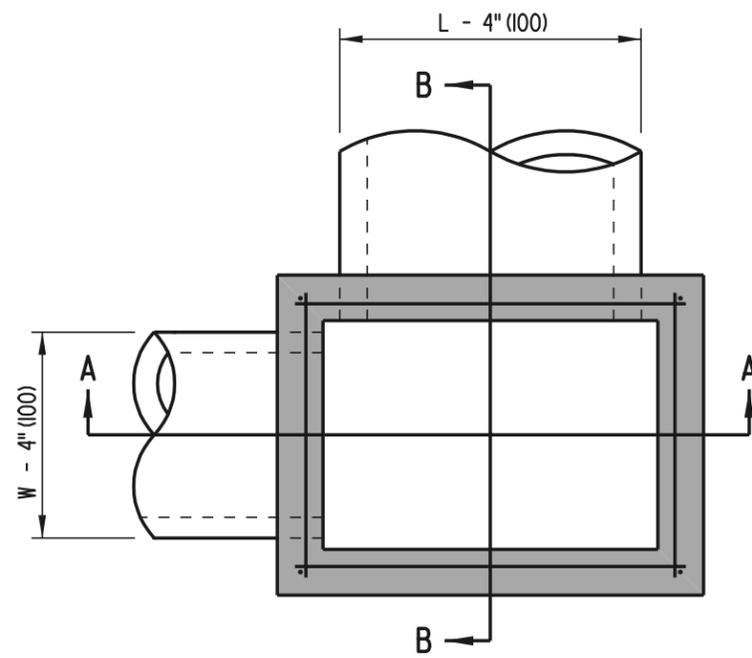


FRAME & GRATE ASSEMBLY DETAIL



- NOTES:**
- 1). PERSONNEL SAFETY GRATES (PSG) SHALL ONLY BE INSTALLED ON STORM WATER PIPE INLETS.
 - 2). THE GRATE SHALL BE MADE TO FIT THE OUTSIDE PERIMETER OF THE FLARED END SECTION (FES) ± 1/2" (13).
 - 3). ALL BOLT HOLES ARE TO BE DRILLED IN THE FIELD.
 - 4). A STIFFENER IS TO BE INSTALLED WHERE TWO OR MORE BARS ARE USED.
 - 5). BOTTOM BAR SHALL BE 6" (150) ABOVE INVERT OF FES.

 DELAWARE DEPARTMENT OF TRANSPORTATION	SAFETY GRATES			APPROVED <i>Carolyn Wick</i> <small>CHIEF ENGINEER</small>	12/15/05 <small>DATE</small>
	STANDARD NO. D-3 (2005)	SHT. 2	OF 2	RECOMMENDED <i>James M. O'Brien</i> <small>DESIGN ENGINEER</small>	11/29/05 <small>DATE</small>



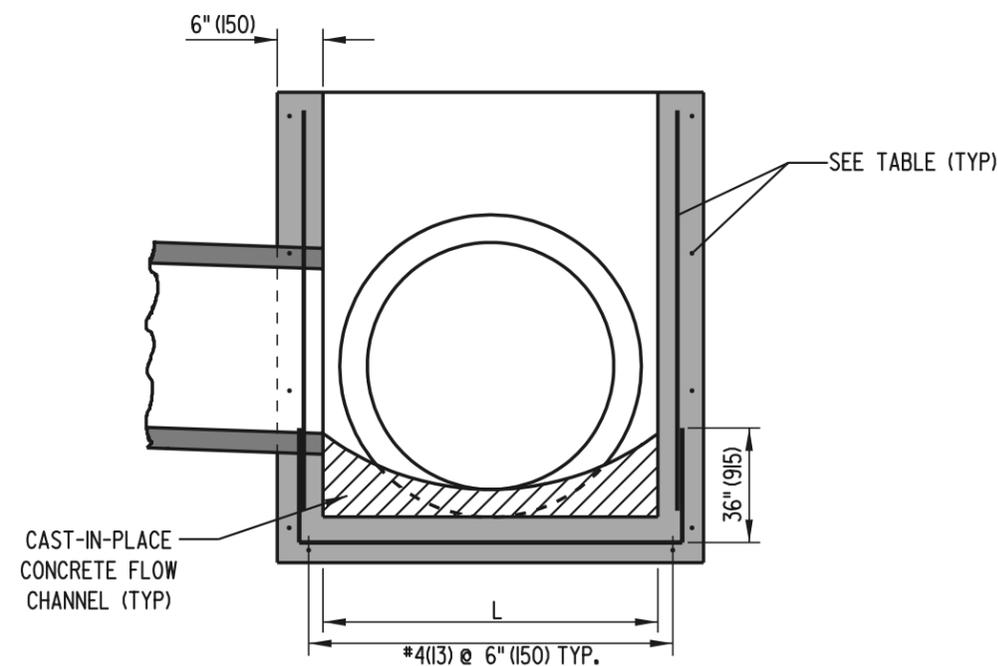
TOP VIEW

WALL REINFORCEMENT SCHEDULE		
INTERIOR WALL DIMENSION	AREA OF HORIZONTAL REINFORCEMENT PER FOOT (mm ²)	AREA OF VERTICAL REINFORCEMENT PER FOOT (mm ²)
	IN ² (mm ²)	IN ² (mm ²)
LESS THAN 4' (1220)	0.132 (85)	0.132 (85)
4' (1220) TO 4.5' (1370)	0.163 (105)	0.132 (85)
4.5' (1370) TO 5' (1525)	0.198 (128)	0.132 (85)
5' (1525) TO 5.5' (1675)	0.239 (154)	0.132 (85)
5.5' (1675) TO 6' (1830)	0.284 (183)	0.132 (85)

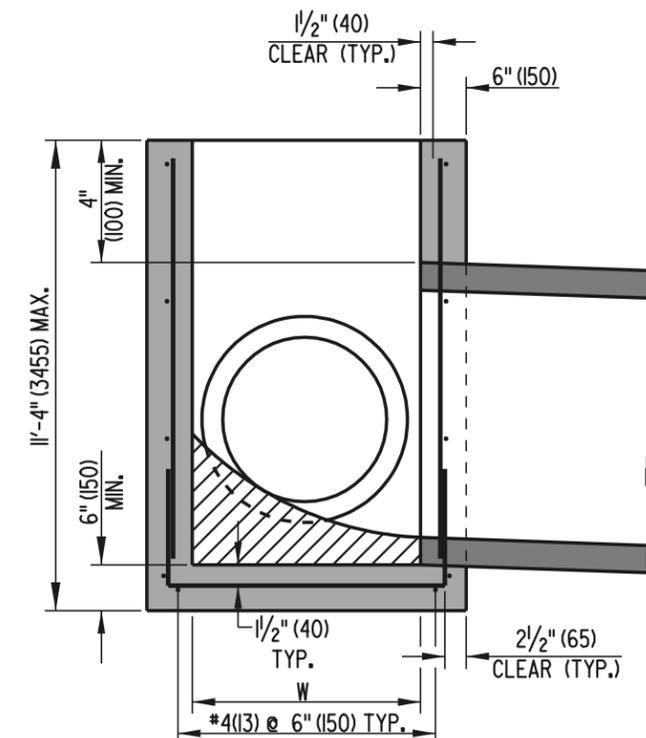
INLET BOX SCHEDULE			
L	W	L MAX	W MAX
34" (865)	18" (455)	34" (865)	18" (455)
34" (865)	24" (610)	34" (865)	24" (610)
48" (1220)	30" (760)	54" (1370)	36" (915)
48" (1220)	48" (1220)	54" (1370)	54" (1370)
66" (1675)	30" (760)	72" (1830)	36" (915)
66" (1675)	48" (1220)	72" (1830)	54" (1370)
66" (1675)	66" (1675)	72" (1830)	72" (1830)
72" (1830)	24" (610)	72" (1830)	30" (760)
72" (1830)	48" (1220)	72" (1830)	54" (1370)
72" (1830)	72" (1830)	72" (1830)	72" (1830)

NOTES:

1. INLET BOXES SHALL BE PRE-CAST OR CAST-IN-PLACE.
2. OUTSIDE OF PIPE MUST FIT INTO THE INTERIOR OF THE BOX.
3. STEPS ARE TO BE INSTALLED IN BACK WALL AS PER SPECIFICATIONS.
4. NO PIPES WITH AN OUTSIDE DIAMETER LARGER THAN 11" (275) WILL BE PERMITTED TO ENTER THE BACK WALL OF A DRAINAGE INLET OR MANHOLE TO ACCOMMODATE STEPS IF REQUIRED. A LARGER BOX MAY BE USED IN ORDER TO FIT THE STEPS AND A LARGER PIPE IN THE BACK WALL, IF NECESSARY.



SECTION A-A



SECTION B-B

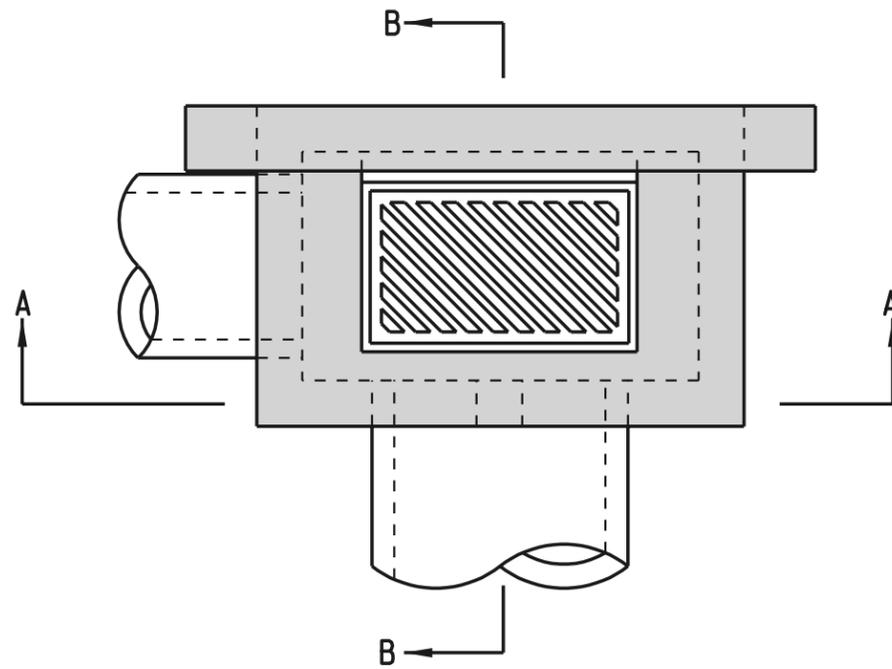


DELAWARE
DEPARTMENT OF TRANSPORTATION

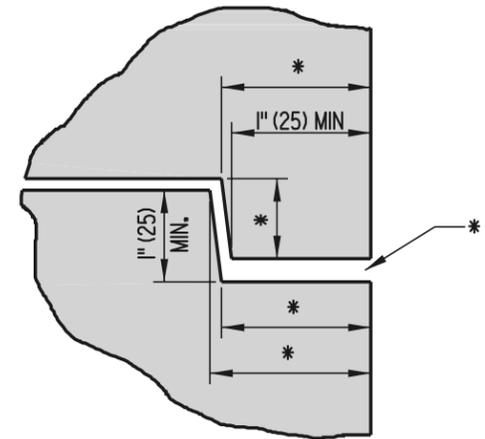
INLET BOX DETAILS

STANDARD NO. D-4 (2002) SHT. 1 OF 1

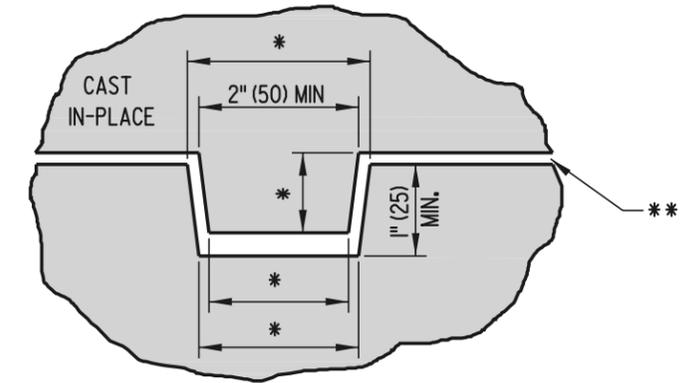
APPROVED *Caution Wicks* 9/6/02
CHIEF ENGINEER DATE
RECOMMENDED *Therese Delgado* 8/19/02
DESIGN ENGINEER DATE



PLAN

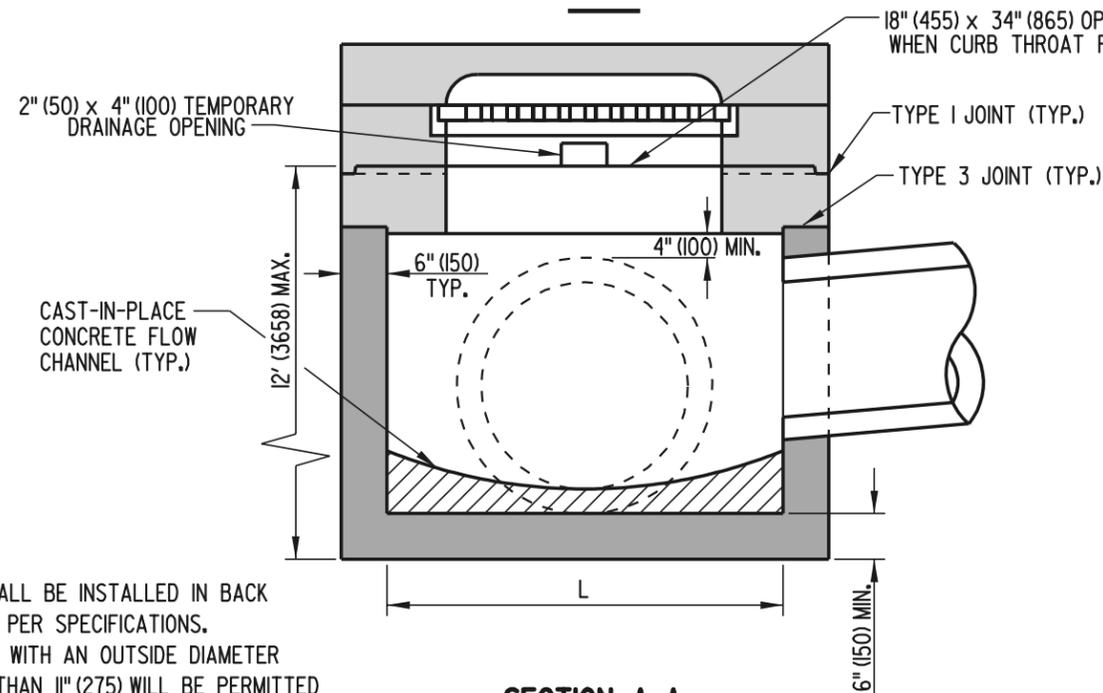


TYPE 1 JOINT DETAIL



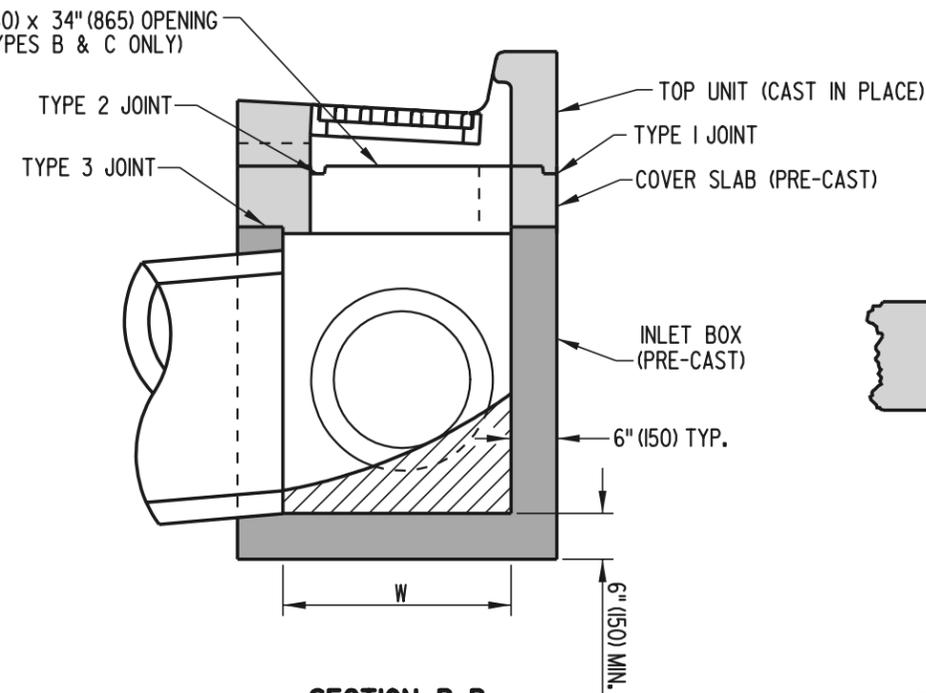
TYPE 2 JOINT DETAIL

* DIMENSIONS WILL VARY
 ** JOINT SEALANT AS PER SPECIFICATIONS

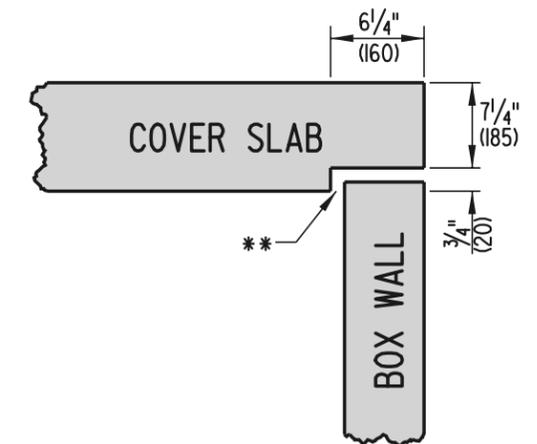


SECTION A-A

DRAINAGE INLET ASSEMBLY



SECTION B-B



TYPE 3 JOINT DETAIL

- NOTES:**
- 1.) STEPS SHALL BE INSTALLED IN BACK WALL AS PER SPECIFICATIONS.
 - 2.) NO PIPES WITH AN OUTSIDE DIAMETER LARGER THAN 11" (275) WILL BE PERMITTED TO ENTER THE BACK WALL OF A DRAINAGE INLET, IF IT IMPEDES THE INSTALLATION OF STEPS IN THE BACK WALL.
 - 3.) IF NECESSARY, A LARGER BOX MAY BE USED IN ORDER TO FIT THE STEPS AND A LARGER PIPE IN THE BACK WALL.

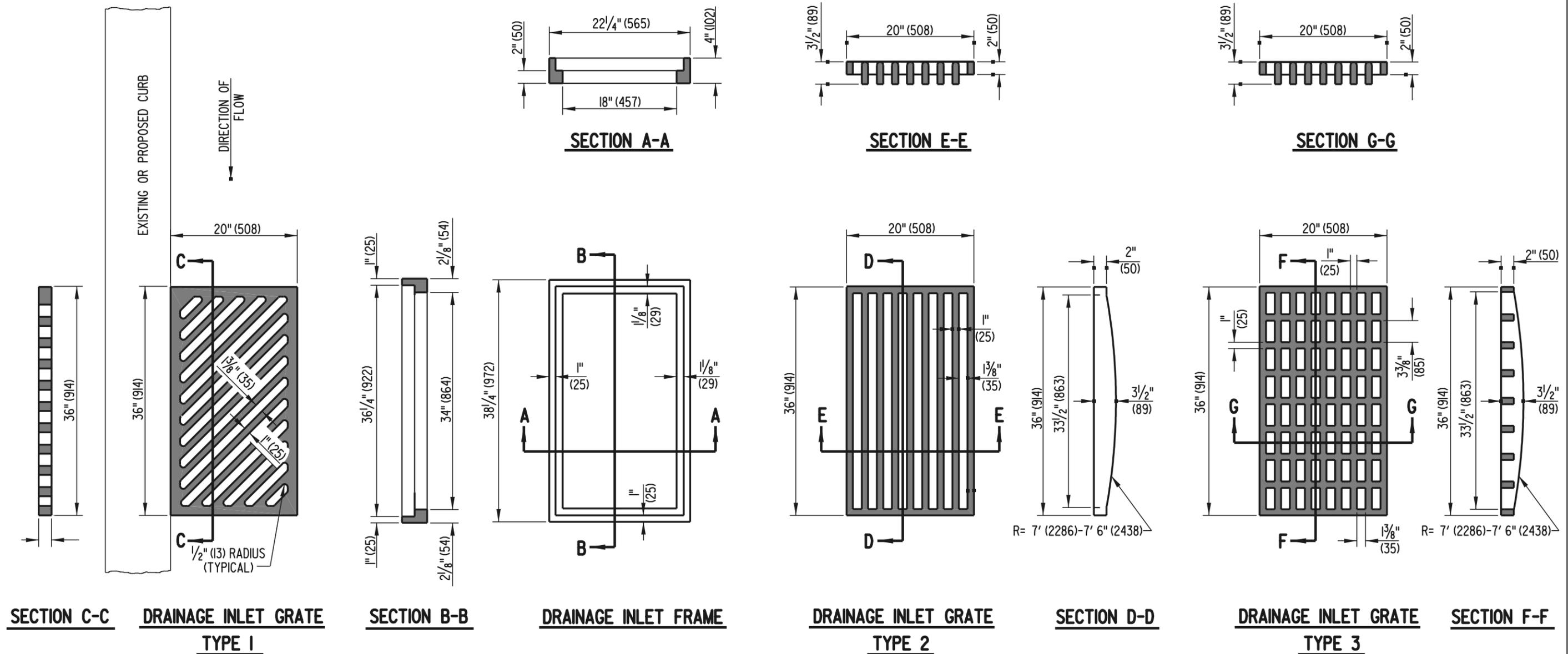


**DELAWARE
 DEPARTMENT OF TRANSPORTATION**

DRAINAGE INLET DETAILS

STANDARD NO. **D-5 (2002)** SHT. **1** OF **8**

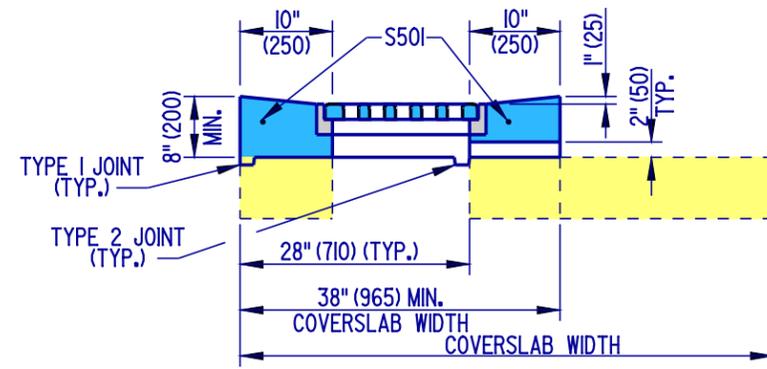
APPROVED *Caution Wicks* 9/6/02
CHIEF ENGINEER DATE
 RECOMMENDED *Therese Delpho* 8/19/02
DESIGN ENGINEER DATE



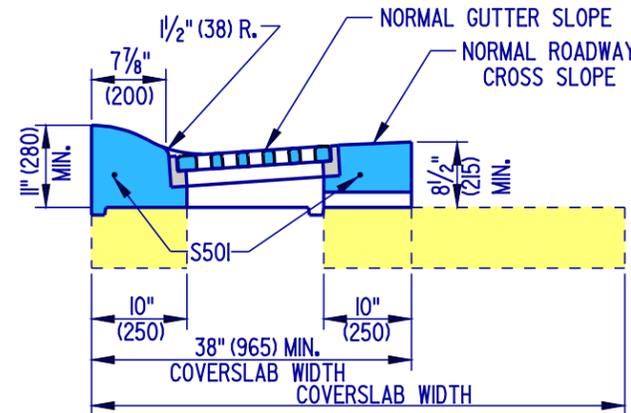
DRAINAGE INLET FRAME AND GRATES

- NOTE: 1. BOTTOM OF TYPE 1 GRATE TO BE FLAT AND TRUE.
 2. TYPE 2 GRATE SHALL NOT BE INSTALLED WHERE BICYCLE TRAFFIC MAY BE PRESENT.

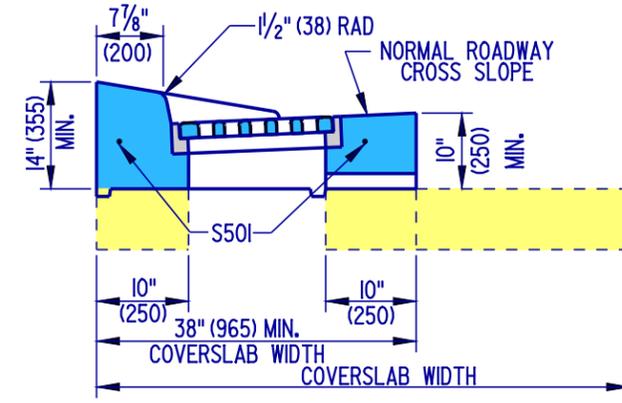
 DELAWARE DEPARTMENT OF TRANSPORTATION	DRAINAGE INLET DETAILS			APPROVED <i>Caution Wicks</i> 9/6/02 <small>CHIEF ENGINEER DATE</small>
	STANDARD NO. D-5 (2002)	SHT. 2	OF 8	RECOMMENDED <i>Therese Delgado</i> 8/19/02 <small>DESIGN ENGINEER DATE</small>



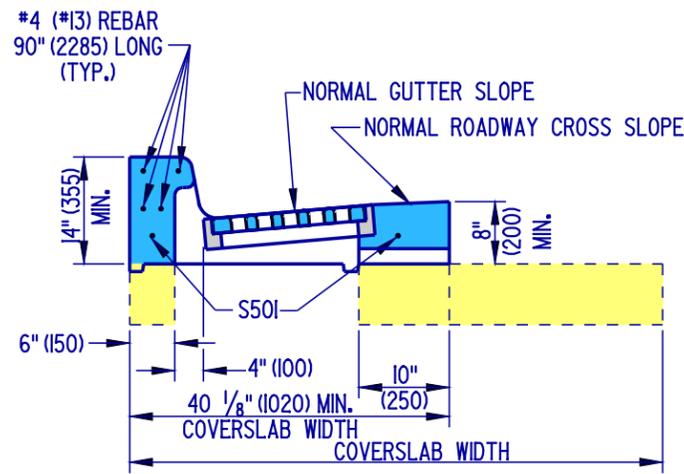
TYPE A



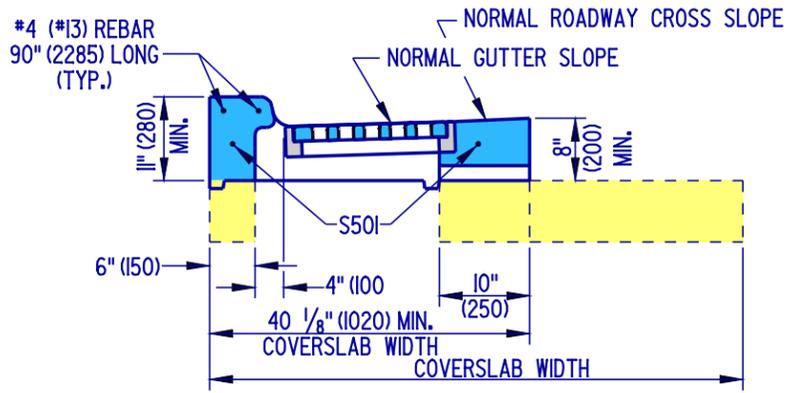
TYPE D



TYPE E

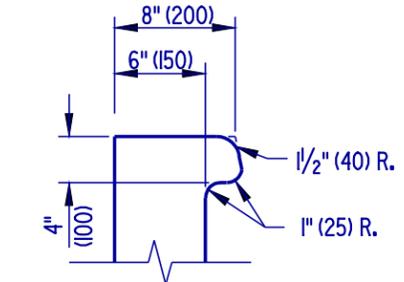


TYPE B

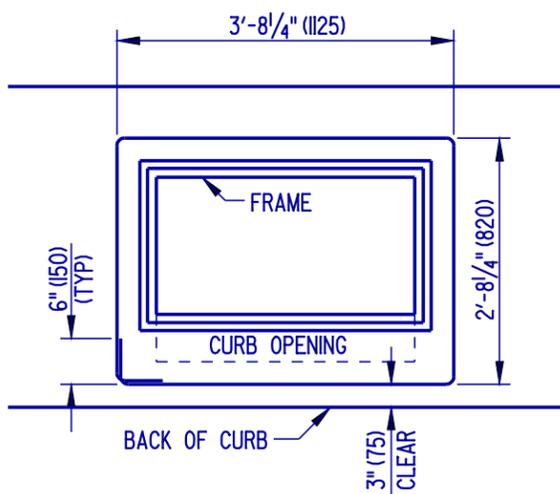


TYPE C

INLET TOP UNIT APPLICATIONS	
TOP UNIT	CURB
TYPE A	USE IN DRAINAGE SWALE
TYPE B	INTEGRAL PCC CURB & GUTTER, TYPE 1 & 3, PCC CURB TYPE 1
TYPE C	INTEGRAL PCC CURB & GUTTER, TYPE 4, PCC CURB TYPE 3
TYPE D	INTEGRAL PCC CURB & GUTTER, TYPE 2
TYPE E	PCC CURB TYPE 2



CURB OPENING DETAIL

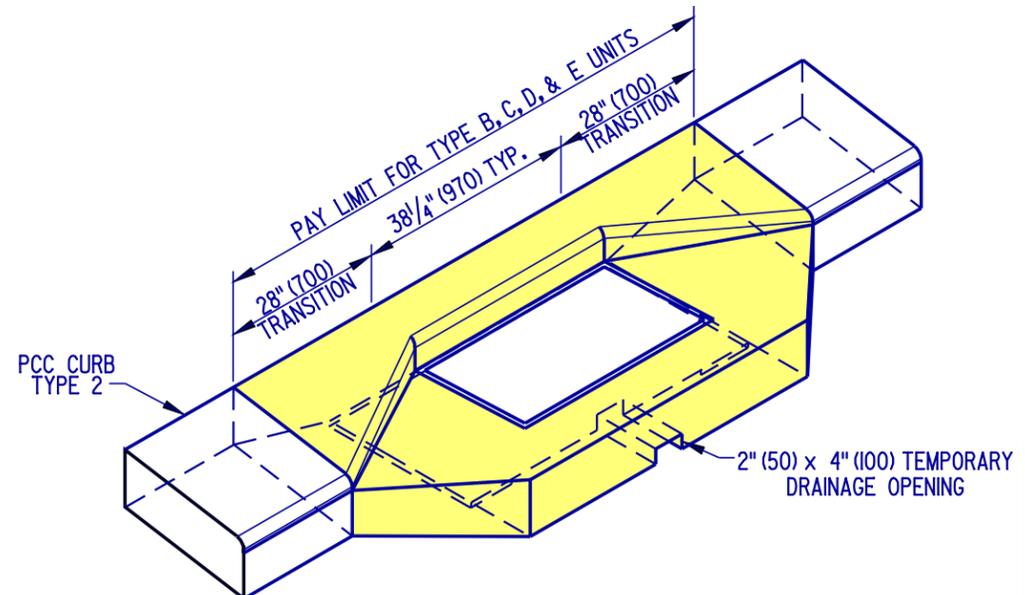


S501 BENDING DIAGRAM

S501 IS NOT REQUIRED TO BE ONE CONTINUOUS BAR. IF MORE THAN ONE BAR IS USED, THERE MUST BE A 12" (300) OVERLAP BETWEEN BARS.

DRAINAGE INLET TOP UNITS

NOTE: TOP UNIT IS TO BE CAST-IN-PLACE TO GRADE AS SPECIFIED ON PLAN SHEETS OR AS DIRECTED BY ENGINEER.



ISOMETRIC VIEW

TYPE E UNIT SHOWN



DELAWARE DEPARTMENT OF TRANSPORTATION

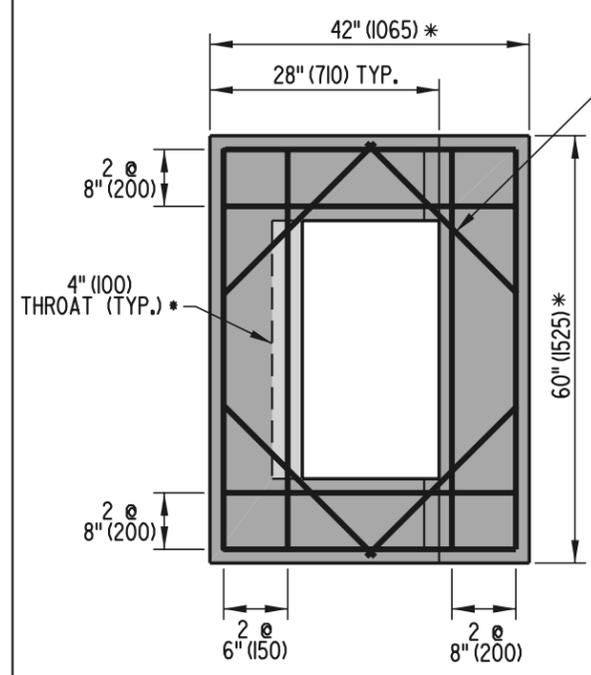
DRAINAGE INLET DETAILS
 STANDARD NO. **D-5 (2004)** SHT. **3** OF **8**

APPROVED *Carolann Wicks* 1/10/05
 CHIEF ENGINEER DATE
 RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
 DESIGN ENGINEER DATE

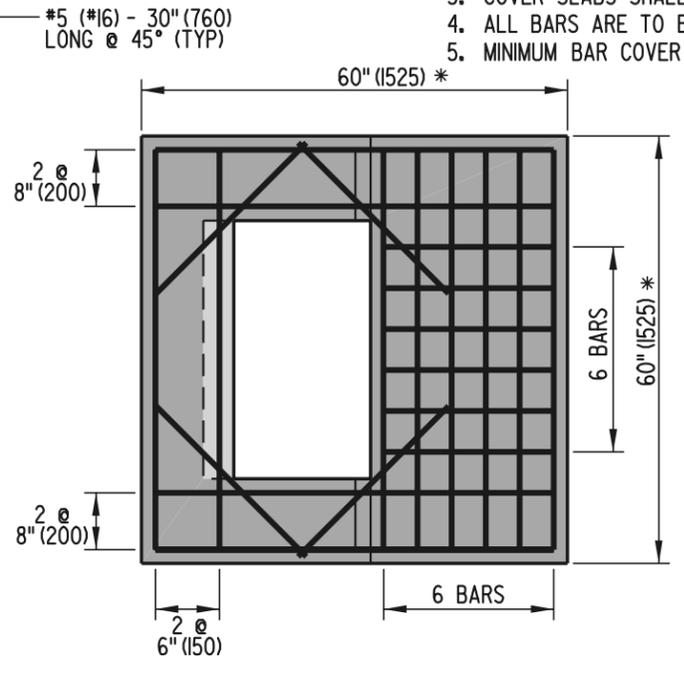
SCALE : N.T.S.

- NOTE :**
- 4" (100) THROAT IS FOR TYPES B AND C TOP UNITS ONLY.
 - RELOCATE ENCROACHING REINFORCING BARS WHEN USING TYPES B & C TOP UNITS.
 - COVER SLABS SHALL BE PRE-CAST AND MUST BE SIZED TO FIT INLET BOX DIMENSIONS.
 - ALL BARS ARE TO BE #5 (#16) SPACED @ 6" (150) ± UNLESS NOTED OTHERWISE.
 - MINIMUM BAR COVER = 1 1/2" (38).

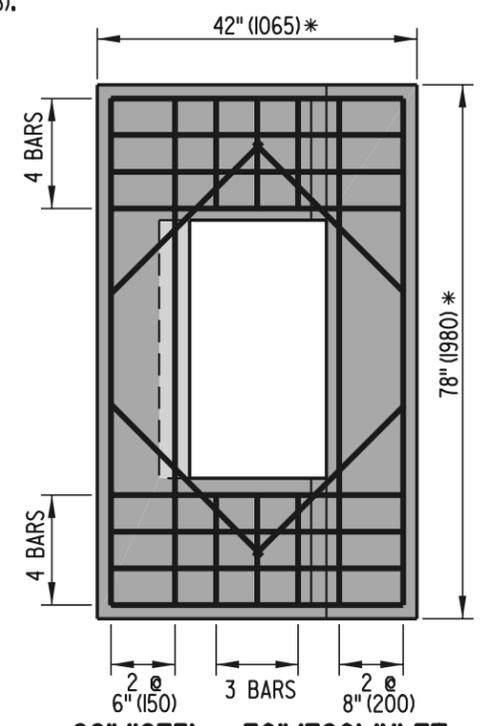
* - DIMENSIONS TO MATCH OUTSIDE TO OUTSIDE DIMENSIONS OF BOX



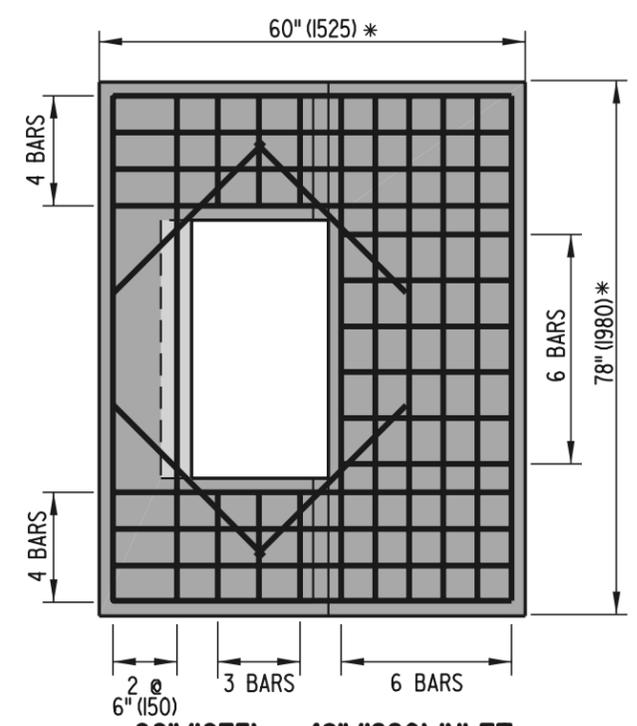
48" (1220) x 30" (760) INLET



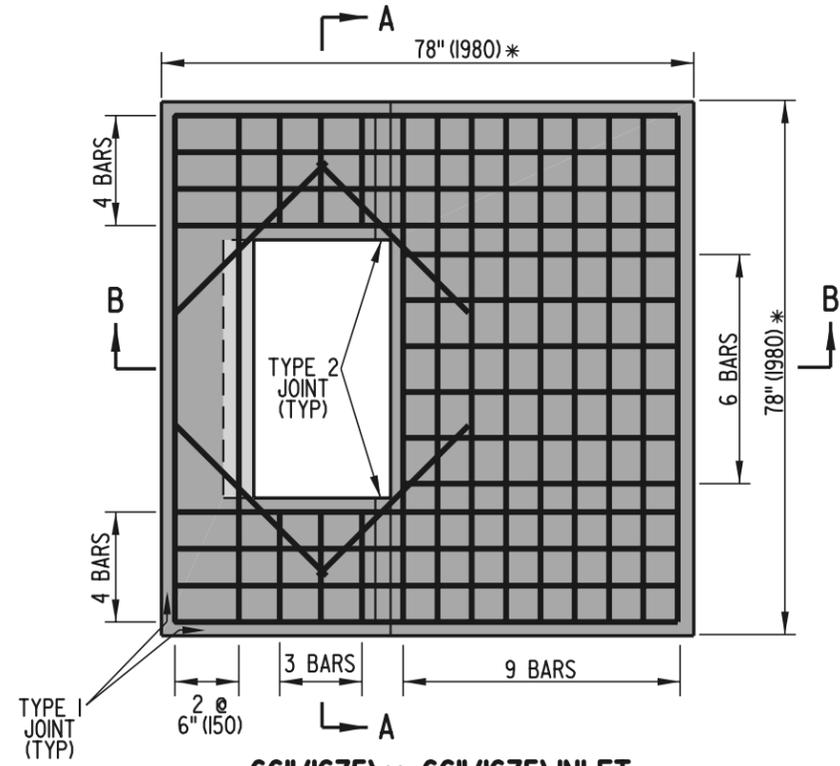
48" (1220) x 48" (1220) INLET



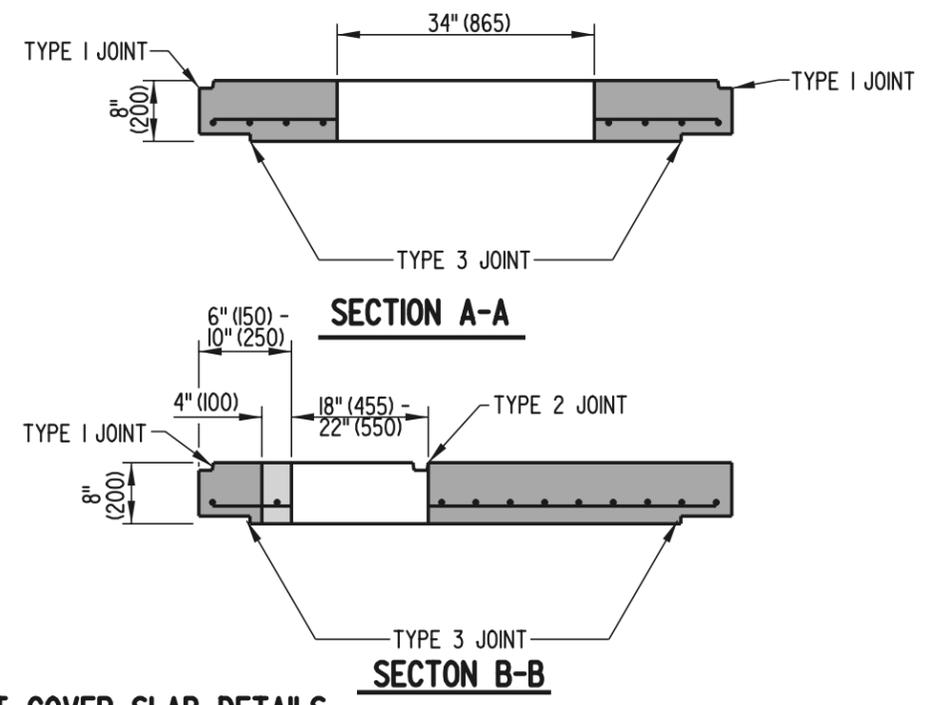
66" (1675) x 30" (760) INLET



66" (1675) x 48" (1220) INLET



66" (1675) x 66" (1675) INLET



DRAINAGE INLET COVER SLAB DETAILS

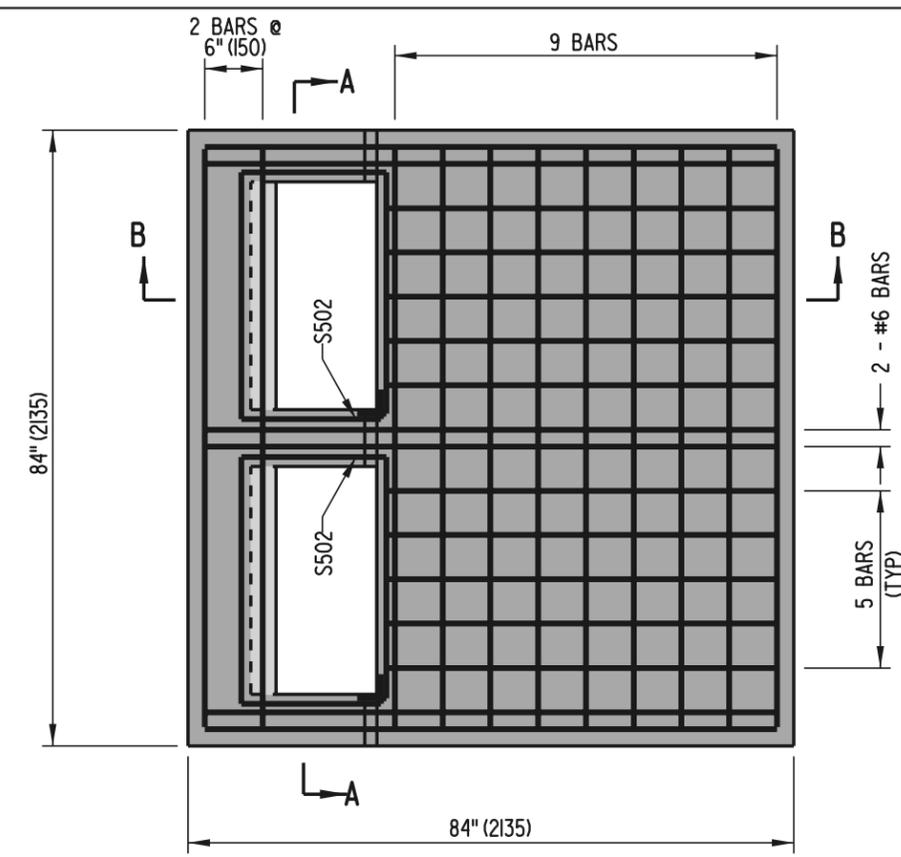
DELAWARE
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET DETAILS			
STANDARD NO.	D-5 (2002)	SHT.	4 OF 8

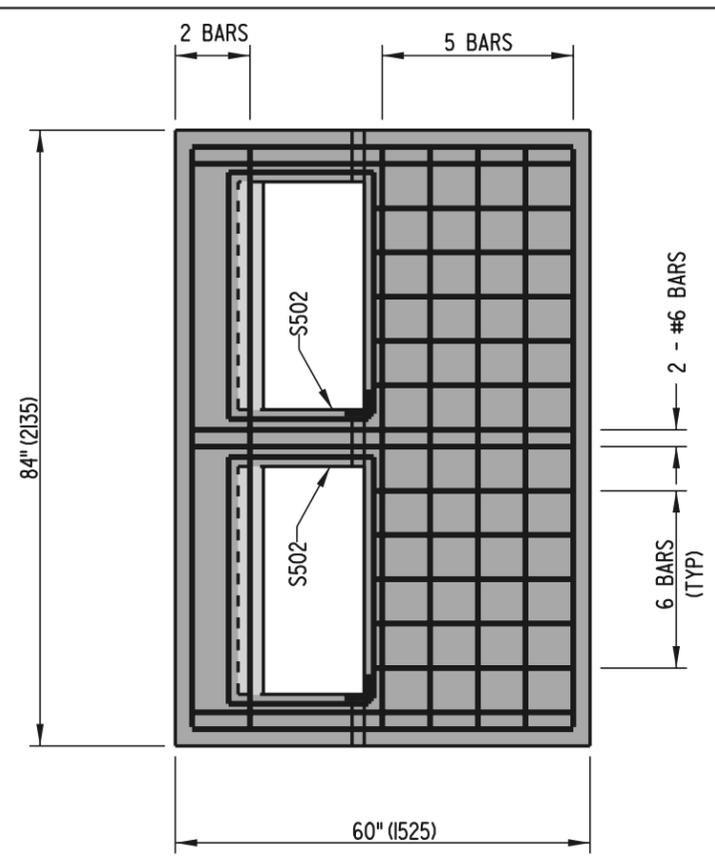
APPROVED *Caution Wicks* 9/6/02
CHIEF ENGINEER DATE

RECOMMENDED *Thurston Phelps* 8/19/02
DESIGN ENGINEER DATE

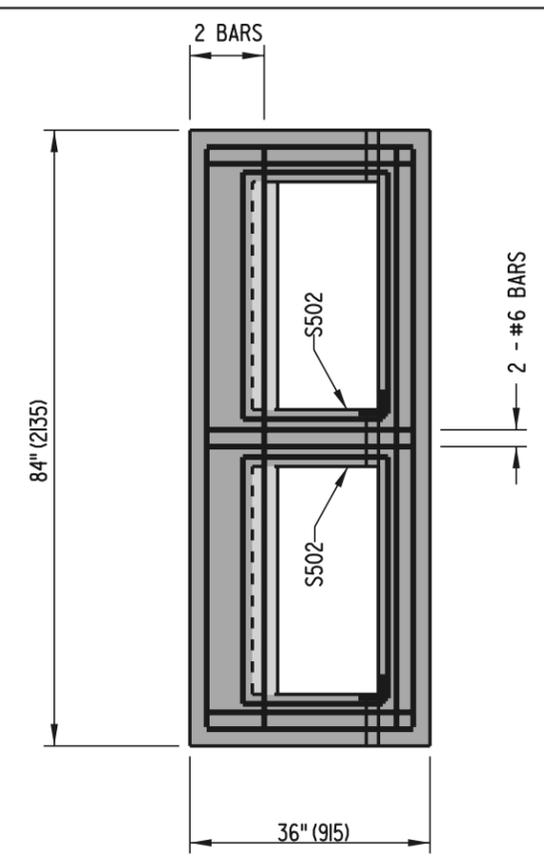
SCALE : N.T.S.



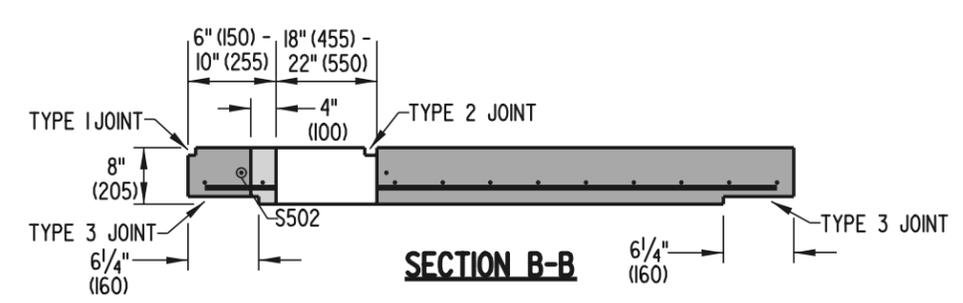
72" (1830) x 72" (1830) INLET



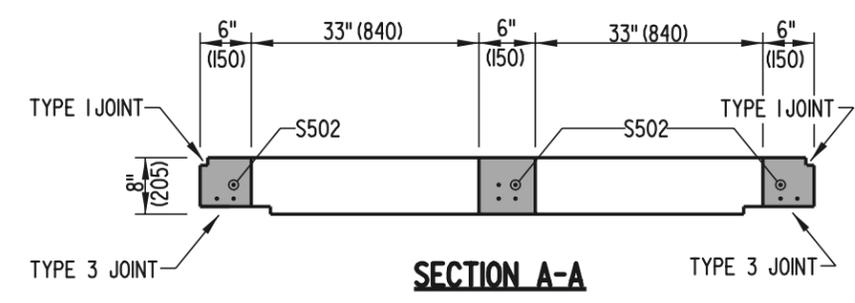
72" (1830) x 48" (1220) INLET



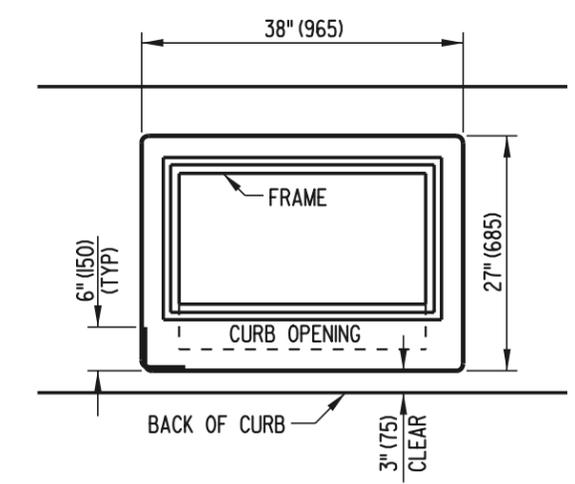
72" (1830) x 24" (610) INLET



SECTION B-B



SECTION A-A



S502 BENDING DIAGRAM

S502 IS NOT REQUIRED TO BE ONE CONTINUOUS BAR. IF MORE THAN ONE BAR IS USED, THERE MUST BE A 12" (300) OVERLAP BETWEEN BARS.

- NOTE :**
- 4" (100) THROAT IS FOR TYPES B AND C TOP UNITS ONLY.
 - RELOCATE ENCRANCHING REINFORCING BARS WHEN USING TYPES B & C TOP UNITS.
 - COVER SLABS ARE TO BE PRE-CAST AND MUST BE SIZED TO FIT INLET BOX DIMENSIONS.
 - ALL BARS ARE TO BE #5 (#16) SPACED @ 6" (150) ± UNLESS NOTED OTHERWISE.
 - MINIMUM BAR COVER = 1/2" (38).



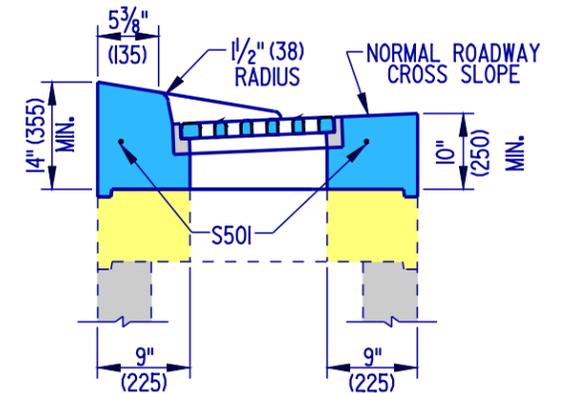
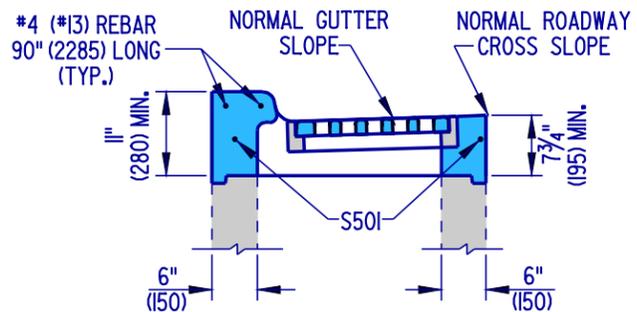
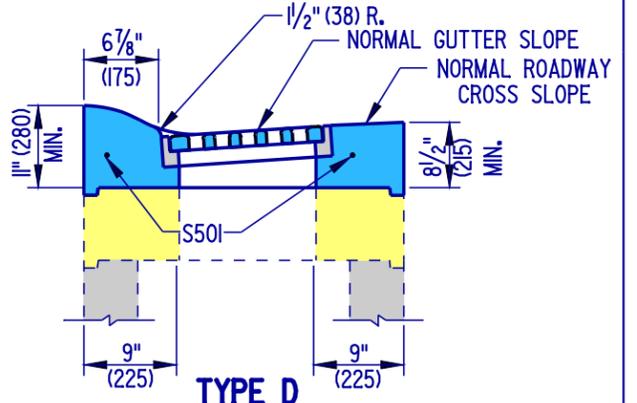
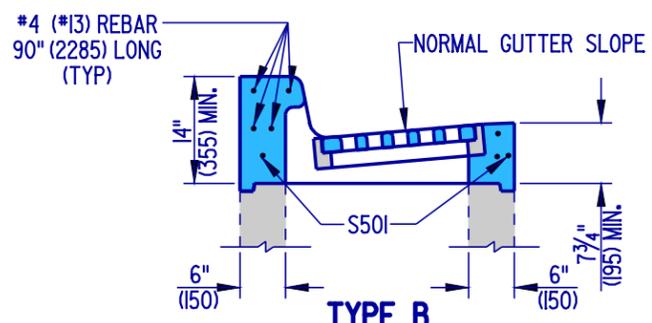
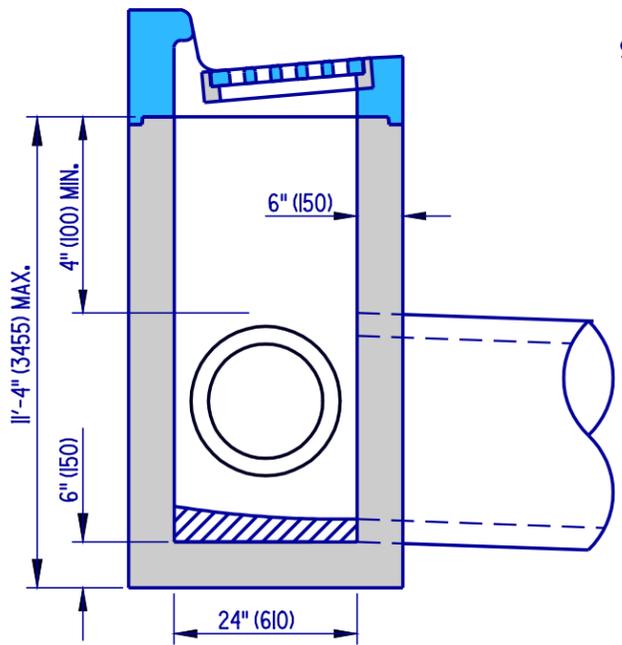
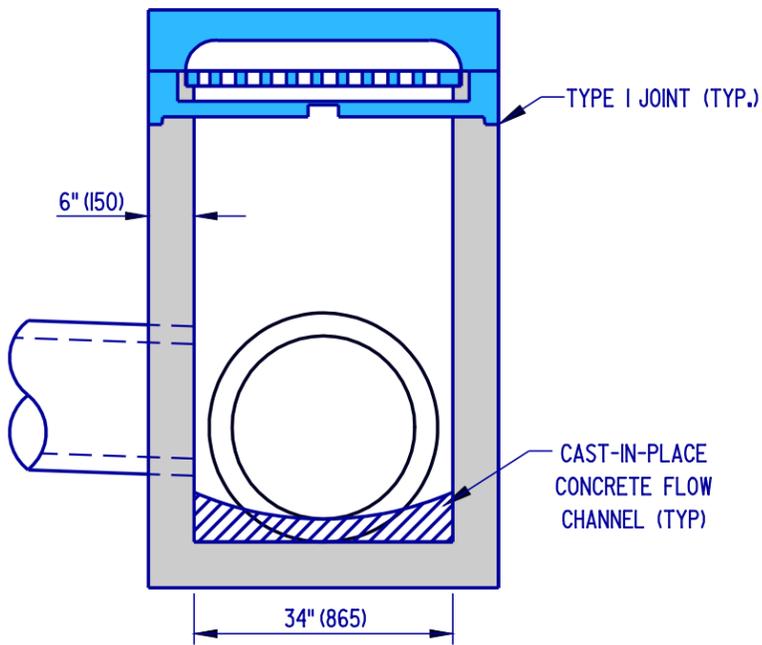
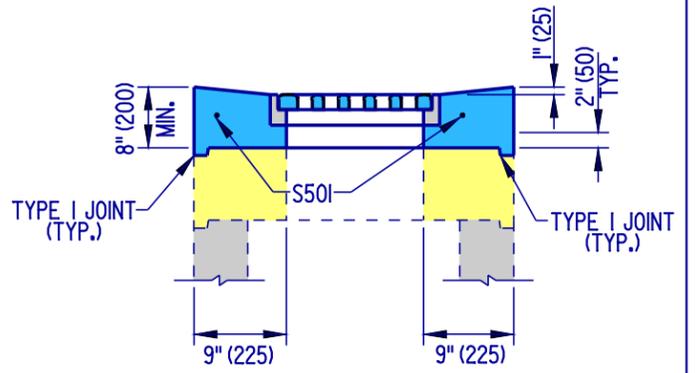
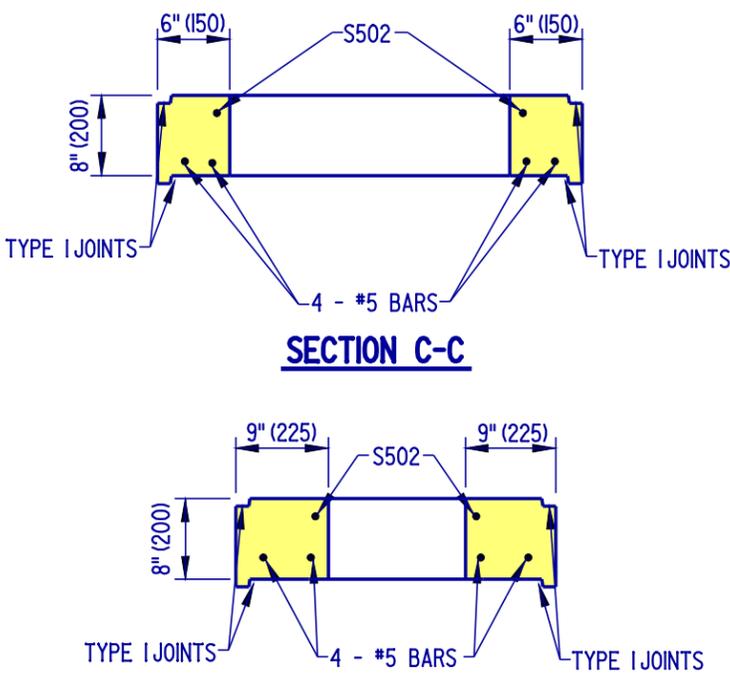
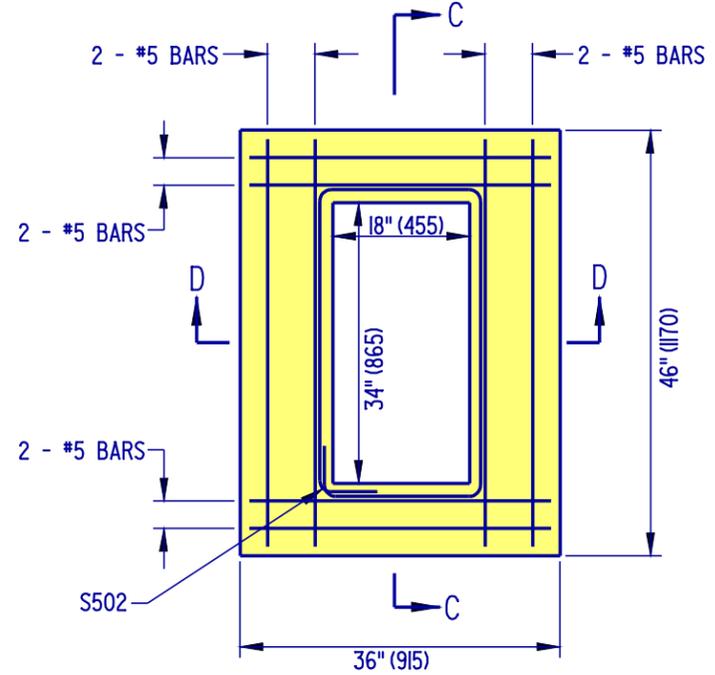
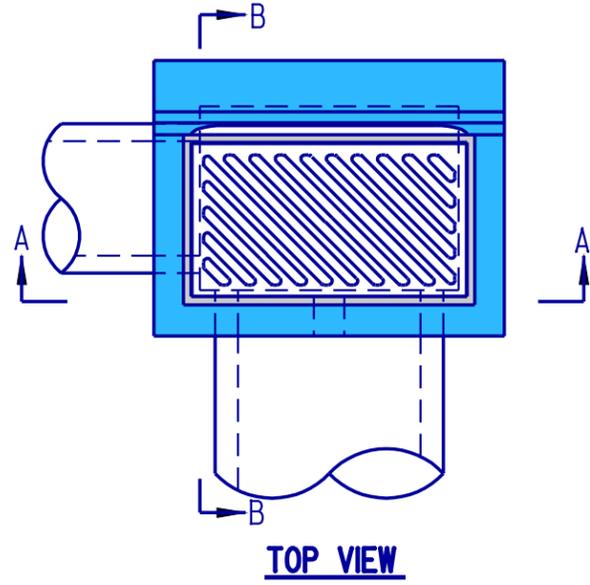
**DELAWARE
DEPARTMENT OF TRANSPORTATION**

DOUBLE INLET COVER SLAB DETAILS

STANDARD NO. **D-5 (2002)** SHT. **5** OF **8**

APPROVED *Caroleen Wicks* 9/6/02
CHIEF ENGINEER DATE
 RECOMMENDED *Theresa Delgado* 8/19/02
DESIGN ENGINEER DATE

SCALE : N.T.S.



34" (865) x 24" (610) DRAINAGE INLET DETAILS
NOTE: REFER TO PREVIOUS SHEETS FOR REINFORCING REQUIREMENTS

TOP UNIT DETAILS



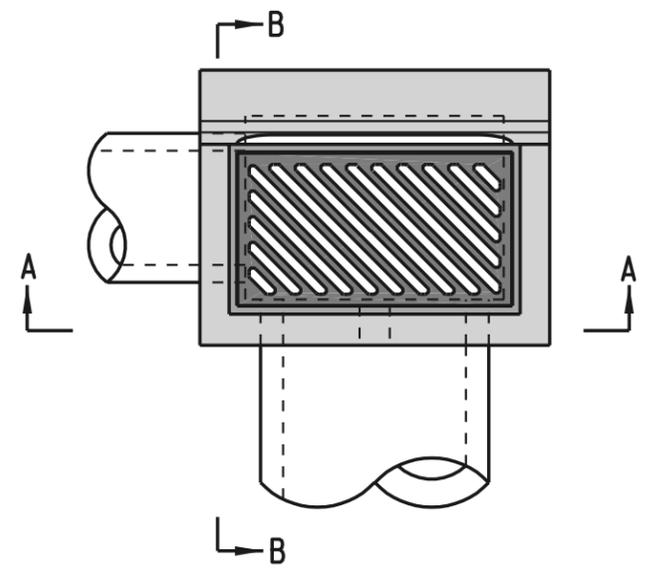
DELAWARE
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET DETAILS

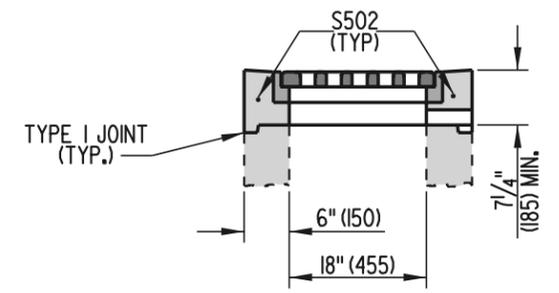
STANDARD NO. **D-5 (2004)** SHT. **6** OF **8**

APPROVED *Carolann Wicks* 1/10/05
CHIEF ENGINEER DATE

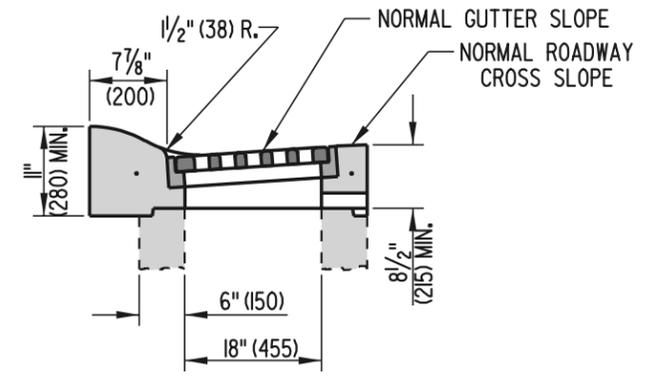
RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE



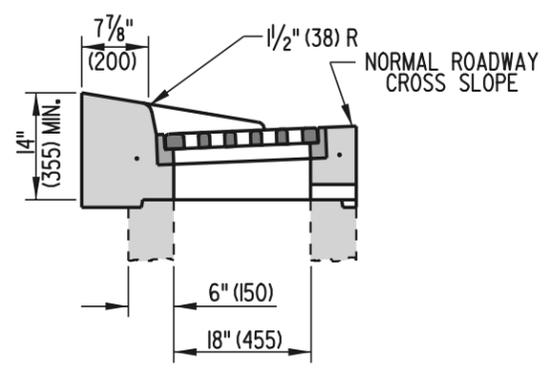
TOP VIEW



TYPE A

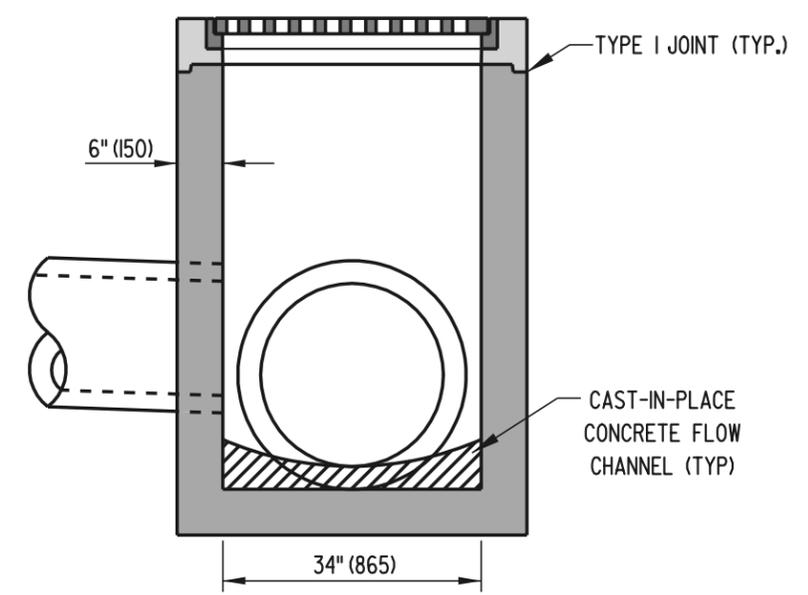


TYPE D

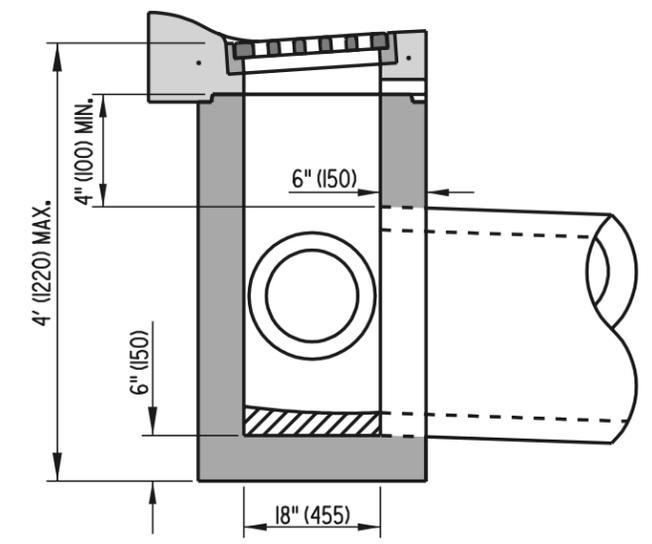


TYPE E

TOP UNIT DETAILS



SECTION A-A

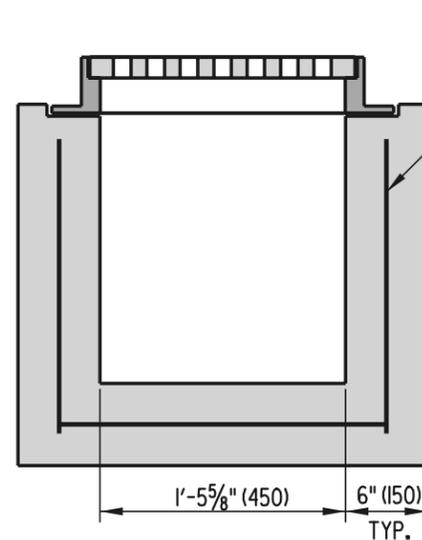
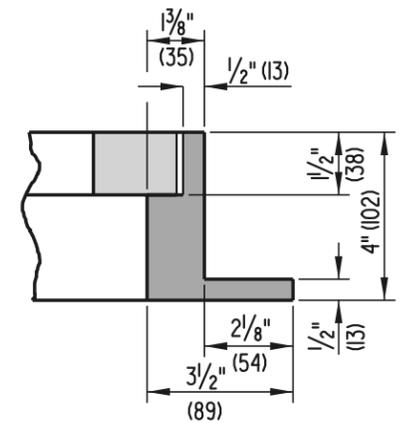
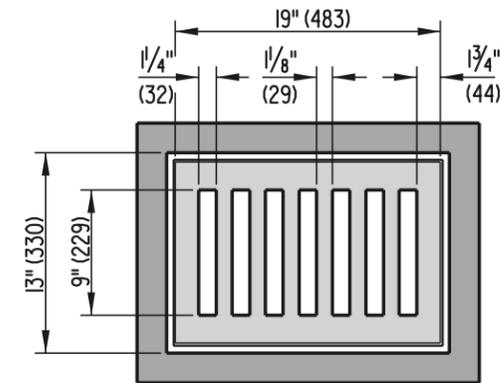
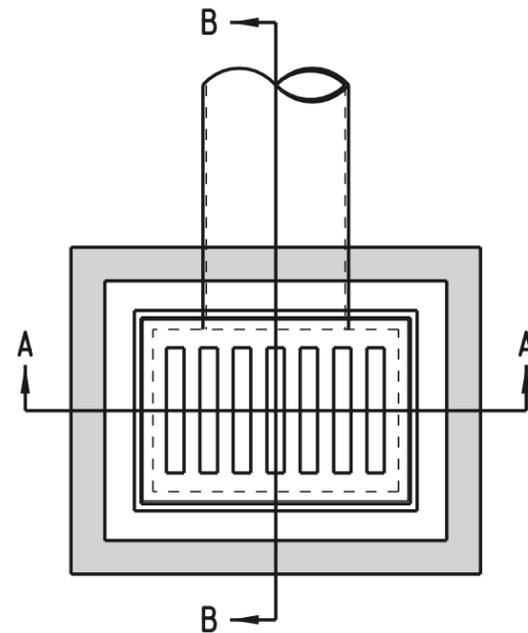


SECTION B-B

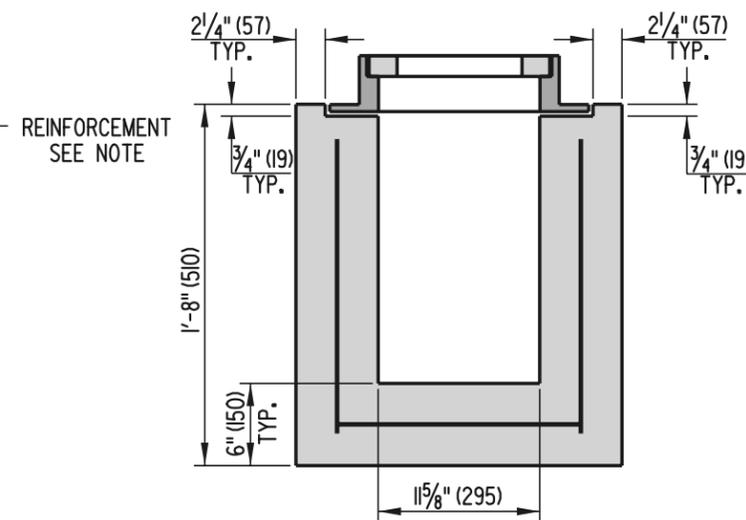
34" (865) x 18" (455) DRAINAGE INLET DETAILS

- NOTES:
 1.) REFER TO PREVIOUS SHEETS FOR REINFORCEMENT REQUIREMENTS
 2.) THE HEIGHT OF THIS INLET IS LIMITED TO 4' (1220) MAXIMUM, THEREFORE STEPS WILL NOT BE REQUIRED AND SHOULD NOT BE INSTALLED ON THIS INLET.

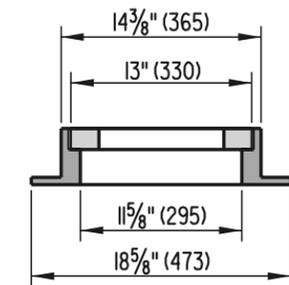
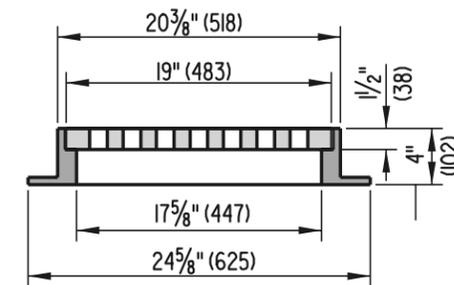
- NOTE:** 1. REINFORCEMENT SHALL BE 4" (102) X 4" (102) W4 X W4 (W26 X W26)
 2. INLET BOXES ARE TO BE PRE-CAST OR CAST-IN-PLACE.



SECTION A-A



SECTION B-B



DELAWARE
DEPARTMENT OF TRANSPORTATION

LAWN INLET

STANDARD NO.

D-5 (2002)

SHT. 8

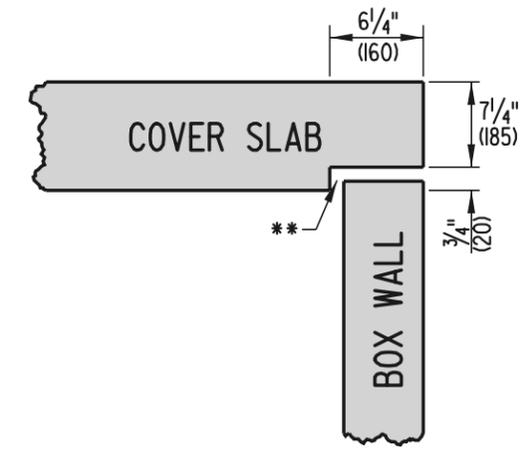
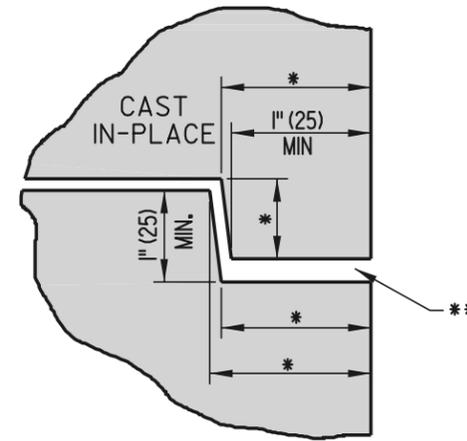
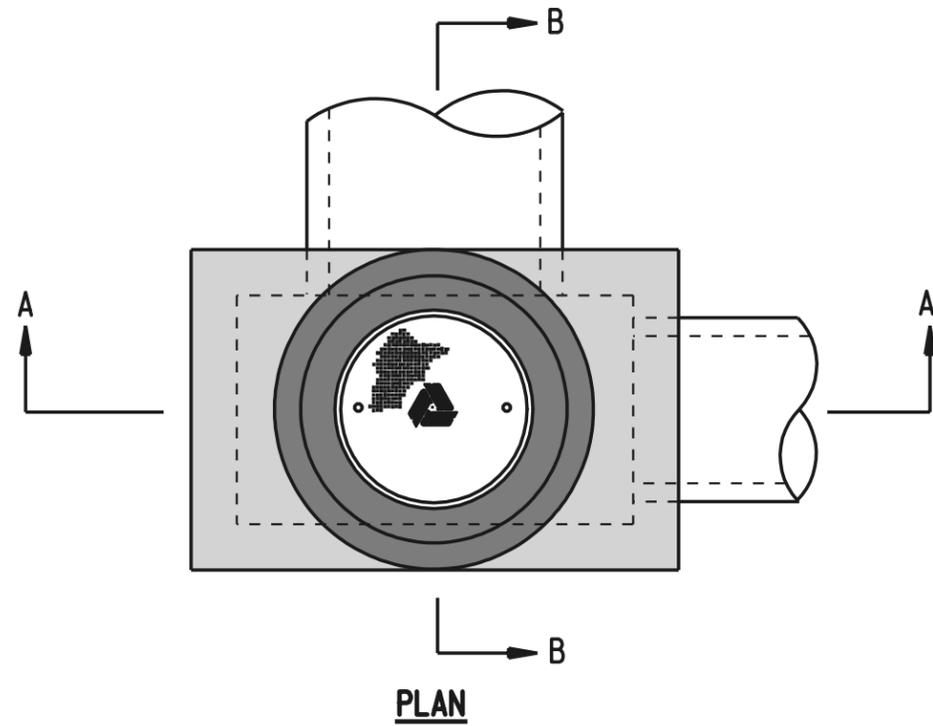
OF 8

APPROVED

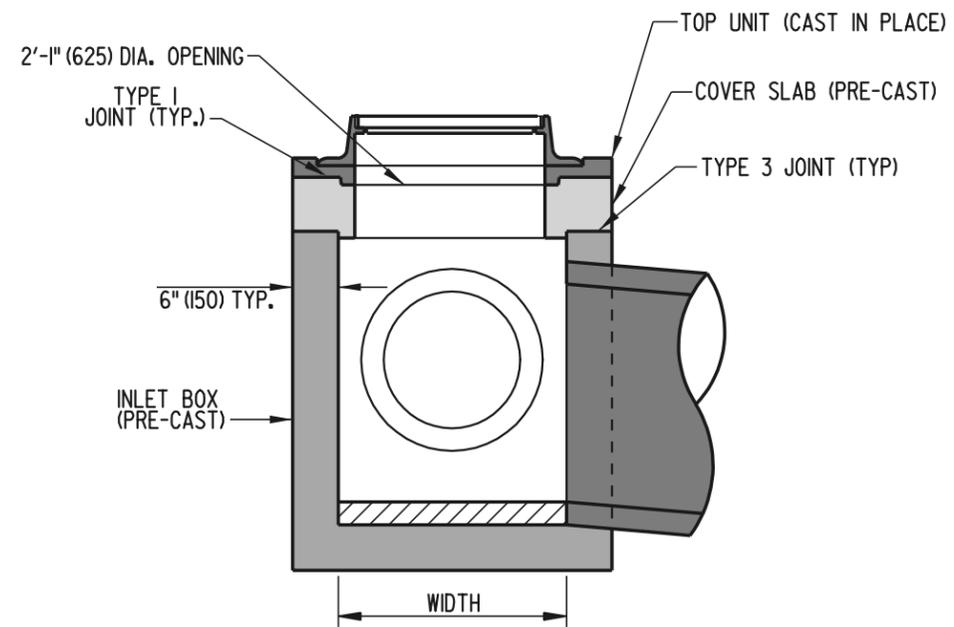
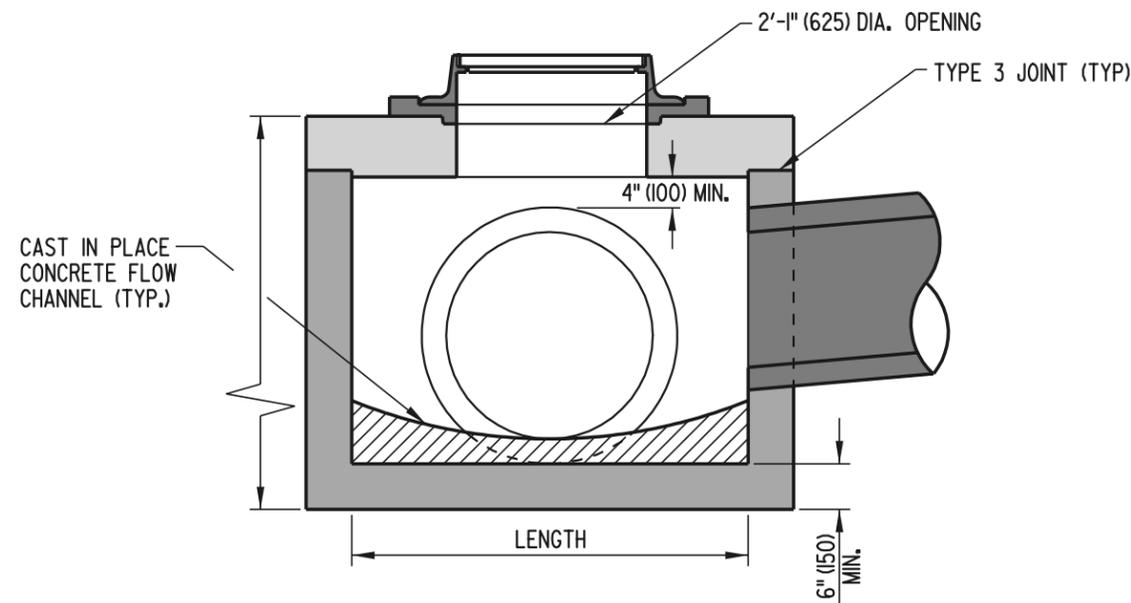
Caution Wicks 9/6/02
CHIEF ENGINEER DATE

RECOMMENDED

Therese Delgado 8/19/02
DESIGN ENGINEER DATE



* DIMENSIONS WILL VARY
 ** JOINT SEALANT



BOX MANHOLE ASSEMBLY



**DELAWARE
 DEPARTMENT OF TRANSPORTATION**

MANHOLE DETAILS

STANDARD NO. **D-6 (2001)** SHT. **1** OF **4**

APPROVED *Ryan M. Harshbarger* **6/18/01**
CHIEF ENGINEER DATE
 RECOMMENDED *Michael R. [Signature]* **6/18/01**
DESIGN ENGINEER DATE